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RESEARCH FESTIVAL

SULONG SALIKSIK

A Compilation of Research Articles

Empowering Futures

Hope and Responsible Innovation in the Age of Artificial Intelligence



FEBRUARY 2025

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The Feasibility of Rice Straw as an Alternative Algaecide for Barley Straw

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Abstract: This study examines the effectiveness of the Using Rice Straw (Oryza sativa) as an Alternative Algaecide for Barley Straw. The reason why the researchers conducted this research is to sustainability with growing concerns over the environmental impact of chemical algaecides, researchers aim to find more eco-friendly and natural alternatives. Rice straw, being a byproduct of rice farming, presents a sustainable, low-cost option for algae control without introducing harmful chemicals into aquatic ecosystems. Researchers aim to assess whether rice straw can offer similar or better results in algae control, providing an alternative that might be more accessible for certain regions or applications. Understanding Natural Algaecides Research into natural algaecides, like rice straw helps deepen our understanding of the chemical and biological processes involved in algae suppression, allowing for more targeted and effective algae management strategies in both small and large water bodies. Environmental Impact Chemical algaecides often have unintended side effects on water quality and aquatic life. By investigating natural options like rice straw, researchers aim to find solutions that are safer for the environment and non-target organisms, promoting healthier ecosystems.

The results of the experiments and surveys revealed that using rice straw (Oryza sativa) as an alternative to barley straw for algae control shows promising results. Both types of straw release phenolic compounds during decomposition, which inhibit algae growth. Rice straw has been found to be as effective as barley straw in suppressing algae, with some studies suggesting it might even be more effective in certain conditions. Rice straw is a sustainable and cost-effective option, especially in regions where rice is abundant, and it helps reduce agricultural waste. However, further research is needed to optimize application methods and understand the best conditions for its use.

Key Words: Algae Control; Algaecide Effectiveness; Natural Algae Management; Water Quality Management

1. INTRODUCTION

1.1. Background of the Study

Algae plays a big role in focusing the attention of the ecosystem, however, some species and especially the so-called cyanobacteria can be very dangerous for the environment as well as for human health. The so-called cyanobacteria generate toxins that can threaten humans as well as animals, compromise water commercials and aquatic fauna feathers suffering (Carmichael, 2012). The unrestrained multiplication of algal spores in the lakes and reservoirs is dangerous because in such conditions the water gets foul, the oxygen is ruined, the balance of the ecosystem is disturbed, and other harmful compounds are produced (Ebrahimzadeh, 2021).

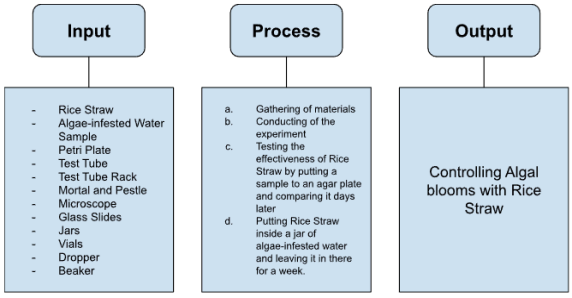
Parasitic algal blooms are traditionally controlled using chemical algaecides, whose effectiveness can be countered by the subsequent environmental pollution. Natural methods of controlling algal blooms exist, most notably using barley straw, but its effectiveness is limited by

very high prices and inconsistent supply. More recent studies indicate that rice straw, which contains water soluble allelochemicals, could be a potential substitute (Li et al, 2019).

The focus of the study is the comparison of the efficiency of rice straw, which contains allelochemicals, and barley straw, regarding algal inhibition. This study attempts to determine the practicality and feasibility of rice straw as an algaecide towards controlling eutrophication and algal blooms in the monitored water bodies.

2. METHODOLOGY

2.1 Conceptual Framework



2.2 Material List

Materials:

1. Rice Straw (g)
2. Algae-Infested Water (mL)
3. Jars
4. Electric scale
5. Bromothymol Blue

2.3 Experimental Procedure

Phase 1: Collection and preparation of the materials

This phase involves the preparation of the materials used for this research. The algae-infested water (mL) shall be found in places where algae can be found, in ponds. The algae should be stored in a clear jar and must be in a hot place for it to grow. The one sack of rice straw used is obtained from a farm in Bulacan. Rice straw is harvested and must be placed where it shouldn't get wet.

Phase 2: Measuring the materials

In this phase, the materials collected are getting measured in order to conduct this experiment. First, they measured the pH level of the algae-infested water with Bromothymol Blue in order to see if the algae was toxic. They measured the grams of the rice straw and the volume of the water.

Phase 3: Preparing the materials

Once measured, the materials were put into sections where they belong. The water with algae is separated into different sizes of jars, following with separating different weights of rice straw.

Phase 4: Assembling the materials

In this phase, the separated rice straws were put into separate jars with the algae. The jars were then left positioned in various locations on days where the sunlight hits to test where the algae will get restricted from blooming.

Phase 5: Analysis

In this final phase, a thorough analysis of the experimental results will be conducted. The procedures from the previous phase will guide the determination of the outcomes. This phase is vital for gaining a deeper understanding of the behavior of rice straw with algae and examining their various aspects.

2.4 Statistical Tools

Interpretation	Point
Very Poor	1
Poor	2
Good	3
Very Good	4

The table shown above presents the performance of the algae when tested with different grams of rice straw left under the sun for similar days.

These range from 1-4, "Very Poor" (1 point) if the algae grows fast even with raw rice straw. "Poor" (2 points) if it grows slowly. "Good" (3 Points) if it has improved— the algae stays the same. "Very Good" (4 points) if the rice straw prevents the algae from growing and if it lessens the algae.

Weighted formula: Mean = $\frac{\Sigma x}{n}$
Whereby: ∑ x = sum of points
n = total number of testings
This formula determines the mean of test results by adding up the points and dividing by the total number of tests. It gives an overall performance rating.

3. RESULTS AND DISCUSSION

Upon the accomplishment of the experiment for this research, the researchers assessed whether Rice Straw could possibly and potentially serve as an alternative Algaecide for Barley Straw. As shown on the table below, regardless of the varied measurements of Rice Straw (50g, 75g, 100g) in different volumes of water, the results remained the same and no observable inhibition of Algal Blooms was recorded in a span of two weeks post-experimentation. Instead of reduction, the Algae continued to grow in all the present samples, indicating that Rice Straw does not manifest Algaecidal benefits in its raw form.

Table 1. The Efficiency of Rice Straw as an Organic Algaecide

Efficiency of Rice Straw as an Algaecide	Water mL	Grams of Rice Straw	Performance Evaluation
1	25 mL	26 g	2
2	50 mL	75 g	2
3	70 mL	100 g	2

The table indicates the scores based on the performance of the algae if it blooms or not. With three different tests, the performance has shown a score of 2 from test 1 up until test 3, the result indicated that it has an overall score of 2.. It has shown that, with different grams of rice straws, the product has shown no improvement.

Efficiency of Rice Straw as an Algaecide	Water mL	Grams of Rice Straw	Days	Reaction Evaluation
1	25 mL	26 g	2 Weeks	3
2	50 mL	75 g	2 Weeks	3
3	70 mL	100 g	2 Weeks	3

The table shows the algae's performance with the same days of the product being under the sun and with different measures of rice straw. The results have shown no improvement, and the products have received scores of 3 from the first test up until the third. The test obtained a score of 3 for overall performance.

Despite the unsuccessful demonstration of Rice Straw to inhibit Algal growth, its sustainability and availability remains as an advantage over Barley Straw. Since the Philippines is an agricultural country, Rice Straw depicts a much accessible material that can potentially serve as an alternative Algaecide with the help of further research on how it can be possible upon undergoing chemical processes.

4. CONCLUSION AND RECOMMENDATIONS

Upon the implementation of the experiment, researchers could've used other chemicals that could enhance the efficiency of Rice Straw as an algaecide, such as Zinc Oxide that has anti-bacterial properties and is less toxic than the usual copper sulfate. Another method is to extract allelochemicals and prolonging its exposure could help in making Rice Straw a successful and possible solution for Algal Blooms.

The experiment results suggest that Rice Straw cannot perform similarly to Barley Straw as an alternative Algaecide due to the presence of allelochemicals. This could be caused by insufficient emission of concentrated allelochemicals to inhibit the growth of Algae for the water samples experimented. Based on further research, allelochemicals usually require specific environmental conditions, such as undergoing chemical alteration, to serve its purpose as an Algaecide effectively.

This research will help in sustainability and further research will enable us to discover the potential of Rice Straw to aid Algal Blooms. This explains the differences and similarities between algae and rice straw. The relationship between algae and rice straw and the possible outcomes of their interactions may be explained to the readers. The researchers' work indicates that, in situations when barley straw is not available, rice straw can be used as an alternative.

5. ACKNOWLEDGMENTS

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Utilizing Citric Acid and Sunflower Oil as a Rust Remover and Rust Resistance to Replace the Chemically-made Rust Remover

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Abstract: House, buildings, and other construction that was made with metal and items that are useful or handy to us are mostly made of iron and metal likes keys to open locked doors, wrench to fix something, nail cutter to cut your overgrown nails, and other stuff that are made out of metal and iron could turn in to a rust and pollute the plants, the water, the environment, and even endanger you if you came in contact with one. This research aims to make a rust remover made with citric acid to replace the chemically made rust remover.

Citric acid rust remover offer potential use of free chemical meaning that it has no chemical mixed in it, since its made out of citric acid and can be less harmful than chemically made rust removers which are pricey and harmful to some or all individual. This research could help civil engineers that are in need of removing rust. This could also help with kitchen ware, were removing the rust on the pan can be useful since pans can get rusty too and might carry some infection or disease when used for cooking if the pan was rusty.

Iron or metal can some times bend or break whenever there is rust on them since the rust weaken the metal. More specifically, it's when elements, like iron, easily lose electrons, and an element such as oxygen absorbs those electrons and then encounters water/moisture. It could potentially reduces the performance of the metal because of its rust.

Key Words: Citric acid rust remover; Chemically made rust remover; Civil engineers; Pollution

1. Introduction

1.1 Background Of The Study

The Current World are full of Chemicals being used in daily household products and in people's daily equipment. corrosion of equipment has became a problem for many common household, resulting in
the use of strong chemical acids like sulfuric acid, hydrochloric acids and phosphoric acids, the results are either the equipment metal surfaces becomes disfigured or not usable.

The researchers concluded that using commercial corrosion inhibitors or removers can ruin the purpose of our daily household equipment, the researcher(s) turned to focus on citric acid, an organic acid, although not a strong acid it's a good chelator. It can bind to metal ions, like iron ions in rust, this helps lift the rust away from the underlying metal surface.

Commercial products of corrosion remover with the properties of chemical compounds have been dominating the market for corrosion inhibitors and removers. while those made with organic compounds paled in comparison to those with chemical properties in the market, since most if these products are bought mostly by construction businesses and engineers for their projects. Since corrosion removers made with organic compounds pales in comparison to those made with chemical properties in terms of using it in heavy metals mainly for the purpose of constructing and engineering. The researcher(s) decided to instead implement eco-friendly corrosion removers to the common household.

This study aims to provide the common household a solution for the corrosion in their household equipment. using the organic compound "citric acid" extracted from either

lemon or calamansi can be more beneficial in removing rust in lighter equipment since citric acid is less corrosive than those stronger chemicals used in construction and engineering works it is naturally more gentle on the surface of the metal, it can avoid the metals disfiguring and ruining their purpose.(Ex. Using stronger acid such as sulfuric acid typically found in commercial products could disfigure knife's sharp ends. Also with the use of sunflower oil, we can make it resistant to the sun which makes the corrosion act sooner or progresses at a faster rate than it would in its absence. Ruining their Purpose) Citric acid is an eco-friendly organic compound and a biodegradable substance derived from citrus fruits such as lemons, calamansi and much more. Its environmentally friendly and cannot harm the ecosystem its the opposite to the commercial products with toxic chemicals such as sulfuric acid and hydrochloric acid that can potentially harm the ecosystem.

1. METHODOLOGY

1.1 Materials List

-Lemon (1kg)
-Sodium hydroxide (5g)
-Calcium Chloride (28.5g)
-Concentrated Sulfuric Acid (2.5ml)
-Distilled Water (5L)
-Filtered Paper (5)
-Large Bowl (for juicing Lemons)
-Sunflower oil
-Rusted metal
-Gloves
-Water
-Container

-Funnel
-Brush or Steel Wool
-Muslin Paper

2.2 Experimental Procedure

Phase 1 : Preparation Of Materials

Wash the lemon properly after washing cutting each lemons in halves, once the lemons are cut, set them aside for later use. avoid direct sunlight. Before handling chemicals always remember to Use GLOVES to avoid contamination and health risks, take 5g of sodium hydroxide and dissolve in a 45ml distilled water. take 28.5g of calcium chloride and dissolve in 70 of distilled water, take 2.5ml of concentrated sulfuric acid and pour it in 22.5ml distilled water, always put the acid in water not the water in acid, always prioritize safety. Put all the solutions away.

Phase 2 : Filtration Process

Juice the lemons in a container. Once juiced take out muslin paper and spread it across the tops of a large container. Once spread pour the lemon juice directly into the container through the muslin paper.
This process filters any solid bits that's made its way to the Juice.

Phase 3 : Neutralization

Carefully take out the NaOH solution made from Dissolving Sodium hydroxide to distilled Water, carefully add the NaOH solution to your filtered lemon juice, the purpose is to adjust the pH level to around level 7 which is called neutral, henceforth the name of the phase "NUETRALIZATION".

Phase 4 : Precipitation

Take out the $CaCl_2$ solution made from dissolving calcium chloride to distilled water and carefully add it to the neutralized lemon juice. making the citric acid precipitate as calcium citrate.

Phase 5: Liberation

Use the H_2SO_4 solution made from dissolving concentrated sulfuric acid in distilled water. Carefully pour it into the container containing the previous lemon juice. Once added, it will react with the calcium citrate. Releasing the citric acid and forming calcium sulfate.

Phase 6 : Purification

Remove the calcium sulfate through another filtration. Once removed concentrate the

citric acid solution by evaporation excess water through high heat. After the process of evaporation, the citric acid may appear to be crystallization. Successfully extracting citric acid from just a kilogram of lemons.

Phase 7 : Application

Once the extraction is finished, take the crystalized citric acid and let it dissolve in a water that's slightly hot not too hot. Once dissolve take the rusted metal and let it submerge. The process can be faster if 2-3 drops of dish soap is added. If you want it to be rust resistant, add a little bit of sunflower oil, it can create a moisture barrier against moisture which is a primary reason for metal rusting(There are also alternatives for sunflower oil like mineral oil, machine oil. These option typically provide better long term protection).

Phase 8 : Removal

Once the metal is submerged for at least 5-10 minutes, wear gloves, take a steel wool or brush, and brush the loosen rust away from the metal's surface. Make sure that's its brushed gently enough to take away the rust particles, we don't want our knives being ruined due to the brush.

Phase 9 : Cleaning

Once the rusted particles are brushed off and the metal is free from corrosion, take it out of the heated citric acid and rinse it thoroughly and dry it.

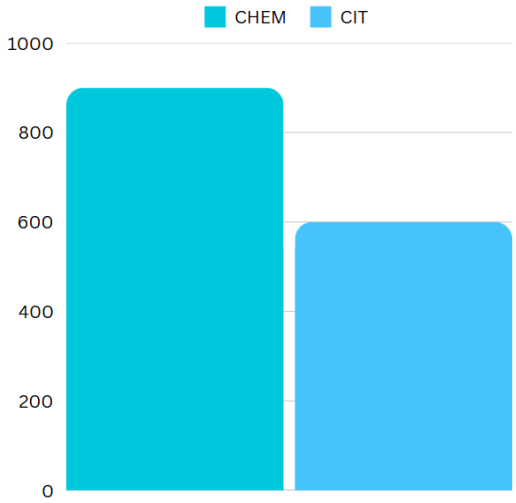
The researchers utilized the statistical treatment mean formula

$$X\sum(\frac{(xi\ x\ wi)}{2})$$

3. Result and Discussion

It takes about two to four days for metal to rust if given enough exposure to water and oxygen, but naturally it takes about weeks, months, or even years to rust depending on your environment. After gathering data, the researchers have sorted and organized the tables to better understand the study, they analyzed the data computation:

The process of removing the acid with citric acid remover (CIT) is much more faster than the effects of chemically made rust remover (CHEM). The computation for the effects are detailed below.



- Chemical rust remover(CHEM)
  Process – 15 min x 60 ÷ 1= 900Seconds

- Citric acid remover(CIT)
  Process – 10 min x 60 ÷ 1= 600Seconds

Test	Chemical rust remover	Citric rust remover
Shelf life (expiration)	273.931649 days	1095.7266 days
Removing rust time	900 seconds	600 seconds
Total	1173.931649	1695.7266

Weighted mean for chemical rust remover (CHEM) = 900 seconds

Weighted mean for citric acid remover (CIT) = 600 seconds

900+600 =1500 seconds

$X\sum(\frac{(xi\ x\ wi)}{2}) = \frac{(1500)}{2} = 750$ seconds

This shows that citric acid is much more superior in removing rust than chemical rust remover

4. Conclusion and Recommendation

In this study, we explored the extraction of citric acid and its ability to remove rust. Through a step-by-step process, we were able to obtain citric acid and test its effectiveness. The results showed that citric acid can successfully help in rust removal, making it a potential alternative to chemical-based rust removers. Using natural ingredients like citric acid not only provides a safer option but also reduces environmental harm.

After removing a part from an acid solution bath, it should have no trace of the acid left on it, otherwise, it will rust quickly and aggressively. Depending on the strength of the acid, it can happen right before your eyes. Flushing the part with water often suffices, especially for weak acids. To be on the safe side, however, it is best to soak the part for a minute or two in a weak base solution, such as baking soda and water.

This works due to basic chemistry. It's the same principle when you pour vinegar on baking soda and it fizzes violently. The vinegar is an acid (acetic acid) while the baking soda (sodium bicarbonate) is a base. The final result of the reaction is water, carbon dioxide, and sodium acetate.

5. Acknowledgements

The researchers Alec Basiano, and Thyrone De Guzman would like to thank the group's teamwork that made this research possible.

We heartily express our gratitude to San Jose Academy for providing endless support, knowledge, and experimental supplies that helped our research topic.

We are thankful for each researcher's contribution to the study. May it be a data collection, analysis, or experimental procedure. Their individual help played an important role in this project.

Lastly, the students would like to thank Ms. Stella M. Gabales for continuously helping the researchers achieve their goal and final product.

Exploring the Effectivity of Elements Present in Lemon Peels and Chili Peppers as Insecticide for Cockroaches

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Abstract: In order to improve the efficiency of organic materials like chili peppers and lemon peels in getting rid of cockroaches, this research attempts to create an environmentally friendly insecticide alternative to the conventional chemical-based pesticide. Investigating these natural materials' potential as a non-toxic and eco-friendly substitute for chemical pesticides is the goal of the project. The study looks at the relationship between the organic insecticide's input components, procedural steps, and output properties using a conceptual framework. Finding the proper, most efficient ingredient ratios, researching the components of the materials to be used, and learning about natural pest management agents by examining the combined impacts of citrus and capsicum annually are all part of the technique. Various samples are tested to determine which of the following ingredient measurements works best. The purpose of quality evaluations is to appraise the attributes, such as effectiveness and quality. In order to compare the qualities of the organic insecticide generated from a combination of ingredients found in chili peppers and lemon peels, data is gathered using statistical analysis and standardized testing methods. The researchers assess the opportunities to develop environmentally acceptable alternatives to synthetic chemicals which will serve as better insecticide solutions for cockroach pest management. The research demonstrates how the organic insecticide operates effectively to advance sustainable pest management practices together with environmental preservation which supports both biodiversity and long-term ecological well-being. Research findings enable scientists to identify potential benefits between citrus and capsaicin which are active components found in lemon peels and chili peppers.

Key Words: Cockroaches; Chili Peppers; Lemon peels; organic insecticide; pest control

1. INTRODUCTION

1.1 Background of the Study

Traditional chemical-based insecticides have been proven to be harmful for the environment. According to the National Library of Medicine in 2016, due to the known ability of chemical-based insecticide to cause a large number of negative health and environmental effects, their side effects can be an important environmental health risk factor. Numerous pesticides have been linked to health and environmental problems, and their usage in agriculture has been discontinued. Insecticide exposure can occur through ingestion, inhalation, or skin contact. The type of insecticide, the length and mode of exposure, and the individual's health status such as malnourishment and skin damage, all influence the potential health consequences.

The scope of this study is to investigate the effectiveness of using organic materials such as chili peppers and lemon peels in eliminating cockroaches. The study aims to explore the potential of these natural substances as a non-toxic and environmentally friendly alternative to chemical insecticides. The

researchers will focus on the repellent and toxic properties of pepper and lemons, as well as their ability to dehydrate and kill cockroaches. By delimiting the scope of the study, they can focus on a specific area of investigation and provide more detailed and accurate results.

Insecticide residues are present in a wide range of common foods and drinks, such as prepared meals, wine, fruit juices, water, snacks, and animal feed. It should be mentioned that residues cannot be entirely eliminated by washing and peeling. The majority of the time, the concentrations stay below the safe levels set by law. These "safe limits," however, might understate the true health risk in situations where there is simultaneous exposure to two or more chemicals, which happens in real life and could have additive effects. This research studies the problem of traditional chemical-based insecticides and finding out a way to make a solution to it by creating organic insecticides. The objective for this research is to minimize the risks posed to human health and environment by creating an innovative product which is organic insecticides.

Applying capsaicin to crops with low insect infestation levels is possible because it possesses some insecticidal activity as well. Extracts from chili peppers have been utilized in both conventional home remedies and commercial goods to manage a variety of insect pests. Limonene, one of the pesticide active components found in lemon peels, is suitable for registration or deregistration with a lowered set of generic data criteria. Because it is a naturally occurring substance and has been shown to be inert, limonene does not require a tolerance and is considered safe by the FDA. Cockroaches are strongly repelled by the scent of lemons and will avoid regions where the fruit is present.

Chili peppers, belonging to the genus Capsicum, are bright, blazing fruits that provide pungency through capsaicin. They have been used for flavor and piquancy all over the world. On the effect of chili pepper on cockroaches, the independent variable can be the presence and concentration of chili pepper or its active constituent, capsaicin. This factor is controlled in order to note the effect that it may have on the cockroaches, Discomfort interferes with their ability to navigate and communicate. For areas treated with chili pepper, such cockroaches will tend to avoid the specific area1. The effectiveness of the chili pepper as a natural repellent or insecticide against cockroaches can be determined by the different quantities used in the experiment. On the other hand, Lemon peels' principal use has always been as a cleaning agent and in medicine. This material was manipulated for observation of changes toward a behavior in cockroaches. Thus, scientists might apply different concentrations of lemon juice throughout a roach-infested area to determine if it deters them and/or decreases the number. Limonene is the chemical responsible for the strong smell and identifying character of lemons, which is believed to be lethal to cockroaches.

2. METHODOLOGY

In addition to substituting an eco-friendly cockroach insecticide for the traditional chemical-based one, the researchers also want to look into the components of the substance they intend to use. As a result, we need to look into the specifics of the substances we plan to use and how they impact cockroaches.

2.1 Materials Used

Lemon peels
Chili peppers
Vinegar
Baking Soda
Beaker
Stirring rod
Funnel

2.2 Experimental Procedure

Phase 1: Gathering of Materials

This stage entails preparing materials, equipment, and ingredients required for the planned experiment. One of the researchers provided the lemon peels, which are now existing as scrap materials from lemonade making. The preservatives, measuring spoons, funnel, knife, and chopping board were acquired in one of the researcher's homes, while the chili peppers used were purchased from the market and sold by the

piece. The stirring rod and beaker were borrowed from the science lab.

Phase 2 : Cleaning of Materials

To prevent inaccurate findings, the borrowed instruments from the previous step must be cleaned and washed before use in this phase. Every piece of equipment that was collected was cleaned to prevent contamination, change the results, and ensure the safety of the researchers.

Phase 3 : Preparing of Mixture

To create this study's product, a concoction of lemon peels and chili peppers, started by getting the excess liquids from the peel to maximize its components. The next step is to simply slice the chili peppers and put it into the mixture. Add vinegar and baking soda as preservatives after everything has been thoroughly combined. As the trial progressed, the researchers tested a variety of samples with varying ingredient measurements. Without any preservatives added, the initial sample included six (6) pieces of chili peppers and the juice from one pair and a half (1 ½) lemon peels. The second sample includes five (5) pieces of chili pepper and lemon juice from one pair (1) of lemon peels, with no additional preservatives added. The third sample contained five pieces (5) of chili pepper and half (½) a lemon peel, along with preservatives of ten (10) tablespoons of vinegar and one and a half (1 ½) tablespoons of baking soda. There are clear differences between the samples with and without preservatives, the researchers noticed.

Phase 4 : Testing of Organic Insecticide

The researchers will assess whether the insecticide—a concoction of lemon peels and chili peppers, is effective in killing cockroaches. By spraying the mixture directly to the insect, this experiment will ascertain how the components of both lemon and chili peppers influence. It took 84 seconds for the product to demonstrate the desired efficacy with 5-7 sprays, according to the most recent study in which a cockroach was killed directly. With 2-4 sprays of the mixture, it took 7-16 seconds for the target insect to be disturbed in the other experiments. During the prevention test, the cockroaches left the area right away after getting into contact with the mixture; the product prevented them from approaching and sniffing the food.

Phase 5 : Prevention Test

In the last trial, the researchers tested if the product can also be used for prevention. Basically, a piece of food is placed in the center of a container, and the mixture is sprayed all around before the cockroaches are placed to see whether or not they approach the food. After coming into contact with the mixture, the cockroaches left the food after attempting to approach it and were agitated, we sprayed more of the mixture directly into them and one cockroach was eliminated.

Phase 6 : Analysis

During this crucial last phase, the product of the experimentation will be comprehensively analyzed. The procedures conducted from the previous phase and the observations of the researchers should serve as the guide to determine the results. This phase will be essential to deeper understand and see the whether the mixture of lemon peels and chili peppers along with its preservatives has a significant effect on the target insect.

2.3 ***Statistical Analysis***

The researchers will assess whether the insecticide—a concoction of lemon peel components and chili peppers—is effective in killing cockroaches. By spraying the mixture directly to the insect, this experiment will ascertain how the components of both lemon and chili peppers influence. Using a scale of 1 to 5,

where 5 represents the most efficient and 1 represents the lowest, this table displays the mixture's quality and duration based on the measurements of its constituent ingredients.

5 - Fully efficient
4 - Efficient
3 - Neutral
2 - Inefficient
1 - Fully Inefficient

Weighted Mean Formula: mean = $\frac{\Sigma x}{n}$

Whereby: $\sum x$ = ratings per trial

n = total number of trials

3. RESULTS AND DISCUSSION

Table 1 – Quality Test: Non-perishability

Quality Test	Trial 1	Trial 2	Trial 3	Average Rate
	1	3	4	2.7

The quality of the samples used in each trial is displayed in the above table. The ranking takes into account factors including how much or how little is obtained from the ingredients, how long it lasts, and whether or not it is perishable. The condition and characteristics of each sample differed significantly, as the researchers observed.

Table 2 – The Functionality of the Organic Insecticide

Function Test	Trial 1	Trial 2	Trial 3	Trial 4	Average Rate
	1	1	3	4	2.3

The table above shows how functional the organic insecticide is on the sample cockroaches. The rating covers the how it affected the said insect while also considering the application and number of sprays.

Table 3 – Duration to Eliminate Cockroaches Using the Organic Insecticide

Duration Test	Trial 1	Trial 2	Trial 3	Trial 4	Average Rate
	2	3	4	4	3.3

This table shows the duration to eliminate the target insect using the organic insecticide. The rating involves how the insect reacted to the product and how many second does it take for them to do so.

4. CONCLUSION AND RECOMMENDATIONS

The first thing that is discovered throughout the trial is that, despite the scent's strength, they are safe for humans to breathe in because of the pleasant aroma of the lemon peel. This lessens the likelihood of experiencing both the immediate and long-term effects of the commonly utilized insecticide. The substance doesn't smell like chemicals and can be sprayed throughout spaces or rooms. The drawback is that, in contrast to chemical-based insecticides, which start working immediately, it takes a long time—many seconds—for it to affect the targeted insects.

The eco-friendly insecticide solution effectively eliminates cockroaches, taking only 84 seconds to kill with 5-7 sprays. It repels insects from food sources, indicating its potential for preventive use. However, its direct killing capability is limited compared to traditional chemical insecticides. The solution's pleasant aroma makes it suitable for indoor use without health risks. Importantly, this eco-friendly alternative stands out safer compared to traditional chemical insecticides. Its pleasant lemon scent and lower health risks for humans make it an appealing option for households concerned about chemical exposure. While it may not offer the immediate results typical of chemical products, its ability to paralyze and prevent cockroach infestations without harsh chemicals positions it as a valuable tool for sustainable pest management. Overall, this solution embodies a balanced approach to pest control that prioritizes

both effectiveness and safety.

5. ACKNOWLEDGMENTS

This research would not have been feasible without the assistance of these important advisers of Grade 10 - Saint Augustine of Hippo, who provided direction and support to the researchers as they completed the study. First, we want to sincerely thank our Basic Research 2 adviser, Miss Stella Gabales, for monitoring, imparting her expertise, and taking the time to read our study report. Next, we would also want to express our gratitude to our adviser for Introduction to Statistics, Miss Chelsey Ann Pura, offered her knowledge and skills in calculating and creating tables and figures utilizing the data. We also like to express our gratitude to our adviser, Mister Eliazar Luciano, for being with us during the experiment. This research paper would not be completed. with their help and support.

Lemongrass and Lanzones as an Alternative Way to Make Organic Insect Repellent Patch Against Mosquitoes.

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Abstract: Mosquitoes make people face substantial health risks like dengue fever which poses serious danger to people, due to this concern, various methods occur such as repellents, sprays, and wearable patches, have been developed to reduce these risks. However, there are a lot of researchers interested in investigating natural and organic substitutes for these traditional techniques due to concerns about the effects of chemicals on the environment.

Lemongrass, a plant known for its high citronella concentration, repels mosquitoes. Citronella oil contains compounds such as citronellal and citronellol, which are known for their insect-repelling properties and making patches. These compounds interfere with the mosquitoes' ability to detect carbon dioxide and body heat, making it harder for them to locate potential hosts. It also has a long history of being shown to repel mosquitoes.

On the other hand, Lanzones peel is known to produce a sticky resin or sap, especially when the fruit is ripe or if the tree is injured. The sap can attract mosquitoes and other insects because of its sweet smell and sugary content. This attraction is likely due to the sap being a food source for some insects.

As for the mosquitoes, they are generally attracted to the odor of certain plants and substances, and the sap may act as a natural lure. If mosquitoes land on the tree or its resin, they might inadvertently get stuck or trapped, leading to their death. Additionally, if the tree is close to standing water, that could create a breeding ground for mosquitoes, further increasing the presence of mosquitoes in the area. However, mosquitoes themselves don't typically "die" because of the Lanzones tree; instead, it's more likely that the tree's environment or the tree's sticky nature causes them to get trapped or die in the area.

This study helps reduce the number of mosquitoes that approach their prey, the patch plays an important role in preventing the mosquito from biting its host on the specific part of the body, but intentionally they do not die, the patch just makes it less likely for them to land on or bite the person wearing the patch.

Key Words: Lemongrass; Lanzones Peel; Patch; Mosquito; Organic

1. INTRODUCTION

1.1 Background of the Study

In tropical countries like the Philippines, mosquito-borne illnesses like dengue fever pose serious health risks to people. According to the Department of Health, mosquito-borne related diseases are common during the rainy season. Dengue cases are rising as expected due to the rainfall, which allows more water to pool and be stagnant. Due to these concerns, various methods to ward off mosquitoes, such as repellents, sprays, and wearable patches, have been developed to reduce these risks.

Even so, there are a lot of researchers interested in investigating natural and organic substitutes for these traditional techniques due to concerns about the effects of chemicals on the environment. For example, in the island of Camiguin, Philippines local folks used the peelings of Lanzones *(Lansium domesticum)* as a way of driving away the said insect by drying it and using it as incense. This study was conducted to determine the efficacy of the Lanzones peelings'

extract as an alternative source of mosquito repellent. The study was conducted in Cebu Doctors' University Zoology Laboratory. Affirming that the Lanzones peel creates a major purpose for the researchers study.

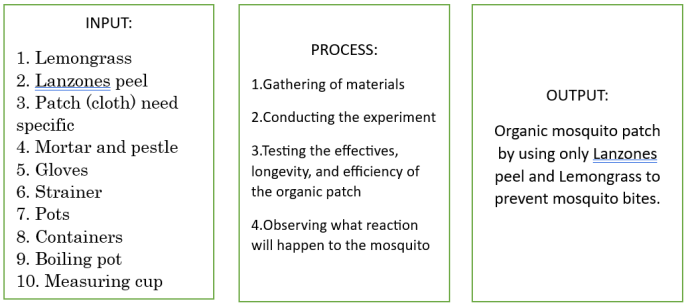
This study intends to determine if the efficiency of a mosquito patch as an alternative organic patch, with additional components using a combination of Lanzones peel *(Lansium domesticum*) and Lemongrass *(Cymbopogon citratus)* will be effective against mosquitoes.

Lemongrass, A plant known with a high citronella concentration, this oil contains compounds such as citronellal and citronellol, which are known for their insect-repelling properties. These compounds interfere with the mosquitoes' ability to detect carbon dioxide and body heat, making it harder for them to locate potential hosts. This natural repellent effect is what makes Lemongrass a popular choice in mosquito patches and other repellent products since citronella has a long history of being shown to fend off mosquitoes, it is frequently used in compositions of mosquito repellnts.

Lanzones peel includes bioactive components (Tannins) and essential oils (Linalool and Limonene) that could potentially increase the efficiency of the patch as mentioned by Biotreks. Also, Lanzones *(or langsat)* trees are known to produce a sticky resin or sap, especially when the fruit is ripe or if the tree is injured. The sap can attract mosquitoes and other insects because of its sweet smell and sugar content. This attraction is likely due to the sap being a food source for some insects. As for the mosquitoes, they are generally attracted to the odor of certain plants and substances, and the sap may act as a natural lure. If mosquitoes land on the tree or its resin, they might inadvertently get stuck or trapped, leading to their death. Additionally, if the tree is close to standing water, that could create a breeding ground for mosquitoes, further increasing the presence of mosquitoes in the area. The development of this mosquito patch leverages these additional components to potentially provide a safer use to consumers compared to chemical-based repellents. By adding Lemongrass and Lanzones peel into the patch, the study seeks to produce a product that not only repels mosquitoes effectively but also offers a sustainable option for consumers concerned about the risks of other patches**.**

2. METHODOLOGY

2.1 Conceptual Framework



2.2 Material List

1. Lemongrass
2. Lanzones peel
3. Patch (cloth)
4. Mortar and pestle
5. Gloves
6. Strainer
7. Pots
8. Containers
9. Boiling pot
10. Measuring cup

2.3 Experimental Procedure

Phase 1: COLLECTING OF RAW MATERIALS

-This phase involves the preparation of the materials and tools needed for the experimentation that will be conducted such as the lemongrass and Lanzones peel,
This also used to double-check whether the raw materials are fresh and clean to use for the experiment.

-The researchers may need lemongrass with five (5) bundles and a kilogram (1) of Lanzones peels that can be bought in the groceries.

Phase 2: EXPERIMENTAL PROCEDURE

-This phase shows how the raw materials work as an alternative way to make a mosquito patch.

-In this phase, the researchers first clean the raw materials such as the Lemongrass and Lanzones.

-Then peel the Lanzones and set them aside.

-Afterwards, boil the water in a boiling pot for about 15 minutes together with the Lemongrass or Lanzones, in no particular order as long as they are both separated. Then continue the procedure until they are both heated. This procedure is one of the important steps because this allows the raw materials to work, its main goal is to extract its juice to make the organic mosquito patch work.

-Then let it sit for 10-15 minutes to lessen its heat, for as long as the researcher/s can bear its hotness, you can continue to do the next step, such as;

-Use a strainer and get a bowl, then use gloves to prevent contamination from the raw extract and also to prevent your skin to get scratched because of lemongrass when extracting.

-Squeeze the Lemongrass and Lanzones peels tightly 3 times for as long as it is not dry, do not use the water that was used in the boiling process, only the pure extract that was from the Lemongrass and Lanzones.

-Then get your patch and place it in a container together with the mixed extract of Lemongrass and Lanzones in equal measure (1ml).

PHASE 3: TESTING OF THE LANZONES AND LEMONGRASS

-The efficacy of the mosquito repellent patch was rigorously tested three times, utilizing varying concentrations of Lanzones and Lemongrass as key variables to assess their effectiveness in repelling mosquitoes under controlled conditions.

PHASE 4: ANALYSIS AND FINDINGS

-According to the data analysis, 24 hours is more successful when soaked properly, because mosquitoes avoid the patch; this is due to the patch's odor, which keeps them away for one to two days.
The researchers think that 24 hours is more efficient because according to the experiment,
After 24 hours of soaking, the mosquito travels farther than the patch. Because the smell of the patch keeps mosquitoes away. The patch has a little scent, but it is not overbearing.

2.4 Rating scale

RATING	INTERPRETATION
3	**The patch helps to further away the mosquito**
2	**The patch attracts the mosquito**
1	**No effect to mosquito at all**

The researchers used a rating scale having a range of 1-3, and 3 being the highest possible rate.

The researchers based their rating on the effectiveness of the patch against mosquito, aiming that the mosquito will go further away to its host to prevent from biting and to cause possible reactions to the body.

In getting the mean of the gathered data, the researchers used this formula:

$$\bar{X} = \frac{\Sigma x}{n}$$

This formula calculated the mean of the data. Wherein Σx is equal to the sum of each rating and "n" is equal to the number of tests.

The researchers calculated the sum of their rating that is based on their observation on the effect of the patch against mosquitoes. After getting the sum of their ratings, they divided it by the number of their tests performed. After that, they used the rating scale to give interpretation to their quotient.

3. RESULTS AND DISCUSSION

To analyze all the data the researchers had concluded, they used charts and tables to organize the data that they had gathered.

Table 1. Longevity of the Organic Patch

The study aimed to determine the efficiency of a mosquito-repellent patch made from Lemongrass and Lanzones peel extracts. Various tests were conducted to assess the effects of different soaking durations on the patch's overall performance against mosquitoes.

	Test 1	Test 2
30 minutes	2	2
24 hours	3	3

-Trial 1: 30-Minute Soaking, after soaking for 30 minutes, the patch initially attracted mosquitoes, likely drawn to the sweet scent of Lanzones peel. However, over time, the mosquitoes perished, possibly due to the sticky resin and bioactive compounds present in the peel.

-Trial 2: 24-Hour Soaking When soaked for 24 hours, the patch released a stronger aroma that caused mosquitoes to stay away and eventually die. The extended soaking period allowed more Lemongrass extract to infuse into the patch, enhancing its repellent properties.

Table 2. Difference of the researchers DIY patch against the Existing patch

	Test 1	Test 2
DIY Product	2	3
Brand X	3	3

-In the table shown below is a comparison of our Lanzones and Lemongrass patches to those of Brand X. This table illustrates how the two patches differ in terms of effectiveness and longevity.

-The trials that have been done showed different effects based on how long they were soaked for. In the first trial in which the patch being tested has been soaked for 30 minutes, we observed that the mosquito was attracted to the scent of the patch and approached it. The mosquito eventually died within 1 hour of being within reach of the patch.

-In the second trial, which was soaked for a full day, in contrast to the first trial, the mosquito avoided coming in contact with the patch due to its quite unpleasant odor. Therefore, serving its purpose of prying off mosquitos, making it effective.

-Lastly, to conclude this statement, it can be said that the researchers' DIY Product can keep up with the Brand X.

4. CONCLUSION AND RECOMMENDATIONS

In summary of this study, the use of Lemongrass and Lanzones as natural ingredients in the formulation of insect-repellent patches offers a

promising alternative to conventional chemical repellents. The extract's efficiency is enough to keep the mosquitoes away if not fully eliminate them. Both Lemongrass and Lanzones possess intrinsic properties that repel mosquitoes effectively while being environmentally friendly and safe for human use. The integration of these natural extracts not only enhances the efficacy of mosquito repellents but also aligns with the growing demand for sustainable and non-toxic alternatives. Given the increasing concerns about the harmful effects of synthetic chemicals, the development of these natural insect-repellent patches could provide a beneficial solution for individuals seeking protection from mosquito bites.

-Since Lanzones are more readily available and less costly during peak season than during the off-season, it is recommended that future researchers do their research during this time. The encapsulation method, adhesive hydrogel patches, microencapsulation technology, and nanotechnology techniques are some of the methods they ought to explore as they create the insect-repellent patch to increase its efficiency and durability. Additionally, in order to improve the quantity and potency of active compounds, several extraction techniques such as solvent extraction, cold press extraction, steam distillation, and fermentation methods should be considered. To make sure the patch is effective in general, it is also advised to conduct tests on its performance against different mosquito species and in various kinds of environmental settings. Lastly, to develop a reliable, environmentally friendly, and efficient insect repellent patch employing Lemongrass and Lanzones, researchers should improve the formulation by taking skin sensitivity, durability, and possible allergic reactions into consideration.

5. ACKNOWLEDGMENTS

The researchers would like to acknowledge the individuals who helped make this research possible. This study could not have been possible without the aid of these significant advisers of Grade 10 - Saint Augustine of Hippo, who guided and helped the researchers in the completion of the study.

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Antibacterial Potential of Red Mangroves against Xanthomonas Bacterial Spots from Tomato.

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Abstract: Plants, crops, and vegetation play a vital role in the environment. It provides the daily necessities for humans, such as food, and fresh air. Since most crops grow in exposed areas, they are prone to bad bacterias that can prevent them from growing and thriving. To fight these bacterias antibacterial solutions, methods, and natural remedies were made. In this study, the researchers plan to use Rhizophora mangle (Red mangroves) as a main ingredient for an alternative antibacterial spray that can possibly eliminate a common bacteria that mostly affects crops like tomatoes. This bacteria is the Xanthomonas Campestri pv. Vesicatoria bacteria or also known as bacterial spots, a bacteria that makes crops rot and wilt. (Koppert, 2025) Red Mangroves have shown potential of antibacterial properties. It contains cytotoxicity that can kill and damage cells (Kenakin, 2017).

The plant shows that it can be a main ingredient in an antibacterial solution with the right amount of balance with other elements. In this research, the researchers will experiment by making the antibacterial spray and mixing the main ingredient with 2 other components. Then, they will observe how the bacteria in the tomato behave when they receive the created antibacterial solution and how many times does the tomato needs to be sprayed for it to become effective.

This study may benefit both humans and plants because this may extend the life of the plant and this can help people in preserving the ecosystem. To further expand this study, it is recommended to have further and broader research on this topic. With the right amount of time, accessibility, and funds, this research has a possibility to enhance its topic and become a successful study.

Key Words: *Red Mangrove; Rhizophora Mangle; Xanthomonas Campestri pv. Vesicatoria; Bacterial spots; Antibacterial spray*

1. INTRODUCTION

1.1 Background of the Study

Plants are all over the world, and each plant serves their own purpose in life, may it be for gardening, eating, collecting, producing good air quality or selling. It may sound like plants could do everything in this world with the care of humans but natural causes such as the weather may cause it to grow bacterias and make the farmers who sell plants for a living worry. One of the bacteria that people who sell plants for a living are scared of is Xanthomonas Campestri pv. Vesicatoria bacteria because it affects most of the edible plants such as our vegetables and fruits. This is the reason researchers considered conducting this study because tomatoes are one of the plants all humans make as an ingredient in our food and when farmers see infected spots on these plants, they immediately throw it to the

trash or cut the leaf of an infected part to stop the spreading.

The objectives of this study are to determine if the solution would eliminate or increase the present bacteria in the tomato, learn the time range for the solution to take effect, and discover if the antibacterial spray gave a significant difference in using the Red Mangrove as a main ingredient. The Red Mangrove, also known as Rhizophora Mangle, is a common type of mangrove but its nutrient-rich leaves are a major source of food for fish and invertebrates in coastal waters which means they decompose and support entire food chains.

It can also be seen in traditional medicines such as, anti-inflammatory, anti-bacterial, anti-oxidant, and antipyretic effects. (Red Mangrove. A Review of Its Botany, Phytochemistry, Pharmacological Activities, and Prospects, 2023)

The study focuses on comparing the effectiveness of each tomato with Xanthomonas Campestri pv Vesicatoria, a bacteria that mostly affects edible plants. By creating two testing areas where a set of tomatoes are sprayed thrice a day and the other only once a day, it'll help determine if using the antibacterial spray multiple times a day could change the results.

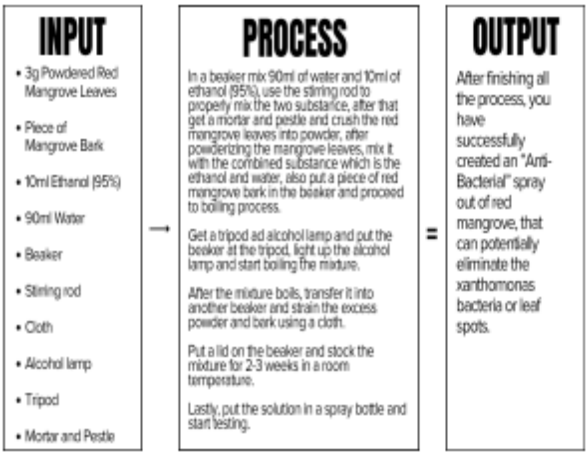
Lastly, the researchers will also use this experiment as a room for examining and testing to see if the antibacterial compound from Red Mangrove could be proven and be used for people especially farmers to not feel worried about not making a living.

2. METHODOLOGY

2.1 Conceptual Framework

The framework shall serve as this paper's guide throughout the study.

2.2 Material List



1. Red Mangrove bark and leaves
2. Ethyl Alcohol
3. Water
4. Beaker
5. Stirring Rod
6. Cloth
7. Alcohol lamp
8. Tripod
9. Mortar and Pestle
10. Spray Bottle
11. Tomatoes

2.3 Experimental Procedure Prepare the materials needed.

In a beaker, mix 90 ml of water and 10 ml of ethanol (95%). Use the stirring rod to properly mix the two substances. After that, get a piece of bark and leaves from the Red mangrove plant. With the use of the mortar and pestle crush the two parts until it powderize. Once the mangrove gets powderized, mix it with the combined substance–ethanol and water. Proceed to the boiling procedure.

Get a tripod and alcohol lamp, then put the beaker on the tripod. Light up the alcohol lamp and start the boiling process. After the mixture boils, strain the mixture using a cloth, transferring the mixture to a different container, while doing so. Put a lid on the container and isolate the mixture for 2-3 weeks at room temperature. After those weeks, put the solution in a spray bottle and start testing.

2.4 Rating scale

RATING	INTERPRETATION
4	Totally eliminate the bacteria spots.
3	Decrease the number of bacteria spots.
2	Eliminate the spots but the tomato easily rots after application.
1	No effect in eliminating the spots.

The researchers used a rating scale having a range of 1-4 and 4 being the highest possible rate. The researchers based their ratings on the physical effect of the solution on the tomato. The rating scale was used to define the effectiveness of the solution and solve for the mean of each trial testing. In getting the mean of the gathered data, the researchers used this formula:

$$\bar{X} = \frac{\Sigma x}{n}$$

This formula calculated the mean of the data. Wherein, Σx is equal to the sum of each rating and "n" is equal to the number of tests. The researchers calculated for the sum of their rating that is based on their observation on the effect of the solution on the infected tomato. After getting the sum of their ratings, they divided it by the number of their tests performed. After that, they used the rating scale to give interpretation to their quotient.

3. RESULTS AND DISCUSSION

To analyze all the data the researchers had concluded, they used charts and tables to organize the data that they had gathered. Table 1. The number of sprays used in the infected tomato.

	NO. OF TOMATO	NO. OF SPRAY A DAY	NO. OF DAYS BEFORE THE SOLUTION SHOWS EFFECT
Test 1	4	1	3
Test 2	4	3	2

The table shows the process on how did the researchers test the effectivity of the anti-bacterial solution, the table contains 4 columns, where in the first column is for the number of testing, the second one is for the number of tomato used in the experiment, third is for the number of spray that the researchers applied to the infected tomato, and lastly the fourth column is for the number of week where the researchers need to consistently apply the solution in the infected tomato.

Table 2. The number of cured tomatoes.

	NO. OF TOMATO	NO. OF SPRAY A DAY	NO. OF CURED TOMATO
Test 1	4	1	0
Test 2	4	3	0

The table shows the result of each trial testing and according to the table, the researchers failed to cure the infected tomato which signifies that the anti-bacterial solution is not effective in eliminating the bacterial spots and this data leads the researchers to a failed experimentation. After the researchers gathered and interpret the data, they've concluded the data with the use of two table, the table shows the testing process of the anti-bacterial solution and the effect of the solution in the infected tomato, base on the given tables and explanations it shows that the experiment process of the researchers failed, due to the ineffectual effect of the solution to the infected tomato.

4. CONCLUSIONS AND RECOMMENDATIONS

This research studied the potential of Rhizophora mangle (Red Mangrove) as an antibacterial agent against Xanthomonas campestris pv. vesicatoria, the bacteria that causes tomato spots. The researchers made an antibacterial solution by combining:

Red Mangrove leaves and bark, ethanol, and water. It was applied to infected tomatoes to test its effectiveness. After 1 week of testing, the results showed that the spray didn't meet their expected outcome, instead of curing the tomatoes from the bacteria, it caused adverse effects. The first batch of tomatoes that was sprayed 3x a day got even worse, it developed black and white spots on the surface.

The second batch that was sprayed once a day also got worse, but only black spots appeared. These observations showed that the Red Mangrove extract didn't fight the bacterial infection in the tomatoes.

Several factors could have contributed to the outcome, like the composition of the antibacterial solution and the short duration of the experiment. Moreover, the study was limited by the availability of Red Mangrove leaves, potential toxicity, difficulty in harvesting due to the diverse wildlife and ecosystem, and the limited budget for materials and equipment.

Despite these limitations, this study can be a basis for further research on Red Mangrove's antibacterial properties to understand its potential as an agricultural tool. Next researchers can adjust the solution's composition, try different application methods or extend the testing period. To determine the plant's safety for use in agriculture, further research should also be done on its cytotoxic effects on humans.

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As the research paper comes to an end, the researchers would like to express gratitude to the people who have shown continuous support throughout the process of their experiment.

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Lastly, we also want to express our gratitude to the people who've helped us in finding the materials we needed to conduct this study.

We're also thankful for San Jose Academy for providing us the scientific equipment we needed and also for giving us a place to

The Effectivity of Egg Shell and Coffee Grounds as an Affordable & Organic Component for Deodorizing Leather and Foam-based Furniture

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Abstract: Furniture is an everyday need and thus, is used daily. This means that it is especially vulnerable to filth odor. Such materials are difficult to clean and so this study seeks to provide a product to neutralize odor using two common household materials - eggshell powder and coffee grounds. This study aims to combine said materials into a cost-effective solid deodorizer for public use. To create said product, both materials were dried and grounded into powder, and then put into tea bags according to their measurement and ratio. These deodorizers are placed in isolated areas using plastic covers and compared using control areas within the furniture, with a 1-7 Likert scale rating being used for analysis. The scale found that 1/2:1/2 tb of eggshell powder to coffee grounds, being moderately effective, is the most optimal ratio for deodorizing in the 60 minute mark. The deodorizer had the greatest impact in the foam bed, being greatly effective, and the least for the leather couch, being ineffective in the 15-30 minute mark and moderately effective after one hour. The most optimal duration was found to be 60 minutes, from an average score of moderately effective among the experimental set-ups. Additionally, only the leather couch had slight coffee stains while the two other furniture types had none, after one hour of application. Thus, these findings suggest examining the impact of environmental factors, wider testing for different furniture types and proportions of materials and conducting patch tests regarding staining. This study demonstrates the potential of natural deodorizers as an effective and sustainable option in neutralizing furniture odor.

Key Words: coffee grounds; eggshell; deodorizer; furniture; odor

1. INTRODUCTION

1.1 Background of the Study

Furniture has become a crucial part in an individual's life as well as in each household. However, are prone to moisture, filth and odor. Moreover, it is also difficult to wash and dry said materials because of their weight. As a result, this study aims for an unusual approach in eliminating and neutralizing the odor of furniture; using common household materials as components in neutralizing odor, such as eggshell powder and coffee grounds. According to research, the chemical that causes the foul odor can be absorbed by porous materials (Hongu et al., 2005). That said, both eggshell powder and coffee grounds are both highly porous components that have low density but significant energy and odor absorption. Moreover, another criteria for choosing the materials is that coffee grounds are a natural alternative to baking soda in their ability to deodorize. Another study claims that coffee grounds and eggshells are effective in deodorizing household equipment individually; simply placing them in smelly places allows them

to absorb odors from the air (Walbert, 2020).

The primary objective of this research is to identify cost-effective and environmentally friendly alternatives for deodorizing and purifying common furniture items. Online searches suggest that furniture deodorizers cost around hundreds of pesos. Compared to those, the deodorizer product of this research will be affordable and easily accessible. The materials are also available at nearby sari-sari stores and even in one's own kitchen pantry.

Furniture plays a crucial role in our daily lives, or our houses, but it always acquires dust, and smell over time. In poor countries like the Philippines, odor removal items cost expensive, and there is a need for cheap and alternative deodorizers. This research has a goal to develop a homemade deodorizer using eggshells and coffee grounds to remove furniture odor as an affordable and eco-friendly alternative.

By applying different ratios, the time of applications, and furniture materials, this study aims to determine the most effective eco-friendly product while avoiding such potential dangers like staining.

The discovery suggests that this deodorizer can neutralize odors effectively, particularly on foam and leather-based types of furniture without leaving stains. However, the difference in absorption and effectiveness show the need for further improvement. Lastly, this research shows that recycling household materials for deodorizing furniture offers a cheap and sustainable solution, providing a different solution to avoid spending too much for deodorizers while promoting being environmentally sensitive.

This research studies the effectiveness of using common household ingredients, coffee grounds and eggshell powder, as an affordable alternative in commercial deodorizer. Benefactors include consumers due to affordability of the product since the raw materials required are easily available. Moreover, this can help manufacturers in potentially reducing costs in procuring raw materials and in the production of deodorizers. Additionally, future researchers can use this study as a related literature and reference for their own research studies. Lastly, this can also benefit the environment, as materials for solid deodorizers can be organic and biodegradable, reducing land and water pollution.

The study aims to investigate the efficacy of eggshell and coffee powder as alternative components for deodorizing common furniture in both leather and foam-based furniture in the aim to utilize said components for an affordable and organic deodorizer. The main factors of the study will be the impact of the organic deodorizer, in particular, its notable effects on odor in furniture made out of leather and cotton under controlled conditions.

The study focuses on foam and leather-based chairs and sofas, as a result, other furniture that are manufactured from less-common materials will not be included in the following experiment. That being said, materials for coffee, eggshell and solid deodorizers will be sourced locally in Navotas City as per their availability. Meanwhile, such furniture will be sourced by each researcher along with containers per ratio of the deodorizer product.

›e set-ups will be used for eggshell powder and coffee rounds: 1) ¼:¾, 2) ½:½, 3) ¾:¾,, totalling to one tablespoon, in which such ratios are mixed and applied by the researchers themselves. Therefore, the accuracy of the responses from the questionnaires will depend on the truthfulness of the participants (i.e. the researchers). Lastly, external factors such as ventilation, age and weather conditions are excluded from the research but are still considered in the findings.

2. METHODOLOGY

2.1 Material Lists

1. Eggshells
2. Used coffee grounds
3. Silica gel
4. Plastic container
5. Plastic spoon
6. Teabags
7. Mortar and pestle
8. Plastic cover

2.2 Experimental Procedure

The deodorizer products are created by grinding both substances into powder. Each product measures to one tablespoon or 15 ml in three varying ratios of eggshell powder to coffee grounds: 3.75:11.25 ml (¼:¾), 7.5:7.5 ml (½:½) and 11.25:3.75 ml (¾:¼).

Using a commercial paper teabag, the deodorizer

is left to sit in an area of the furniture as the experimental set-up, while an equal area is isolated as the control set-up. The effect of the deodorizer is checked in the area every fifteen minutes until one hour, in which the results are rated by the researchers.

2.3 Statistical Analysis

A table will be provided for comparing and contrasting the data gathered from the setups. With this, the mean shall be used in statistical analysis. A Likert scale from 1 to 7 will be implemented, with the data being used to calculate the mean or average performance of the deodorizer in neutralizing odor. The data collection will fall under these criteria:

Numerical Rating	Observation
1	Completely Ineffective
2	Very Ineffective
3	Moderately Ineffective
4	Neutral
5	Moderately Effective
6	Very Effective
7	Completely Effective

Additionally, the recorded ratings of the set-ups per 15-minute intervals will then be used to find the optimal duration for the deodorizer to take effect using the mean formula of :

$(\bar{x} = (\sum x_i)/ n)$

Whereby:

$\bar{x}$= average score for the duration

x_i = individual value of each interval

$\sum x_i$ = sum of all values

n = total number of values in the data set.

2.3 Data Collection

The tables 1.1 to 1.3 will display the collected data from varying ratios of the variables as well as their duration.

Table 1.1 – One-fourth tb eggshells : Three-fourth tb coffee grounds

Duration	Scale
15 minutes	4
30 minutes	5
45 minutes	6
60 minutes	7

This table shows the effectiveness of the deodorizer in the ratio of ¼ tablespoon of eggshells to ¾ tablespoon of coffee grounds. This mixture showed promising results in deodorizing, while also leaving a very strong caffeine odor in the furniture.

Table 1.2 – One-half tb eggshells : One-half tb coffee grounds

Duration	Scale
15 minutes	3
30 minutes	4
45 minutes	5
60 minutes	5

This table shows the effectiveness of the deodorizer in the ratio of ½ tablespoon of eggshell to ½ tablespoon of coffee grounds. This mixture also showed promising results in deodorizing and moisture absorption, while leaving minimal smell of caffeine in the furniture.

Table 1.3 – Three-fourth tb eggshells : One-fourth coffee grounds

Duration	Scale
15 minutes	2
30 minutes	3
45 minutes	5
60 minutes	4

This table shows the effectiveness of the deodorizer in the ratio of ¾ tablespoon of eggshell and ¼ tablespoon of coffee grounds. This mixture showed less promising results in deodorizing, leaving only a very faint smell of caffeine in deodorizing.

Overall, these tables showed the effectiveness of the deodorizer in three different ratios, in which the researchers determined that the most optimal ratio of eggshell powder to coffee grounds is the ½:½ ratio, it was more effective in absorbing moisture and deodorizing furniture, especially at the 45 to 60 minute mark.

3. RESULTS AND DISCUSSION

3.1 Furniture Type

The tables 2.1 to 2.3 will contain the ratings and observations on each furniture type and each ratio of materials, evaluated over a period of one hour. The following set-ups for each furniture type used similar ratios of one-half eggshell powder and one-half coffee grounds. The researchers observed the odor using the 1-7 Likert Scale as per the Statistical Analysis, along with noting additional observations.

Table 2.1 – The Effectiveness of ½ Coffee Grounds and Eggshell Powder on Foam Bed

Duration	Scale
15 minutes	3
30 minutes	5
45 minutes	5
60 minutes	6

This table shows the effectiveness of the deodorizer in a foam bed. The product showed very great deodorizing properties especially during the 60 minute mark, with only a slight smell of caffeine.

Table 2.2 – The Effectiveness of ½ Coffee Grounds and Eggshell Powder on Foam Couch

Duration	Scale
15 minutes	2
30 minutes	4
45 minutes	5
60 minutes	5

This table shows the effectiveness of the deodorizer in a foam couch. The product showed moderate deodorizing properties especially at the 45 to 60 minute mark, with only a slight smell of caffeine.

Table 2.3 – The Effectiveness of ½ Coffee Grounds and Eggshell Powder on Leather Couch

Duration	Scale
15 minutes	1
30 minutes	2
45 minutes	3
60 minutes	5

This table shows the effectiveness of the deodorizer in a leather couch. The product showed poor deodorizing properties at the 15-30 minute mark and moderate deodorizing properties in the 60 minute mark, with noticeable traces of caffeine.

After recording the rating of the deodorizer per 15-minute intervals, the researchers recorded the mean of the product's score during each 15-minute interval and concluded that 60 minutes is the most optimal duration. The mean of the three set-ups for the 60-minute mark was calculated by:

$$\bar{x} = (16)/(3)$$

Whereby:

$\bar{x}$ = average score for the duration

$x_i = 6, 5, 5$

$\sum x_i = 6 + 5 + 5$

$\sum x_i = 16$

$n = 3$

Therefore, the calculated mean for the product's score

in the 60 minute mark is 5.33 out of 7, being moderately effective.

3.2 Stain Assessment

Table 3 – Stain Assessment on Each Furniture

Furniture Type	Stain Observation
Foam bed	No Stain
Foam couch	No Stain
Leather couch	Slight caffeine stain

This table displays the level of visual stains left on each furniture type after one hour of application. Among the three furniture types, only the leather couch was left with visible caffeine stains after the application.

4. CONCLUSION AND RECOMMENDATION

This study explored the use of eggshell powder and coffee grounds as natural deodorizers for furniture. Testing different ratios revealed that the ½:½ ratio of eggshell powder to coffee grounds was the most effective at neutralizing odors from both foam and leather furniture. The mixture worked best on foam, where odors were eliminated within 30-45 minutes, while leather took a bit longer. Foam furniture showed no staining, but slight caffeine stains were observed on leather surfaces.

These findings suggest that a ½:½ mixture offers a cost-effective and eco-friendly solution for deodorizing furniture. It provides a viable alternative to chemical deodorizers while reducing the environmental impact. The approach is simple, affordable, and accessible, making it a practical option for homeowners looking to use natural solutions in their homes.

Further studies should examine the impact of environmental factors, such as humidity and ventilation, on the deodorizing effectiveness of the mixture. Additionally, testing the mixture on a wider variety of materials could help assess its broader applicability. Experimenting with different proportions of eggshell powder and coffee grounds could yield even more effective ratios, especially for particular types of furniture or materials, and a wider range of odors could be tested.

Given the potential for staining on leather surfaces, users should conduct a patch test before applying the mixture to avoid any unwanted discoloration. In conclusion, this study demonstrates the promise of natural deodorizing agents, with eggshell powder and coffee grounds proving to be an effective and sustainable solution for keeping furniture fresh.

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Utilization of Waste Cooking Oil as an Eco-friendly Alternative for Sodium Lauryl Sulfate (SLS) in Laundry Detergent Component

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Abstract: Laundry detergents also have sodium lauryl sulfate (SLS) as their common ingredient, a surfactant with intense foaming and cleaning characteristics. SLS is, however, an environmental and health issue that causes skin irritation and takes time to biodegrade. In contrast, waste cooking oil is a significant contaminant that ends up being discarded in the wrong way, clogging drains, and polluting water. The potential for substituting SLS in laundry detergent formulations with waste cooking oil as a greener option is explored in this study. The objective of this research was to determine if soap produced from waste cooking oil can substitute SLS and continue to function effectively in cleaning. The research was conducted in two phases. Waste cooking oil was first purified and subjected to saponification with sodium hydroxide, producing solid soap. The soap was tested for both foaming ability and cleaning power. In the second phase, the hardened soap was ground into fine particles and incorporated into a powder laundry detergent. The performance of the detergent was evaluated by washing soiled fabric. The outcome indicated that waste cooking oil-based soap generated considerable foam and performed well in removing stains, as good as normal SLS-based detergents. No irritation to the skin was also reported, making it a safer option. This research points to the possibility of using waste materials for recycling into clean products, thus lowering pollution levels and encouraging ecological responsibility. The cost-effectiveness and mass production can be explored further.

Key Words: Cooking Oil; Sodium Lauryl Sulfate; Saponification Process; Laundry Detergent

1. INTRODUCTION

1.1 Background of the Study

People often do their laundry every day, sometimes the other day, per week or if needed, depending on the type of what they are washing. Multiple washes could be observed on an average household basis for the reason of the separation of color into categories (e.g. white, black, dark, light colors), quantity, variation of fabric, size, and considering the type of washing machine they use, in the modern era, or through hand wash. With the aid of laundry detergent, either in common forms of powdered, liquid, pods or known as single-dose packs, strips, and bars, they aid in cleaning thoroughly by eliminating pathogens, odors, and stains; instilling freshness, safety, and preservation of quality in clothes. Wastewater used for laundry is drawn straight into sewage, and later on can be used for treatment (Water and Wastewater Facilities | Manila Water Company, Inc., n.d.).

ıaware of the presence of different components in a detergent, some of them can have disadvantages — which can lead to destructive and adverse effects in both health-related and environmental impact. Such examples of common harmful ingredients found in it are fragrances, ethanol, sodium lauryl sulfate (SLS), and propylene glycol. These ingredients tend to cause harm and root problems if not properly used and observed. Upon careful analysis and research, it is found that sodium lauryl sulfate or better known as SLS for short, is found widespread in cleansing, cosmetic, and personal care products.

As mentioned earlier, sodium lauryl sulfate, or SLS, is a chemical ingredient and primary surfactant used for foaming and cleansing, especially in detergent with a weight ratio of 10-20% by active content. On the contrary, it is claimed to be safe when it is observed in proper amounts and usage, when not, it can cause adverse effects. The World Health Organization (WHO) has issued a number of SLS warnings. According to the Journal of Clinical Toxicology on the study of toxicity of SLS, it can irritate the eyes, lungs,

and respiratory system and be dangerous if swallowed (Dhruv, 2023). For those with sensitive skin, the possibility of irritation is especially significant. In addition to skin issues, there have been talks over SLS's potential negative environmental effects due to its petroleum origins and very slow rate of biodegradation.

Likewise, waste cooking oil has its environmental impacts if not disposed of and segregated properly into bins, making it as alarming and concerning as it can be when tons of liters are being used daily. Not only does it clog sinks in households, but it also affects the land and water ecosystem drastically - being one of the main sources of pollution worldwide. Utilizing waste cooking oil, as it is now being used and implemented in studies such as oil-derived soap bars and biodiesel, can also be an environmentally safe surfactant. Oils contain several chemical components including triglycerides and free fatty acids, which are the crucial elements in making soap-related products. Through filtering the used waste and the process of saponification, it has the potential to replace SLS and uplift major problems that both have adverse impacts in different areas and sectors.

Hence, with this study, waste cooking oil can act as a potential eco-friendly material alternative in a safer, more efficient, greener, and sustainable way, rather than sodium lauryl sulfate, which promotes minimalizing pollution, and less toxicity to impact and effects for humans and the environment. Thus, with this, the researchers want to know if it can function effectively as a surfactant component, replacing SLS, in a laundry detergent after conducting, implementing, and analyzing the variables.

1.2 Significance of the Study

Sodium lauryl sulfate (SLS) is a widely used surfactant in detergents and its effects on health and the environment have been widely infected mainly due to its chemical characteristics. This research aims to present an economically friendly option seeking to

investigate the possibility of using waste cooking oil which is a renewable and reusable material to counter the negative effects that are usually attributed to common surfactants. The sum of this study can be useful in changing the state in the segment of the laundry detergents and help in the creation of new environmentally friendly products. This research focuses on the utilization of used cooking oil in terms of its advantages and how it is better than the other options. The outcomes of this study can be used for the synthesis of a more environmentally friendly and efficient alternative of SLS derived from used cooking oil.

The usage of used cooking oil as an alternative to the presence of SLS is crucial to alleviate concerns regarding SLS-related skin health issues and provides an adequate component for people who are sensitive to typical detergent-induced irritations. Further, the integration of cooking oil also benefits the environment by minimizing the contamination it can lead to in wet and dry environments, influencing the market to move over to safer products for both consumers and the environment, ensuring a well-sound future of sustainability and cleaner laundry solutions as consumers tend to favor eco-friendly products. Offering an effective replacement that satisfies the rising need for skin and an eco-friendly cleaning solution, thereby opening the door for a more consumer-focused and sustainable approach to laundry care.

1.3 Scope and Delimitations

The intent of this study is to learn how used cooking oil can be utilized as a surfactant substitute for sodium lauryl sulfate (SLS) in laundry detergent. As cooking oil, being a waste, that could cause harm to the ecosystem, can be used as a sustainable alternative through processes that minimize the damaging impact on Earth, unlike SLS which could harm human health. Different steps and measures will be used to combine the ingredients, resulting in a powdered laundry detergent, excluding the sodium lauryl sulfate and substituting it with used cooking oil through the saponification procedure. Solvents, surfactants, anti-redeposition agents, enzymes, stabilizers, bleach, brighteners, dyes, and perfumes will be used as the base ingredients to form the expected output. The product will be tested on a sample fabric to determine its efficacy through data and understanding. As a result, the findings of the study will be used to establish on how effective is used cooking oil as a substitute for SLS in laundry detergent. It should be notified that the negative effects of sodium laureth sulfate (SLES) will not be tested further. People tend to get confused over the difference between SLES and SLS because of its shared similarity; thus, to specify, it will not be included in the study.

It ought to be noted as well that hazardous substances mentioned earlier such as fragrances,

ethanol, and propylene glycol will not be included as well since the focus will take place solely on replacing sodium lauryl sulfate, same as experimenting on the types of cooking oil (vegetable, olive, coconut, sesame, peanut, etc.) to determine the effectiveness and suitability of the outcome. The health concerns regarding with SLS will not be tested.

2. METHODOLOGY 2.1 Data Gathering Procedure Mentioned in the flowchart covers the equipment, apparatuses, and ingredients that will be needed in the study to create a detergent, as well as various sample clothes with different kinds of stains (e.g. dirt and condiment spills), sodium lauryl sulfate (SLS) which tends to have effects on human health and environment, and its alternative, waste cooking oil that can serve as an eco-friendly replacement in achieving minimal harmful impact. Furthermore, it tackles the method of making the detergent — the dry mixing process, which involves blending the components into a powdered consistency, similar to grinding, a process in physical technique "to become pulverized, polished, or sharpened by friction (Merriam-Webster Dictionary, 2024)" and the saponification method that transforms the waste cooking oil into a surfactant through filtration and process. The aim of the study is to test the detergent without the presence of SLS as it will undergo experimentations, testing, and analysis in substituting with cooking oil as its counterpart for its effectivity as its outcome.

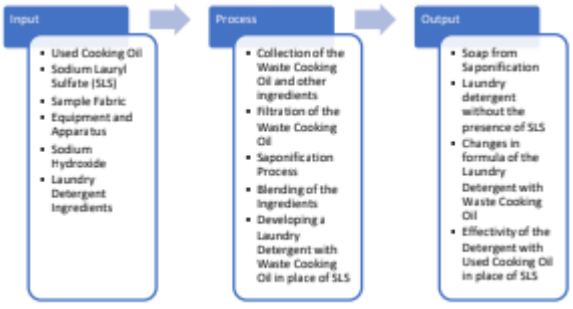


Fig. 1. Input-Process-Output Flowchart. 2.2 Statistical Analysis The rating is set to investigate and analyze the overall cleaning capability of the product, effects of the outcome, and evaluate the feasibility of switching from sodium lauryl sulfate (SLS) to a waste cooking oil-based surfactant. However, it may have a potential not be as effective as SLS, used cooking oil, undergoing the saponification process, nonetheless performs the same function without endangering the well-being of the environment in accordance to the study that the researchers conducted to determine the effects and changes of replacing SLS with an alternative. Below is the list of levels that aims to answer the results of the expected output, together with the rating values ranging from 1, being completely free from stains, to 5, being the dirtiest:

Dirtiness Scale of Hands

Level	Description
1	Completely Clean: No signs of stains such as marker, highlighter, and ink. Leaves no marks and gives overall cleaning sensation.
2	Slightly Dirty: Barely visible stains that are applied to the skin. Looking clean and unnoticed under normal viewing conditions.
3	Mildly Dirty: There are light stains on the skin that are now slightly noticeable but still appear to be clean.
4	Moderately Dirty: Stains on the skin are now noticeable but not completely covering it.
5	Very Dirty: Visibly dirty being covered in heavy stains of marker, highlighter, and

Table 1. Dirtiness Scale of Hands.

Dirtiness Scale of Fabric

Level	Description
1	Completely Clean: No signs of stains such as ink, dirt, and dust residue. Having no signs as well of discoloration on the fabric and in perfect condition.
2	Slightly Dirty: Barely visible stains that are applied to the fabric. Looking clean and unnoticed under normal viewing conditions.
3	Mildly Dirty: There are light stains on the fabric that are now slightly noticeable but still appear to be clean.
4	Moderately Dirty: Stains on the fabric are now noticeable but not completely covering the fabric.
5	Heavily Dirty: Visibly dirty being covered in heavy stains of ink, dirt, and dust residue. It is very dirty and needs significant cleaning.

Table 2. Dirtiness Scale of Fabric.

Equation An equation will be used to show the percentage of the cleaning effectiveness of the product, depicting how much of the stains were removed after going through a cleaning process. This will be the same applied to both stains applied on hands and fabric. Below here will be the formula demonstrating how it will be computed for individual stains: Cleaning Effectivity (%) = Initial Stain Level − Residual Stain Level Initial Stain Level − 1 × 100 Whereby:

• Initial Stain Level refers to the individual stain level applied to the hands/fabric before washing.

• Residual Stain Level refers to the individual stain level applied to the hands/fabric or amount remaining after the cleaning process, together with the product.

To compute for the overall cleaning efficiency of the product or the mean for both phases, another equation will be used: Cleaning Effectivity (%) = Total Stain Removed + Number of Stains Total Initial Stain Level × 100 Whereby:

• Total Stain Removed refers to the stain removed after getting the difference between initial and residual dirt.

• Number of Stains refers to the number of stains per test performed in the phase.

• Total Initial Stain Level refers to the sum of all initial stain level gathered from the tests per phase.

3. RESULTS AND DISCUSSION

3.1 Phase 1: Soap Results

Table 3. Test 1: Marker

Type of Stain	Initial Stain Level	Residual Stain Level	Cleaning Effectivity
Marker	4	1	100%

Table 4. Test 2: Highlighter

Type of Stain	Initial Stain Level	Residual Stain Level	Cleaning Effectivity
Highlighter	3	1	100%

Table 5. Test 3: Pen

Type of Stain	Initial Stain Level	Residual Stain Level	Cleaning Effectivity
Pen	4	1	100%

Table 6. Average Cleaning Efficiency

Tests	Total Stain Removed	Total Initial Stain Level	Cleaning Effectivity
1 (Marker), 2 (Highlighter), 3 (Pen)	8 (Stains Removed) + 3 (Number of Test Stains)	11 (Sum of all Initial Stain Removed)	100%

In the first phase of experimentation, three tests were conducted to evaluate the soap's cleaning performance. These tests were designed to assess its effectiveness in cleaning various stains. For this purpose, the researchers used ink-based stains to evaluate the soap's cleaning capability. The first test focused on the removal of marker stains. Initially, the stain intensity was rated at 3 on the evaluation scale, reflecting the heavy pigmentation of the marker. After the washing process, the final stain intensity was reduced to 1, indicating complete removal of the marker stains. The second test assessed the detergent's ability to remove highlighter stains.

The initial stain intensity was rated at 3 on the evaluation scale. Following the washing process, the final stain intensity was also reduced to 1,

demonstrating effective removal of highlighter stains.

The third test examined the removal of pen stains. The initial stain intensity was rated at 4 on the evaluation scale. Similar to the previous tests, the final stain intensity was reduced to 1 after washing, indicating successful elimination of pen stains. Overall, the soap proved to be highly effective in removing various ink-based stains, consistently achieving complete stain removal across all tests. Despite the absence of additional components such as pre-mix ingredients and foam boosters, the soap itself still proved to be an effective stain remover.

These results confirm that strong cleaning power does not have to come at the expense of the environment. By delivering effective stain removal, the soap demonstrates potential as a sustainable alternative, cleaning efficiently without relying on harsh chemicals commonly found in conventional detergents, such as SLS.

Throughout the three tests conducted, the researchers observed no instances of skin irritation or other health-related issues. Based on these results, the soap is considered a suitable potential to be integrated into the detergent with its cleansing capability and being harm-free with regards to health, in contrast to the existing detergents containing harmful chemicals.

3.2 Phase 2: Laundry Detergent Results Table 7. Test 1: Soap

Type of Stain	Initial Stain Level	Residual Stain Level	Cleaning Effectivity
Marker	4	2.5	50%
Dust	5	1	100%
Dirt	5	2	75%

Table 8. Test 2: Soap, Pre-mix

Type of Stain	Initial Stain Level	Residual Stain Level	Cleaning Effectivity
Marker	4	2	66.67%
Dust	5	1	100%
Dirt	5	1.5	87.50%

Table 9. Test 3: Soap, Pre-mix, Foam Booster

Type of Stain	Initial Stain Level	Residual Stain Level	Cleaning Effectivity
Marker	4	1	100%
Dust	5	1	100%
Dirt	5	1	100%

Table 10. Average Cleaning Efficiency

Tests	Total Stain Removed	Total Initial Stain Level	Cleaning Effectivity
1 (Soap)	8.5 (Stains Removed) + 3 (Number of Test Stains)	14 (Sum of all Initial Stain Removed)	82.14%
2 (Soap, Pre-mix)	9.5 (Stains Removed) + 3 (Number of Test Stains)	14 (Sum of all Initial Stain Removed)	89.29%
3 (Soap, Pre-mix, Foam Booster)	11 (Stains Removed) + 3 (Number of Test Stains)	14 (Sum of all Initial Stain Removed)	100%

In the second phase of the experiment, three tests were conducted to further evaluate the detergent's performance.

The first test focused on the soap itself. The 45g product was tested on towel fabric stained with marker, dust, and dirt. For this test, the researchers utilized the traditional hand-washing method, which effectively removed 82.14% of the corresponding stains: For marker stains, the initial stain intensity was rated at 4 on the evaluation scale. As marker stains tend to adhere firmly to fabrics and cannot be removed with water alone. After the washing process, the stain

intensity decreased to 2.5, leaving minimal residue. For dust, the initial stain intensity was rated at 5, with the buildup visibly present in the wastewater.

Following the washing process, the final stain intensity was reduced to 1, demonstrating complete and effective removal of dust. For dirt stains, the initial stain intensity was rated at 5, as soil and other substances were clearly noticeable on the fabric. After washing, the stain intensity decreased to 2, leaving minor residues on the material. Overall, the normal mixture proved to be highly effective in removing all types of stains, with dust removal achieving 100% cleaning effectiveness. This highlights the mixture's strong performance, particularly in eliminating dust, while also demonstrating satisfactory results in reducing marker and dirt stains. In the second test, it was focused on the mixture that was composed of 40g of soap and 10g of premix 4-1.

The product was tested on towel fabric stained with marker, dust, and dirt. For this test, the researchers utilized the traditional hand-washing method, which effectively removed 89.29% of the corresponding stains: For marker stains, the initial stain intensity was rated at 4 on the evaluation scale. As marker stains tend to adhere firmly to fabrics and cannot be removed with water alone. After the washing process, the stain intensity decreased to 2, leaving minimal residue. For dust, the initial stain intensity was rated at 5, with the buildup visibly present in the wastewater. Following the washing process, the final stain intensity was reduced to 1, demonstrating complete and effective removal of dust. For dirt stains, the initial stain intensity was rated at 5, as soil and other substances were clearly noticeable on the fabric.

After washing, the stain intensity decreased to 1.5, leaving minor residues on the material. Overall, the normal mixture proved to be highly effective in removing all types of stains, with dust removal achieving 100% cleaning effectiveness.

This highlights the mixture's strong performance, particularly in eliminating dust, while also demonstrating satisfactory results in reducing marker and dirt stains. In the third test, it was focused on the mixture that was composed of 10 grams of pre-mix, 40 grams of soap and 5 grams of foam booster. The product was tested on towel fabric stained with marker, dust, and dirt.

For this test, the researchers utilized the traditional hand-washing method, which effectively removed 100% of the corresponding stains: For marker stains, the initial stain intensity was rated at 4 on the evaluation scale, as marker stains tend to adhere firmly to fabrics and cannot be removed with water alone. After the washing process, the stain intensity decreased to 1, indicating complete removal of the marker stains.

For dust, the initial stain intensity was rated at 5, with the buildup visibly present in the wastewater. Following the washing process, the final stain intensity was reduced to 1, demonstrating complete and effective removal of dust. For dirt stains, the initial stain intensity was rated at 5, as soil and other substances were clearly noticeable on the fabric. After washing, the stain intensity decreased to 1, indicating successful elimination of dirt stains. Overall, among the three experiments, the third test was the most successful. Achieving 100% cleaning effectiveness proves that the detergent can remove tough stains without relying on harmful additives.

No stains were visible on the fabric after the experiment, demonstrating the detergent's exceptional stain removal capability in this test. The varying results across the three tests help identify which combinations of ingredients are most effective in creating a detergent that has the capability to effectively remove different types of stains. This research is significant as it promotes Presented at the sustainable product development and environmental protection by exploring the use of waste cooking oil as an alternative ingredient in laundry detergent, contributing to ecological sustainability. Based on the findings, the mixture shows strong potential as a safe and effective alternative to conventional cleaning products.

4. CONCLUSION AND RECOMMENDATIONS

4.1 Conclusion

The saponification process experiment, which involved turning wasted cooking oil into solid soap, was highly successful. This first experiment began with a feasibility test in which leftover cooking oil was turned into soap using the following necessary ingredients and apparatuses: water, sodium hydroxide (lye), mortar and pestle, beaker, weighing scale, and a stirring rod. The best result was obtained by carefully following the intended saponification process. The use of the soap itself showed that there was no irritation of the skin, and hence its use on a daily basis would be feasible. With its exceptional cleansing, the soap gently washed hands, removing stains based on results and leaving them always clean after use. After the soap was hardened, it shows how greatly it foams and cleans; it has shown to be a reliable cleaning solution.

With the addition of eucalyptus oil, it gave a nice, scented finish. Overall, the experiment showed that used cooking oil may be recycled into soap that is both fragrant and helpful. In the second experiment, sodium lauryl sulfate (SLS) was substituted for the hardened soap created from used cooking oil in the laundry detergent. The experimenters decided to cut up the hardened soap into small pieces in order to mimic the powdered consistency. After pulverizing the hardened soap, the correct amount was measured and incorporated it into the mixture. Along with the standard ingredients such as the product of the saponification process, pre-mix, and foam booster, all of them were combined to create a powder-based detergent and divided it into three sections to determine the best formula. Once created, three sample clothes with stains incorporated are tested with labels test 1, test 2, and test 3. As mentioned earlier, the inclusion of all components or known as test 3 bested other formulas, proving how it was further effective in removing stains without facing further complications.

4.2 Recommendations

The experimentation was divided into two parts – the saponification process and the making of the laundry detergent. In contrast to both of the successful procedures, the researchers also encountered difficulties in performing the study. These problems were faced such as the availability and searching the right equipment, area of difficulty, and minuscule accuracy of the measurement of ingredients used to make the laundry detergent.

Even if the research was concluded into a success, there are still room for recommendations to further improve the study. These might aid for future related areas of research and help to combat problems faced with laundry detergent in alignment with the objectives. The following are the suggestions of the researchers for the coming investigations. Invest in time for research. One of the difficulties of the researchers faced were limited information due to time management, which led to some parts to be completed in a rush. Having equipped with accurate and feasible data will aid to achieve expected results and search for alternatives with ease. More tests and experiments.

The researchers only opted to a towel and rinsed with through handwash for the laundry detergent. Using a variety, such different types of fabric and washing machine might help to achieve overall success. Explore different kinds of detergent. Laundry detergent does not only end with powdered consistency, but it also exists in other forms such as liquid, sheets, bars, pods, and etc.

The study only focused on replacing SLS in the powdered laundry detergent due to availability. Find eco-friendly alternatives for other harmful substances present in detergent. SLS is one of the various components that could be found, but it has the most impact on health and environment. Others also include propylene glycol, fragrance, ethanol, etc. Use protection like masks, gloves, and apron. During experimentation, the researchers encountered irritation and inhalation from the ingredients,

especially chemicals like sodium hydroxide and SLS, which might cause harm to skin and lungs when in contact with large amounts of these. Using barriers and washing hands after trial will avoid any unwanted harm.

To conclude, the researchers suggest to invest time in research, opt for more tests and experiments, explore a wide variety of detergent forms, find alternatives for other harmful components, and usage of masks, gloves, and apron. These recommendations were based from experiences faced in conducting the study. In addition, it might help future investigations to explore the aspects of laundry detergent and mitigate potential harms and risk posed to health and the surrounding environment.

5. ACKNOWLEDGMENTS

The researchers would like to thank and recognize the following for their contribution in concluding this research as a success. First and foremost, we would like to express our gratitude to Ms. Stella Gabales, our Basic Research 2 teacher, and Mr. James Daniel Miranda, our former Basic Research 1 teacher, for their necessary advice, ongoing assistance, and support throughout this paper. We couldn't have accomplished our study without their assistance, knowledge, and experience to help us along the way. Their support and helpful criticism have been significant in improving our research and gave their best to assist us. The researchers would like to express their sincere gratitude to our research leader, Filius Laureano, whose invaluable guidance and unwavering support made this research possible. Laureano's deep knowledge of both the scientific and environmental aspects of this study significantly contributed to shaping the direction and success of our work. His determination and hard work helped greatly with our research, particularly during the periods when he had restless nights trying to finalize our study. Finally, the research leader and its members as well wish to acknowledge our members: Althea Mae Bulaong, Anika Skye Calica, Zaira Mae M. Gailo, Breanne Mathena Loza, and Caylie Jeriel Magpayo for providing accurate resources for our research, their dedication, and collaboration throughout our research. Special thanks to Bulaong and Calica for giving additional ideas and suggestions while conducting our research; Gailo for writing down important notes for the revision of the paper; Loza for aligning the objectives of the study; and Magpayo for bringing the needed resources, which significantly advanced the quality of the parts in our research.

Ticks Be Gone: Calamansi Peels and Castor Oil Plant Seeds as an Acaricide.

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Abstract; In summary, the researchers experiment tried to make an acaricide against ticks by using calamansi peels and castor oil plant seeds. The researchers then found out that calamansi peels have a compound that is limonene. The researchers had researched that limonene can put an end to/eliminate ticks. The researchers then also found out that castor oil plant seeds have a compound that is poisonous that is called ricin, which can also put an end to/eliminate ticks. The researchers then conducted an experiment to see if limonene in calamansi peels and ricin in castor oil plants can really put an end to/eliminate ticks. The researchers then did a test by only using 1 calamansi peel and 2 castor oil plant seeds. Then the researchers extracted the calamansi peel by using an alcohol burner and then later added the castor oil plant seeds. Then the researchers put it in a spray bottle using a paper funnel. The researchers then tried to spray it on the ticks and waited for 40 minutes, and if the spray lasted for 40 minutes, the researchers considered it a failed experiment. During the experiment, the researchers then observed that when the product is sprayed on the ticks, the ticks are just getting weak to the product and kind of attracted to the product because the researchers observed that the ticks are getting close to the product rather than staying away from it, so the researchers hope that this finding in their experiment can be helpful for the future researchers.

Key Words: Ixodida(ticks),Acaricide,External Parasites,Calamansi peels(limonene), castor oil plant seeds(ricin)

1. Introduction:

Ixodida or more commonly known as ticks continue to spread and grow in population. A single female ticks can lay a thousand eggs at once, these are hard to detect because of their small size and painless bites making them difficult to notice to the host. These ticks are problems both to pet owners and animals as they are known to carry different types of diseases such as Lyme diseases, Rocky Mountain spotted fever, and ehrlichiosis, which can cause severe problems if left untreated. Furthermore, different types of ticks have shown resistance to most acaricide treatments reducing the effectiveness of most chemical based acaricides, as a result of that concerns have grown. This study aims to create a acaricide using natural substances that is safe to both pet owners and animals, is effective, strong enough to eliminate the ticks while keeping the animals safe, and cost-effective.

The study focuses on making an acaricide using natural substances such as calamansi (Citrus microcarpa) peels and castor oil plants (Ricinus communis) seeds as active ingredients, These natural substances are known for their potential pesticidal properties and are readily available, making them an affordable and environmentally friendly alternative to synthetic chemical acaricides. Our research aims to contribute to making new innovations of pet products and to show that using natural substances can also be effective in making an acaricide. This study can benefit the consumers, future researchers, and the environment. Pet owners and the animals will have a safer and more natural acaricide treatment, the researchers will gain more knowledge about how natural substances can be made into an alternative instead of using chemical based substances, and the environment will benefit the lives of animals, improving the well-being of animals affected by

the ticks.

The scope of this research is to determine if using limonene and ricin can be made into a natural acaricide that is safe and effective for daily use in animals and humans.

2. METHODOLOGY

TEST	1 - Poor	2 - Fair	3 - Good	4 – Very Good	5 – Excellent
Test#1	/				
Test#2	/				
Test#3	/				

As the researchers conducted their research with the use of the table below, they could determine which of their tests did well.

The table shows that from the researchers experiment, their tests 1 to 3 did badly and considered their experiment as a failed research.

$$\text{MEAN} = \frac{3+3+2}{3} = \frac{8}{3} = 2.67$$

3. Results and discussion

Using the experimental research design, we conducted 2 experiments One with measurement and one without measurement and we used the equation for mean to get the mean of our research here are the tables for said experiment:

TEST	NUMBER OF SPRAYS	MEASURE HOW FAR IS THE SPARY(inches)	TIME(minutes)
Test#1	3	10 inches	40min
Test#2	1	2 inches	20min
Test#3	2	5 inches	30min

TEST	NUMBER OF SPRAYS	TIME(minutes)
Test#1	3	40min

Test#2	1	20min
Test#3	2	30min

the researchers experiment, the researchers attempted using 1 calamansi peel and 2 castor oil plant seeds. During their first test, they tried only 3 sprays om the test subject and sprayed it 10 inches away from the test subject and waited for approximately 40 minutes. During their second test, they attempted using only 1 spray and sprayed it 2 inches away from the test subject and waited for approximately 20 minutes. During their third test, attempted only 2 sprays and sprayed it 5 inches away from the test subject (note that this test subject is significantly bigger than the previous 2) and waited for approximately 30 minutes. Unfortunately, as results show, all of their tests have been considered failed due to a lack of experiments, insufficient materials,and faulty materials.

4. CONCLUSION AND RECOMMENDATIONS

This study aimed to develop an acaricide using natural substances, limonene and ricin to create a safe and effective product for eliminating Ixodida. The results did not go well and it indicate that the product the researchers made was not effective, as it did not eliminate Ixodida within 30 minutes. There are many possible ways why it did not worked. First, the time may not be enough, meaning it needs a longer period of time on the ixodida for it to be eliminated. And second, the way the researchers make the acaricide, the hydrodistillation as the levels of toxin in ricin may have been reduced. Although the results did not go well, it still gave information that limonene and ricin may not be suitable being an acaricide. Based in the key findings that the researchers found, here are some of the recommendations that they could do.

First, the researchers can take longer period of time when experimenting it, to see what is the limit time of how the ticks will handle it. Second, the way they hydrodistillied it may affect the properties of both ingredients. Third, is how the researchers could use another ingredients that might also be high in toxin and then combining all to enhance its toxin level to work on ixodida.

5. Acknowledgement

We sincerely thank Ms. Stella Gabales for her assistance and support throughout this research. San Jose Academy is also thanked for the materials it provided. Gratitude is often expressed to friends, classmates, and family for their encouragement and support. Finally, thanks to God for giving us the intelligence and strength to carry out this project.

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Using Dog Fur as Filter for Oil Spill

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Abstract: This study investigates the potential of dog fur as a natural and sustainable oil absorbent for oil spill cleanup. Through experimental trials, its absorbency, oil retention, and reusability were evaluated alongside other natural materials such as peat moss, sawdust, cotton, and human hair. The results showed that dog fur effectively absorbed oil, with 60% of the water remaining clean after filtration. While some limitations were observed, further refinement could enhance its efficiency. Dog fur presents a promising, eco-friendly alternative for oil spill mitigation, contributing to marine conservation and environmental protection.

Key Words: Filtration; Substance; Process; Combination; and Dog Fur

1. INTRODUCTION

1.1 Background of the Study

Oil spills occur when liquid petroleum hydrocarbon is released into the environment, especially into oceans, rivers, and bodies of water. Oil spills happen when a ship accidentally releases oil. They can affect marine life, coastal habitats, marine ecosystems, and water quality. Long-term effects can include ecological damage, economic loss, and adverse effects on human health. A product that can help prevent or stop oil spills is being researched. According to various studies, human hair and animal fur can help prevent oil spills because they naturally collect oil. Just as they collect oil from your skin, they also collect oil from environmentally threatening oil slicks. This product can help prevent oil spills because fur and hair have a natural oil-absorbing property. An example is when you take a shower and use shampoo containing oil, which is absorbed by your hair and fur. Additionally, this product can help create protective barriers or wraps around sensitive coastal habitats or marine life affected by oil spills. The dog fur is one of the good things for cleaning oil spills. According to global specs, the dog fur is one of the effective things for cleaning oil spills from the storage tank, causing big problems. It can harm sea creatures, ruin a day at the beach, and make seafood unsafe to eat. The research team simulated three types of land surfaces; non-porous hard surfaces, semi-porous surfaces, and sand, to recreate common oil-spill scenarios. The researcher determined one of the effective methods for oil spilling is dog fur. Our product used dog fur that can be just as good as synthetic fabrics at cleaning up crude oil spills on hard land surfaces like highway roads, pavement, and sealed concrete floors. Polypropylene, a plastic, is a widely-used fabric used to clean up oil spills in aquatic environments. According to Dr. Murray, we find out that the peat moss absorbent was the least effective for absorbing oil leaks in our oceans.

2. METHODOLOGY

Research Design

This study employs an experimental research design to evaluate the effectiveness of dog fur as a natural oil filter. The research focuses on the absorbency, oil retention capacity, and reusability of dog fur compared to other natural oil absorbents such as peat moss, sawdust, cotton, and human hair. The study also investigates dog fur's performance in different oil spill conditions, including saltwater and cold-water environments.

Data Gathering Procedure

The experiment involved conducting three trials to assess the oil absorption efficiency of dog fur. The process included the following steps:
1. Water mixed with oil was passed through a filter made of dog fur.
2. The filtered oil was collected separately, and the cleanliness of the water was
assessed.
3. The experiment was repeated three times to ensure reliability.

Test Results:

• Test 1: All oil was absorbed, leaving nearly clean water.
• Test 2: Most oil was absorbed, but some passed through, likely due to the initial
filter use.
• Test 3: Similar to Test 2, with some oil passing through the filter.
After three trials, 60% of the water remained clean, while 7% of the oil was left unfiltered.

3. RESULTS AND DISCUSSION

Results

The results indicate that dog fur is an effective natural oil filter, capable of absorbing most oil spills. The first test demonstrated complete oil absorption, while the subsequent tests showed slight inefficiencies due to the reuse of the filter. Despite these limitations, dog fur proved to be a viable eco-friendly alternative for oil spill remediation.

Discussion

The filtration process required multiple rounds to remove most of the oil, but a small amount remained after the final test. This inefficiency highlights the need for improvements in filtration techniques to enhance dog fur's effectiveness in oil spill cleanup. Future research should explore methods to optimize the filtration process and investigate large-scale applications. Additionally, studies should analyze the impact of different dog breeds on absorbency levels and assess the economic feasibility of collecting and processing dog fur for commercial use.

4. CONCLUSION AND RECOMMENDATIONS

Conclusion

This study confirms that dog fur is a promising natural oil absorbent with significant environmental benefits. While some limitations exist, further research and refinement of filtration techniques can improve its efficiency. Dog fur offers a sustainable and accessible solution for mitigating oil spills, contributing to marine conservation and
ecosystem protection.

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Lastly, to Almighty God, for the strength and perseverance that led us to this educational milestone.

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Exploring Natural Alternatives: Investigating The Efficacy Of Egg Shells, Coffee Grounds And Aquarium Water As An Effective Fertilizer Product

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Abstract: *The growing concerns over reliance on synthetic fertilizers in modern agriculture have raised the need for better and more sustainable alternatives. This research explores the potential of using eggshells, coffee grounds, and aquarium water as natural, sustainable substitutes for synthetic fertilizers. It also investigates the nutrient content of these materials that can support plant growth and soil fertility. While synthetic fertilizers effectively boost plant growth, they contribute to soil degradation, greenhouse gas emissions, and water pollution, creating a need for environmentally friendly options. This study aims to evaluate the efficacy of these readily available waste products in promoting healthy plant growth and improving soil fertility.*

Additionally, the disadvantages of synthetic fertilizers in terms of soil quality, air and soil pollution, and mineral depletion are examined. The significance of this work lies in its potential to help farmers improve soil and plant health, benefit plant enthusiasts and flower shops, and contribute to environmental sustainability by increasing greenery through the use of natural fertilizers. The researchers believe that this approach not only reduces the negative effects of synthetic fertilizers but also encourages the recycling of waste materials that are frequently discarded.

Trials were conducted to test the efficacy of each formulation, and after testing various mixtures, one stood out as the most effective. These findings suggest that natural waste products not only help strengthen soil fertility and support plant growth but also minimize environmental waste and encourage organic gardening practices.

Key Words: *Coffee Grounds; Egg Shells; Aquarium Water; Sustainable Alternatives*

1. INTRODUCTION

1.1. Background of the Study

The widespread use of synthetic fertilizers has raised concern, primarily due to their adverse effects on the environment. Even with proper practice and dosage extensive use can still harm the conditions of our environment and to our health.

Many farmers are struggling to meet the demands due to the increasing population and the minimal resources, henceforth using fertilizers. Especially Synthetic fertilizers or chemical fertilizers
. Since they offer more profit to farmers. Synthetic fertilizers have a quick effect, are easily manageable, and cost less than organic but their downsides are what have harmful effects on the environment.

According to (Ritchie et al., 2022), estimate that nearly half the world's population relies on synthetic fertilizers,exceeding organic fertilizer use. This extensive use has lasting effects on soil and plants. Including reduced soil fertility, plant damage, even direct contact or exposure to synthetic chemical fertilizer can harm babies and cause health problems for many people (Ursry, 2012)

This study explores an alternative fertilizer made from Eggshells, coffee grinds, and aquarium water to address the negative environmental effects of synthetic chemical fertilizers. Although synthetic fertilizers are easy to apply and control, they can harm plants if overused and require frequent reapplication. This research offers a more safe and potentially more profitable long-term solution to farmers.

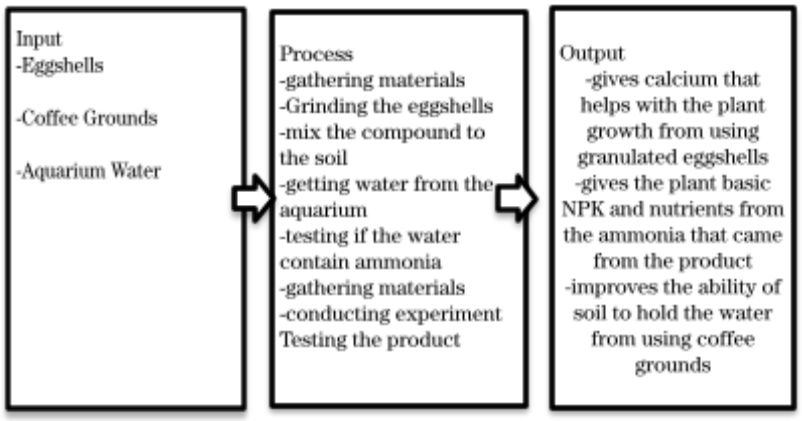
However, Some of its drawbacks are that it's slow-acting and one of its ingredients has high contents of nutrients, The Researchers are working for more optimal application to ensure plant health. Additionally, although organic fertilizers have the same basic NPK and nutrients as the researcher's study, Other organic fertilizers are made out of raw materials such as the researcher's study are made out of common goods.

Furthermore, Often eggshells, coffee grinds, and aquarium water are considered as waste. It has been identified as a potential ingredient for fertilizers. Easily accessible and can be made at home for plant use.

In this study, the researchers aim to make an alternative use for synthetic fertilizer using Eggshells, coffee grinds, and aquarium water as fertilizers. And would be tested for long-term use, efficiency, benefits, and progression. The researchers aim to make a safer way for plant growth without using chemicals

2.METHODOLOGY

2.1 Conceptual Framework



2.2 Material List

1. Coffee Grounds
2. Egg Shells
3. Aquarium Water
4. Measuring Cups
5. Mortar and Pester

2.3 Experimental Procedure

Phase 1: Crush the egg shells into smaller pieces, this will help your plants to absorb the nutrients easily and efficiently. The crushed egg shells will provide calcium, potassium, and magnesium.

Phase 2: Make sure to dry the coffee grounds before putting it to the soil, this will prevent the coffee grounds from molding into it. Also putting used coffee grounds will be more efficient, because they are less acidic compared to unused coffee grounds. Unused coffee grounds will be more effective for the plants because during the brewing process it reduces the caffeine from the coffee grounds.

Phase 3: Use the water from the freshwater aquarium during the usual routine of changing the water in the aquarium. Also make sure that the aquarium water doesn't have any salt or chemicals because this will harm the plants.

2.4 Statistical Tools

The rating system is set to investigate and find the efficiency percentage of the overall soil moisture, soil texture and the plant health.

Below are the ratings which are used to determine the efficiency of the mixtures:

Ratings	Soil Moisture	Soil Texture	Overall Plant Health
5	Very moist, soil waterlogged, potential for root rot	Very fine, smooth texture, excellent aeration.	Excellent, plants are robust and vigorous.
4	Moist, soil retains water well, plants thrive.	Fine, small particles, good aeration.	Very good, plants are thriving.
3	Moderately dry, soil slightly moist, plants appear healthy.	Medium, balanced particle size, adequate aeration.	Good, plants are healthy with minor issues.
2	Very dry, soil feels powdery, plants show signs of stress.	Coarse, noticeable large particles, some aeration.	Fair, plants show signs of stress but are alive.
1	Extremely dry, soil cracks and plants wilt.	Very coarse, large particles, poor aeration.	Poor, plants are dead or severely stressed.

Equation

A formula would be used to show the combined percentage of each table(soil moisture, soil texture, and overall plant health). Below here would be the formula going to be used:

$$\text{Efficiency Percentage} = \left(\frac{Total\ Score}{Maximum\ Possible\ Score}\right) \times 100$$

3. RESULTS AND DISCUSSION

What is the efficiency of the natural alternative fertilizer depending on the amount of Eggshells, Coffee Grounds, or Aquarium water used?

Table 1. Soil Moisture

	Trial1	Trial2	Trial3	Trial4
Eggshells	1	1	2	2
CoffeeGrounds	2	2	2	3
AquariumWater	2	3	5	5
SyntheticFertilizer	2	2	3	3

The first table presents a comparison of the materials we tested for their ability to moisturize the soil, alongside a synthetic fertilizer commonly available in local stores. Our findings indicate that the ingredient that excelled in moisture retention was the mixture containing the highest proportion of aquarium water, which significantly improved the moisture level of the loam soil we used.

Table 2. Soil Texture

	Trial1	Trial2	Trial3	Trial4
Eggshells	1	1	2	3
CoffeeGrounds	2	3	3	4
Aquariumwater	1	2	2	3
Synthetic Fertilizer	2	2	3	4

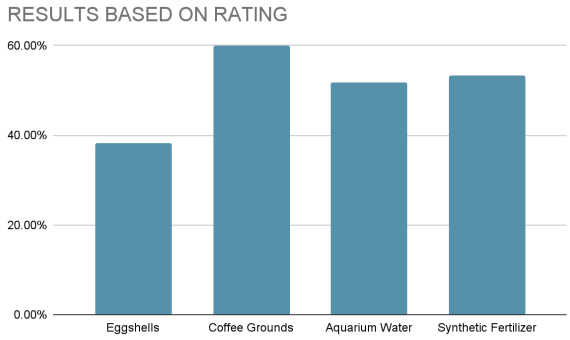
Table 2 presents the ingredients and mixtures that enhance soil texture and health. To ascertain the optimal combinations, researchers conducted various trials and observations. Subsequently, they assessed the performance of each mixture based on their findings.

Table 3. Overall Plant Health

	Trial1	Trial2	Trial3	Trial4
Eggshells	2	2	3	3
CoffeeGrounds	3	3	4	5
Aquarium Water	1	2	2	3
Synthetic Fertilizer	2	2	3	4

The final table summarizes the overall performance of each ingredient as it relates to plant growth, based on the previous data. Notably, the mixture containing the highest amount of coffee grounds demonstrated significantly better results compared to the other mixtures and even the synthetic fertilizer.

3.1 . *Combined Percentage*



3.2

The data from Table 1 reveals that the Aquarium Water mixture displayed the best moisture retention capabilities, surpassing other natural alternatives. This suggests that the organic matter and nutrients in aquarium water significantly enhance soil water retention. Coffee Grounds and Synthetic Fertilizer exhibited moderate moisture retention, while Eggshells had the least effect due to their limited ability to retain

water.

Regarding soil texture (Table 2), Coffee Grounds contributed the most considerable improvement, attaining a cumulative score of 12, likely due to their capacity to loosen compacted soil and improve aeration. Aquarium Water and Synthetic Fertilizer performed comparably, while Eggshells had minimal impact on enhancing soil texture.

Table 3 showed that the Coffee Grounds mixture achieved the highest score in promoting plant health and growth, with an end the duration of trials would also provide insight into the long-term effects of these fertilizers on soil health and plant development. Additionally, testing across various efficiency scores of 60%, compared to 53.33% for Synthetic Fertilizer. This highlights Coffee Grounds' potential as an effective alternative fertilizer, providing essential nutrients such as nitrogen, phosphorus, and potassium. Aquarium Water positively affected plant health, while Eggshells demonstrated the least growth-promoting effects.

In conclusion, this research advocates for the use of natural fertilizers as effective and environmentally friendly alternatives to synthetic options, particularly emphasizing Coffee Grounds as a highly efficient choice.

4. CONCLUSION AND RECOMMENDATIONS

4.1 Conclusion

The experimental results revealed a faster growth between two types of using the alternative fertilizer and the synthetic fertilizer. Using coffee ground, aquarium water, and egg shells reveals that it helps the plants to grow faster and healthier.

Natural alternatives like coffee ground, aquarium water, and egg shells are eco-friendly, cost effective, and can be used for long term. Also it decreases the amount of waste that goes to landfills, this reduces the need for harmful chemicals, and improves the soil health by adding organic products.

In conclusion, exploiting coffee grounds, aquarium water, and eggshells as fertilizer provides a sustainable and eco-friendly alternative to harmful chemicals. By repurposing these available products in your household waste materials, we can lessen the environmental waste and promote organic gardening practices.

4.2 Recommendations

To enhance this research, several key recommendations should be considered. First, conducting long-term studies would help understand the lasting effects of eggshells, coffee grounds, and aquarium water on soil fertility and plant growth over multiple planting cycles, ensuring reliable results and effectiveness over time. Additionally, testing these fertilizers on a wider variety of plants, including crops, vegetables, and ornamental species, will help assess their adaptability. A laboratory analysis of nutrient content, particularly nitrogen, phosphorus, and potassium levels, would also be beneficial for comparison with synthetic fertilizers. It is also recommended to experiment with different ratios of the natural ingredients to find the most effective combinations for plant growth while monitoring soil pH changes to avoid negative impacts. Conducting a cost-benefit analysis will determine the practicality of natural versus synthetic fertilizers. Lastly, raising awareness through workshops and educational programs will encourage the use of organic fertilizers, promoting sustainability. By implementing these recommendations, the study can lead to more effective and environmentally friendly agricultural practices.

5. ACKNOWLEDGMENTS

We, the researchers Franchesca Medina, Margaret Che, Davy Bautista, Zeth Reyes, Patrick Garcia, and Sebastian Poblete, would like to take a moment to express our heartfelt gratitude to everyone who played a role in making this study a reality.

First and foremost, we extend our sincerest appreciation to Ms. Stella Gabales, our research teacher, whose unwavering guidance and support

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Lastly, we wish to express our profound gratitude to God for bestowing upon us the knowledge and expertise required to conduct this research study. We are humbled by the opportunities we have received and the guidance we have experienced along the way.

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Exploring the Effectivity of Elements Present in Lemon Peels and Chili Peppers as Insecticide for Cockroaches

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Abstract: Researchers are working on developing an accessible water filtration method to tackle the ongoing issue of contaminated water, a problem that has persisted globally for years. This study focuses on creating an alternative water filter for drinking purposes. The team employed pre- experimental research and quantitative methods to evaluate the effectiveness of filters made from safer, more benign materials. They designed two different models for the filtration process. To filter the water, the researchers utilized a combination of soil, cotton, activated carbon, and kinetic degradation fluxion balls, all housed in a container. These materials are known for their ability to remove bacteria, debris, and other contaminants, making them crucial for ensuring human health. The dirty water used for testing was collected from rainwater on the ground. After the researcher filtered the water and observed deeply, they noticed that the number of debris decreased significantly during the process of filtration, eventually releasing a murky black to gray hue, gradually transforming into a blurry transparent appearance. The researchers also examined the water closely and conducted a pH test level. The water quality was assessed after filtering; the first filter had pH values of 7, while the second water filter had pH values of 8, both achieving the standard pH level for drinking purposes.

Key Words: Water Filter; Water Quality; Water; Contaminated Water; pH Level

1. INTRODUCTION

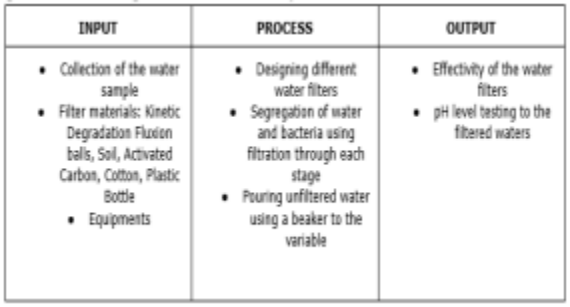
1.1 Background of the Study Among the numerous needs of humans, water is of utmost importance because of its many uses in daily life for hydration, hygiene, and overall well-being. According to Worcester Polytechnic Institute (2008), water is vital for nutrition, with an average daily requirement of two liters to perform bodily functions properly. However, only 73 percent of the global population, around 6 billion people, has access to clean and safe drinking water services, according to the UN Water (2021). The remainder of the population has to seek clean water with difficulties. There are several factors as to why not everyone can be able to have access to safe and clean water; two of them are the absence of sanitation infrastructure and water treatment facilities (National Geographic, 2023). The scarcity of these facilities in certain areas leave 2 billion people to not have access to sanitized water. The primary supply of drinking water is from bodies of water such as nearby surface and ground waters, but not all sources of water can be consumed. Seawater, for instance, contains a high concentration of salt, which isn't suitable for drinking as the human body can only ingest minimal amounts of salt. Additionally, improper solid waste disposal has contaminated these sources of water, which has put the environment and public health at risk due to the insufficiency of drinking water. The demand for clean water shows the need for accessible and cost-effective water filtration methods. This study aims to develop a low-cost and accessible alternative water filtration method to improve water quality and safety and availability in deprived areas. Contrary to conventional water filters on the market that aren't feasible for

various areas. The researchers specifically employed testing the alternative water filtration method from rainwater on the ground to filter to evaluate its effectiveness in removing impurities and contaminants present in water. Through this study, the researchers hope to contribute to further advancement in water filtration processes for safe and accessible water to communities that lack the resources.

2. METHODOLOGY

2.1 Conceptual Framework

The framework shall serve as this paper's guide throughout the study



INPUT	PROCESS	OUTPUT
• Collection of the water sample • Filter materials: Kinetic Degradation Fluxion balls, Soil, Activated Carbon, Cotton, Plastic Bottle • Equipments	• Designing different water filters • Segregation of water and bacteria using filtration through each stage • Pouring unfiltered water using a beaker to the variable	• Effectivity of the water filters • pH level testing to the filtered waters

2.2 Material List

1. Kinetic Degradation Fluxion (KDF)
2. Soil
3. Activated Carbon
4. Cotton
5. pH Test Reagent
6. Beaker
7. Test Tube
8. Test Tube Rack
9. Plastic Bottle
10. Dropper

2.3 Experimental Procedure

The researchers started the experiment by making two models of water filter. Then, they layered the water filter with soil, cotton, charcoal, and kinetic degradation fluxion balls inside two recycled plastic bottles into two different orders. Next, the researchers collected dirty water from the school grounds and poured it gently into the models. The researchers waited for the water to go through the filters and added a small beaker on the bottom of each filter to collect the water that has gone through each layer. Lastly, with the water collected from each filter, the researchers tested both of their pH level by collecting samples from each and putting it in test tubes. They then added pH test reagent to the test tubes. The first sample turned green which means it's neutral where the pH level of it is on or close to the base, which means it has low acidity level. In contrast, the second sample turned blue which has a much farther pH level from base of the pH level.

2.4 Rating Scale

Rating Scale	Interpretation
5	Excellent performance, filtered the water greatly
4	Good work, somehow filtered the water
3	Decent filtration
2	Barely filtered the water
1	The water filter has no effect

The researchers used a rating scale having a range of 1-5 with 5 being the highest rate. The rating scale serves as the basis for the researchers' ratings. The rating scale is used for the mean equation and to assess the water filter's effectiveness. The researchers calculate the effectiveness of the water filter using the equation below wherein Σx is the sum of score and n is the number of parameters.

$$\bar{x} = \frac{\Sigma x}{n}$$

3. RESULTS AND DISCUSSION

Table 1. Quality of the Water After Filtration

Parameters	Water Filter Model 1	Water Filter Model 2
Turbidity	1	1
Debris	5	5
Color	1	1
pH Level	5	3
Score	3	2.5

Both filters perform equally in filtrating the water's clarity and removing visible impurities, but the results were different when it comes to the pH

level. Water Filter Model 1 produced pure water (pH 7) While, Water Filter Model 2 produced alkaline water (pH 8). The pH levels of the water fall under recommended pH level of drinking water. To test the efficacy of the ingredients with KDF, soil, activated carbon, and cotton.

Layering of the ingredients in different orders were conducted. Water Filter Model 1 layering of material goes: KDF measuring 2 inches, soil with 1 inch, activated carbon in 1 inch, and cotton. The filter was tested on collected rainwater from the ground. The turbidity and color of the water after undergoing filtration performed poorly showing no improvement.

However, debris was reduced significantly after the process. Moreover, the pH level got a desirable result of 7. Thus, the water filter model 1 got a score of 3, showing that it is decent enough to filtrate a contaminated water. While, Water Filter Model 2 layered from top to bottom: KDF, activated carbon, soil, and cotton, the first three measuring an inch. The performance of the model after filtration is similar with the first model. The turbidity and color showed no signs of improvements nor any differences, and the number of debris decreased, but the pH level got worse, having a pH level of 8.

With these results, the water filter model 2 acquired a score of 2.5, signifying that it needs some improvements to enhance its ability to filter. The results indicate that although the alternative water filtration system created in this research holds potential for sustaining an acceptable pH level, it does not adequately enhance water clarity and turbidity.

Both water filters gained a favorable pH level of 7 and 8, respectively, which falls under the recommended pH level for drinking water, suggesting that the filtration process does not negatively impact the water's chemical makeup. Nevertheless, the unstable turbidity and the unfavorable shift in color to black indicate that the system requires additional improvement.

4. CONCLUSION AND RECOMMENDATIONS

In this study, a water filtering system that minimizes microbial content and balances pH levels was developed and evacuated. Kinetic degradation fusion, activated carbon, soil, and cotton were used in the construction of the filter in order to evaluate its effectiveness on untreated water samples.

The results demonstrated that although the filter can produce a recommended pH level, it is not enough to eliminate the turbidity and color from the water. Even though the pH level only slightly improved, there were still some drawbacks, like the lengthy filtering process and the negative shift in the water quality, which indicated the need for additional adjustments.

Despite the difficulties, this study offers important insights into reasonably priced water filter purification techniques and lays the groundwork for future improvements in filtration technology. The resources employed in this study are affordable and readily available, with the exception of the kinetic degradation fluxion (KDF).

This component is effective in capturing large particles like leaves, dirt, and sediments prior to water passing through the finer filtration layers. To reduce costs, the researchers propose substituting the kinetic degradation fluxion with pebbles, which serve a similar purpose and are more universally accessible.

Additionally, it's possible that the soil utilized in the water filter slowed down the flow rate. Sand is strongly advised as a substitute since soil may transfer contaminants into the water. Future researchers can explore different orders of materials to find the most optimal filtration method to improve the water filter. In conclusion, the newly made water filter performed worse than the standard water filtration method. Although the performance of the former is not up to the standard in terms of improving the turbidity and color of the water, its ability to significantly reduce the debris and refine the pH level is comparable to the latter. 5. ACKNOWLEDGMENTS The researchers of this study would like to extend their sincerest gratitude to those who contributed to and guided them throughout the research process. First and foremost, they express their heartfelt appreciation to their Basic Research II adviser, Miss Stella Gabales, for overseeing their work and sharing her insights and knowledge in pursuit of their research. They would also like to thank Mister James Miranda, their Basic Research I adviser from the previous year, for his guidance

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An Ethnographic Study of Marketing Strategies Employed by Fish Vendors in Navotas City

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Abstract: The fishing industry is the prominent source of livelihood in Navotas City. According to Perez (2017), the livelihood of 70% of the total population in Navotas is involved in the fish industry, mainly fishermen and fish vendors. The Navotas fish industry contributes significantly to the supply of seafood in the Philippines, especially in Metro Manila. However, Mohan (2023) stated that fish vendors have a vital role in society but face numerous challenges affecting their livelihoods. In addition, according to the study conducted by Bermas et al. (2023), market competition significantly impacts the welfare of a business and its profitability. Marketing strategies are pivotal in achieving consumer satisfaction, and effective marketing strategies are developed around the identification of consumer expectations using such dimensions as product, price, place, promotion, and with organization's distinctive competence (Shaw, 2012), additionally developing and utilizing marketing strategies helps the business to maintain and sustain the intense competition in the marketplace. This research aimed to investigate and understand various marketing strategies employed by Navoteño fish vendors comprehensively. This study employed a qualitative ethnographic design to investigate various marketing strategies employed by Navoteño fish vendors comprehensively. This study found that Navoteño fish vendors used different marketing strategies for their sales revenue or success. An illustrious strategy is the use of sales talk and offering discounts. Fish vendors strategically arrange their stores and have attractive products to captivate buyers, draw their attention, and encourage purchases. Additionally, Navoteño fish vendors used different strategic approaches to pricing. Primarily the cost-plus pricing that guarantees a consistent profit margin for the vendors. At last, this research indicates that Navoteño fish vendors are facing several challenges like financial instability, low fish sales, depletion of fish stocks, market competition, and consumer behavior. The researchers recommend utilizing a mixed-approach research design to reach numerous respondents and extract in-depth data that could be beneficial in the study of the marketing strategies of fish vendors.

Key Words: fish vendors; market competition; marketing strategies; ethnographic study; challenges

1. INTRODUCTION

1.1 Background of the study

Navotas City is known as the "Fishing Capital of the Philippines," and is recognized as the premier fish center of the country. It is the home of the largest fish port in Asia, the Navotas Fish Port Complex. The fishing industry is the prominent source of livelihood in Navotas City. According to Perez (2017), the livelihood of 70% of the total population in Navotas is involved in the fish industry, mainly fishermen and fish vendors. The Navotas fish industry contributes significantly to the supply of seafood in the Philippines, especially in Metro Manila. Perez (2017) added that Navotas fish port manages approximately 800 tons of seafood daily, supplying numerous provinces nationwide. In the dynamic landscape of Navotas fish industry, the fish vendors instigate pivotal roles in ensuring that seafood is delivered to market–consumers efficiently and effectively.

In a competitive marketplace, marketing strategies are essential in a business to mitigate the intense competition in the market. It helps the business establish its branding, attract buyers, and build relationships to retain customer loyalty. In Navotas' fish vending context, effective marketing strategies contribute an essential role in fostering and navigating a competitive marketplace. It enables Navoteno fish vendors to uphold in the intense market competition and sustain their business.

However, despite the significant contributions of the fish industry, specifically, fish vendors, the industry is encountering several challenges, particularly, intense competition in the market. According to Bermas et al. (2023), the growing competition in the seafood market is one of the challenges faced by fish vendors. Moreover, Tayone (2023) highlights that competition in the Navotas marketplace complicates the maintenance of profitability and sustainability of Navoteno fish vendors in the long term. This significant dilemma impacts the welfare of livelihood of fish vendors and needs an in-depth and comprehensive investigation.

Marketing strategies play a vital role in the growth and success of Navotas' fish vending, yet they remain underutilized due to insufficient information in marketing research. Studies on the marketing strategies used by fish vendors in Navotas City have identified several gaps. These include a limited focus on the local area context and a lack of research that tackles the factors that affect the marketing strategies of fish vendors. These gaps highlight the need for ethnographic studies that provide in-depth and comprehensive data to develop effective locally-oriented marketing strategies. Belk and Casotti (2014) emphasize the fundamental role of the ethnography research approach in gaining insights and formulating effective marketing strategies.

1.2 Statement of the Objectives

This research aimed to investigate and understand various marketing strategies employed by *Navoteno fish vendors*. This research aimed to answer the question: What are the marketing strategies employed by Navoteno fish vendors?

Specifically, it sought to answer the following questions:

1. What is the demographic profile of the respondent:

   1.1 Name (optional);

1.2 Gender;

1.3 Barangay;

1.4 Income?

2. What are the factors that affect their marketing strategies?
3. What are the challenges faced by fish vendors in implementing their marketing strategies?

1.3 Significance of the Study

The purpose of this research is to explore and understand different marketing strategies employed by Navoteno fish vendors. It aimed to give a comprehensive insight and in-depth understanding into the marketing landscape within the fish vendors. The result of this research is relevant to the following:

For fish vendors. This research could help the *fish vendors* by providing in-depth and empirical results to understand various marketing strategies that they can utilize to boost their sales and profits.

For the Local Government Unit (City Agriculture Office). This research could help *LGU* by providing in-depth data, which can be utilized to innovate hands-on initiatives and projects that would be beneficial to the entire fish industry, specifically, fish vendors.

For the higher government unit. This research could help *higher government units* by providing comprehensive and in-depth findings, which can be utilized to make laws, policies, and allocate funds to support the fish industry, specifically, fish vendors.

For educators. This research could help *educators* by providing comprehensive and in-depth findings, which can be utilized to create a lesson that tackles various marketing strategies that will inspire the entrepreneurial thinking of the students.

For students. This research could help *students* to explore and understand the various marketing strategies employed by the fish vendors, which can be utilized to establish their own business.

For Future Researchers. This research could help *future researchers* by providing in-depth and empirical results that can be utilized to support and improve current findings.

1.4 Scope and Delimitations

This ethnographic research aimed to provide comprehensive findings by exploring and understanding various marketing strategies employed by fish vendors in Navotas City. The study involved face-to-face interviews with 18 fish vendors randomly selected from various marketplaces within Navotas City. This study examined marketing strategies employed by Navoteno fish vendors, factors that affect their marketing strategies, and challenges encountered in their implementation. This study was limited to fish vendors in Navotas City, excluding fish vendors from other cities to maintain a concentrated scope. Additionally, it solely focused on exploring and understanding several marketing strategies and does not assess their effectiveness and overall impacts on the fish business. Furthermore, it only relied on an ethnographic–qualitative approach and did not involve quantitative–numerical analysis.

2. METHODOLOGY and RRL

2.1 Review of the Related Literature

The Navotas fish industry plays a pivotal role in the food security, livelihood, and economic development of the Philippines. The city has the Navotas Fish Port Complex which is recognized as the largest fish center in Southeast Asia. Navotas Fish Port instigates a crucial role in the seafood stock in the Philippines. In 2017, Perez noted in his study that the Navotas fish port manages approximately 800 tons of seafood every day and supplying numerous provinces in the country. It ensures the stability of seafood stocks which is significant to meet the dietary needs of the growing population in the Philippines. Additionally, the city's fish industry provides a prominent and stable source of livelihood and income for 70% of the total population in Navotas (Perez, 2017). Furthermore, as highlighted by Israel and Roque (2000), the livelihoods generated by the fish port support a variety of related industries, including fishing, processing, and distribution, thereby strengthening the economic framework of the community.

Fish vendors play a significant role in society, including ensuring food security and contributing to the economic development of the Philippines. According to Rajan et al. (2014), fish vendors substantially contribute to the economy. However, despite the significant contributions of fish vendors to society, they remain in poverty. Mohan (2023) stated that fish vendors have a vital role in society but face numerous challenges affecting their livelihoods.

Market competition refers to the rivalry among firms operating within the same industry or market segment. This competition in the marketplace has significant impacts on various aspects of the business, including pricing strategies, product development, quality assurance, consumer demand, and marketing approaches (Tsujiki, n.d.). According to the study conducted by Bermas et al. (2023), market competition significantly impacts the welfare of businesses and their profitability. The study highlights the challenges that arise as market competition increases, the business may struggle to maintain profitability due to rising operation

Marketing strategy is essential for a business especially for new entrants and small-scale businesses, as it enables them to establish their branding, attract potential customers, attain customer satisfaction, and sustain in the intense market competition. A marketing strategy is an action plan on how an organization intends to achieve its marketing objectives (Wang'ondu, 2016). According to Ebitu (2014), marketing strategy utilizes the traditional mix of product branding and improvement, pricing and price adjustments, placing or location, packaging, and promotion. On the other hand, in the study of Shaw (2012) stated that marketing strategies are pivotal to achieving consumer satisfaction, and effective marketing strategies are developed around the identification of consumers' expectations using such dimensions as product, price, place, promotion, and with organization's distinctive competence. Additionally, developing and utilizing marketing strategies helps the business to maintain and sustain the intense competition in the marketplace. Moreover, Hersh et al. (2014) noted that marketing strategies help the business to attain long-term profitability and sustainable revenue.

2.1 Synthesis

The Navotas fish industry, crucial for food security, livelihood, and economic development, has significant research gaps. Despite its importance, there is a lack of studies on the local context and unique challenges faced by Navoteno fish vendors. Ethnographic methods are underutilized, and research on marginalization and poverty faced by fish vendors is insufficient. Addressing these gaps will enhance understanding of the Navotas fish vending industry and support the development of effective, locally-oriented marketing strategies.

2.2 Methodology

2.2.1 Research Design

The ethnographic approach is a qualitative research design that involves studying people and their cultures in their natural environments (Hassan, 2024). By immersing in the daily lives of respondents, researchers gain a comprehensive and in-depth understanding of cultural norms, behaviors, rituals, and interactions. This method is widely used in anthropology, sociology, education, and marketing to explore cultural phenomena and human experiences

This study employed a qualitative ethnographic design to investigate various marketing strategies employed by Navoteno fish vendors comprehensively. It involved gathering in-depth insights, perceptions, traditions, behaviors, and cultural norms to thoroughly understand different marketing strategies in the Navotas fish market. According to Belk and Casotti (2014), an ethnographic approach is important in gaining insight and formulating effective marketing strategies.

2.2.2 Population Sampling

This ethnographic study involved fish vendors who sell and operate in several marketplaces in Navotas City. A total of eighteen (18) Navoteno fish vendors were interviewed. Convenience sampling was employed in selecting these participants, ensuring that the vendors chosen were readily accessible and willing to share insights into their marketing strategies. To be eligible, vendors must operate in Navotas public marketplaces, and be willing to participate in the study and provide required information. This method allows for efficient data collection from a diverse range of fish vendors, offering a comprehensive understanding of the marketing practices prevalent in Navotas City's bustling fish markets.

2.2.3 Research Instrument

The researchers utilized in-depth interviews guided by semi-structured interview questions so that they could ask additional questions during the interviews if clarification and further explanation were needed. The researchers maintained and secured the confidentiality of the information provided by the respondents including their demographic profile, which is guided in compliance with the Data Privacy Act of 2021. The act includes the right to object to the processing of your data, the right to correct any inaccurate data and the right to erasure or block data.

2.2.4 Data Gathering Procedure

The study used interviews to gather data from fish vendors in Navotas City. The gathered data was analyzed using thematic analysis.

3. RESULTS AND DISCUSSION

The researchers utilized tables to briefly present the demographic profile information of the eighteen (18) respondents. Additionally, to present the findings clearly and effectively, the researchers used a table to showcase the common themes and codes identified in the participants' responses, along with the frequencies of these codes—specifically, how many times each theme was mentioned.

Table 1. Gender of the RespondentsTable 1. Gender of the Respondents

Gender	Frequency	Percentage
Male	2	11%
Female	16	89%
TOTAL	**18**	**100%**

Table 1 presented the gender of the respondents, eleven (11%) or 2 out of 18 respondents were male, and eighty-nine (89%), or 16 out of 18 respondents were female.

Table 2. Barangay of the Respondents

Barangay	Frequency	Percentage
Tangos South	6	33%
Tangos North	2	11%
Daanghari	3	17%
San Roque	2	11%
NBBS	3	17%
NBBN	2	11%
TOTAL	**18**	**100%**

Table 2 presented the barangay of the respondents, Tangos South has the highest frequency, with 6 respondents, making up thirty-three (33%) of the total respondents. This was followed by Daanghari and NBBS each having seventeen (17%) or 3 respondents. The remaining barangays, Tangos North, San Roque, and NBBN, each compromise with eleven (11%) or 2 respondents.

Table 3. Monthly income of the Respondents.

Monthly Income	Frequency	Percentage
PHP 20, 000+	2	11%
Php 10, 000+	5	28%
Below Php 10, 000	11	61%
TOTAL	**18**	**100%**

Table 3 presented the monthly income of the respondents, the majority of the respondents, eleven (61%) or 11 respondents have a monthly income below Php 10, 000. Next, twenty-eight (28%) or 5 respondents have monthly earnings of Php 10, 000 and above. Lastly, eleven (11%) or 2 respondents earn Php 20, 000 and above monthly.

Table 4. Marketing strategies

Question	Common Themes	Code Frequencies
1. What are your strategies to attract customers and promote the products in your stall?	a. Discounts b. Visual Merchandising c. Sales talk (Customer engagement)	a. 8 b. 7 c. 14

Table 4 presented the common themes and frequencies of codes derived from respondents' answers to Question 1. This question seeks to investigate the various methods and strategies that Navoteno fish vendors use to attract customers and promote their fish products in the market. The data reveals three main strategies employed by these vendors to promote their products and catch the attention of buyers to increase their sales.

Sales talk has the highest frequency, fourteen (14) fish vendors mentioned that they are using sales talk to engage and promote their fish products to the market. Sales talk refers to the verbal communication techniques used by the business to connect with customers and influence their buying decisions (Kaveh et al., 2020).

Offering discounts had the second to the highest frequency, eight (8) fish vendors stated that they are offering various price discounts to the market, and it enables them to attract potential buyers. Discount is a strategy in which the original price of a product or service is reduced, it helps the business to attract buyers and increase its sales (Kotler & Keller, 2016).

Lastly, visual merchandising has the lowest frequency of seven (7). This practice involves strategically arranging stores and implementing promotional activities aimed to captivate buyers. Marketers focus on various elements including product display and arrangement (Bhatti & Latif, 2014).

Table 5. Pricing Strategy

Question	Common Themes	Code Frequencies
2. How do you decide on pricing for your fish products?	a. Cost-plus pricing b. Penetration pricing c. Bundle pricing	a. 16 b. 5 c. 4

Table 5 presented the common themes and frequency codes derived from respondents' answers to Question 2. This question seeks to know the various methods and strategies on how do the fish vendors decide on pricing their fish products or simply their pricing strategy.

Cost-Plus has the highest frequency, sixteen (16). This method involves determining the total production cost of a product and then adding a percentage to set the selling price for consumers (Abid, 2022). Its simplicity and straightforward cost-based approach make it the preferred strategy among the vendors.

Penetration has second to the highest frequency, five (5). This pricing strategy, which begins informally, sets an item's initial price low to swiftly capture a large portion of the market. (Repetti et al., 2015). It is often used by fish vendors to attract customers in highly competitive markets.

Lastly, bundle pricing has the lowest frequency four (4). This pricing technique known as "product bundle pricing" involves offering clients many goods, services, or any combination of them as a single package at a single cost (Yan & Bandyopadhyay, 2011). This method is less frequently used because it can lower profits, complicate inventory management, and restrict customer choice.

Table 6. Building and Maintaining Relationships

Question	Common Themes	Code Frequencies
3. How do you decide on pricing for your fish products?	a. Cost-plus pricing b. Penetration pricing c. Bundle pricing	d. 16 e. 5 f. 4

Table 6 presented the common themes and frequency codes derived from respondents' answers to Question 3. This question seeks to know the various methods and strategies on how fish vendors build and maintain relationships with their customers.

Good customer service has the highest frequency, fifteen (15). This strategy encompasses a range of elements, including understanding customer inquiries and striving to exceed expectations. Parasuraman et al. (1985) stated that by prioritizing these aspects, businesses can foster strong relationships with their customers, enhance satisfaction, and build loyalty.

Additionally, five (5) fish vendors mentioned that consumer satisfaction is one of the key factors contributing to their loyal customer base. Satisfaction is defined as the judgment that a product or service feature, or the product or service itself. By ensuring high levels of customer satisfaction, vendors can foster loyalty and encourage repeat business (Oliver, 2010).

Table 7: Factors and challenges that affect Marketing Strategies

Question	Common Themes	Code Frequencies
4. What are the factors and challenges that affect your marketing strategies	a. Financial Instability (Lack of Capital) b. Low fish sales c. Depletion of fish stock a. Market competition d. Consumer Behavior	a. 7 b. 11 c. 1 d. 1 e. 1

Table 7 presented the common themes and frequency codes derived from the respondents' answers to Question 4. This question seeks to investigate the different factors that affect the marketing strategies of fish vendors.

Low fish sales have the highest frequency, eleven (11). Low sales are when a company's revenue generation falls short of the anticipated or planned levels due to a reduction or below-average level of product or service purchases. (Summer, 2023). This factor commonly affects the vendors because low sales lead to low profits, leaving them without capital. Their poor fish sales appear to be causing financial losses.

Financial Instability (Lack of capital) has second to the highest frequency, seven (7). Financial instability is the term used to describe circumstances in financial markets that impair or threaten to impair the operation of an economy by affecting how the financial system functions (Schinasi, 2004)

Market Competition, Fish Stock Depletion, and Consumer Behavior got the lowest frequencies, one (1) each. This Market competition is the conflict between already-existing businesses, goods, or services in a particular market. Marketing professionals use rivalry as a factor in their campaigns to assist some businesses stand out from their rivals in the market. While, fish stock depletion is characterized as a decline in fish populations brought on by overfishing and overexploitation of waterways, which decreases production capacity and causes undesirable fish to be caught. Then, consumer behavior refers to the thoughts and actions people go through when they search for, consider, buy, and use products or services (Cole, 2007).

4. CONCLUSION AND RECOMMENDATION

4.1 Conclusion

The study revealed that Navoteno fish vendors utilize various marketing strategies that are essential for their sales revenue and success. A prominent strategy is the use of sales talk, where vendors employ verbal communication techniques to engage customers and influence their purchasing decisions. They also offer discounts, strategically lowering product prices to attract potential buyers and boost sales, thereby making their products more appealing in the market. Additionally, visual merchandising instigates a vital role, as vendors strategically arrange their stores and implement promotional activities to captivate buyers. Through attractive product displays and organized layouts, they draw customers' attention and encourage purchases.

This study also found that Navoteno fish vendors used different strategic approaches to pricing that reflect both their operational costs and market conditions. One of the primary methods is cost-plus pricing, which involves calculating the total production costs—such as sourcing, handling, and transportation—and then adding a specific markup percentage to establish a selling price. This cost-based strategy not only ensures that all expenses are adequately covered but also guarantees a consistent profit margin for the vendors. Moreover, fish vendors also implement penetration pricing to gain a foothold in competitive markets by initially setting prices low to attract a larger customer base quickly, establishing brand loyalty, and market share before gradually adjusting prices as needed. Furthermore, bundle pricing is another pricing tactic used

by Navoteno fish vendors, whereby multiple products are packaged together and offered at a single price, providing added value to customers who perceive they are getting better.

Lastly, the results indicated that Navoteno fish vendors are facing several challenges, including financial instability, low fish sales, depletion of fish stocks, market competition, and consumer behavior. These factors significantly impact their marketing strategies and their implementation.

4.2 Recommendations

Fish vendors. They should adopt innovative sales techniques, such as online platforms and home delivery services, to enhance customer reach and convenience. Moreover, they should invest in better display and packaging techniques to make fish products more appealing and hygienic.

City Agriculture Office. They should develop programs and projects that will provide training and resources on effective marketing strategies, and collaborate with fish vendors to understand their needs and challenges. Furthermore, they should promote local fish markets through events and campaigns.

Government. They should legislate supportive laws and policies that will be beneficial for the fish vendors. Additionally, they should allocate funds to support the project for the improvement of the fish industry's infrastructure and vendor support systems and conduct regular research to stay updated on industry trends and challenges.

Educators. They should utilize and integrate these findings into business and entrepreneurship courses, promote practical learning through workshops and hands-on activities, and encourage students to think creatively about marketing and business development.

ABM students. They should study these strategies to gain insights into effective business practices, pursue entrepreneurship using the research findings to develop business ideas, plans, and engage in internships with fish vendors to apply theoretical knowledge and gain practical experience.

Future Researchers. They should build on existing research to explore new aspects of the fish industry's marketing strategies, collaborate with industry experts to gather more comprehensive data and insights and publish their findings on accessible platforms, allowing stakeholders to benefit from the information and contribute to ongoing discussions. Furthermore, they should utilize a mixed-method approach to reach wider respondents and extract in-depth data.

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Experiences of Sari-Sari Store Owners in Managing Credit Relationships In Navotas City

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Abstract: This research examines the experience of Navotas city Sari-sari store owners. Sari-sari stores are small retail outlets with cheap products that are widely practiced in the Philippines. The study examines how owners keep records of customers, debts and financial difficulties in business, it also examines the experience and the practices that some of the sari-sari store owners in Navotas City employ in managing their credit relationships with their customers. Applying this research Qualitative research was utilized to gather in depth data about personal experiences, opinions and perceptions of sari-sari store owners. The study within depth interviews as the main data gathering. Fifteen sari-sari store owners in Navotas city were chosen for the interview. The interviews revolve around handling customer credit, difficulties in payment collection and the effect of unpaid debts on business. Outcomes pointed out shares such as record keeping to maintain track of customers' debt. The reason for this study is to discuss the experiences of sari-sari store owners in dealing with their credit relations in Navotas City, formulate strategies for managing credit, and introduce their beliefs and perceptions. Using the Purposive sampling technique, the researchers were able to get the appropriate participants for the interview. The interview results indicate that the majority of sari-sari store owners have similar strategies and approaches to managing customer credit. In Conclusion this highlights that the majority of sari-sari store owners use manual records to manage credits which has some limitations but it works. Nonetheless, there is a need for better financial management strategies to reduce bad paying customers.

Key Words: Sari-sari store; credit relationship; financial management; debt tracking; customer tracking

1. INTRODUCTION

1.1 Background of the study

Sari-sari stores are mini stores that one can find in every corner in the Philippines. This store is important to all Filipinos because it has affordable

merchandise that even poor Filipinos can afford. Credit relationship is a relationship between customer and owners and the credit is the ability of the consumer to acquire goods or services prior to payment.

Resource-Based View (RBV) theory by Wernerfelt (1984) asserts that tangible and intangible resources are the key for the excellent performance of enterprise. This theory further suggests that utilizing internal opportunities is more practical rather than acquiring new skills for outside opportunity. The theory also says that all micro businesses repeatedly face inadequate resources and compels them to continue doing business under financial and capability constraints (Bennett et al., 2004; Siano & Zucchela, 2014). Providing for the family is both the primary reason and inspiration for engaging in the business of sari-sari stores. Their actions and mindsets are premised on a profound trust in God accompanied by action. This study contributes to existing literature by providing localized insights into the credit management practices of sari-sari store owners in Navotas City, expanding on financial literacy research (Quijano, 2024). Sari sari store problems and solutions encountered by store owners. Trailblazer Digital, enhancing microfinance understanding (Flaminiano & Francisco, 2021) and offering valuable data that can inform local policy and support programs aimed at improving financial practices for small businesses. Limited access to formal financing, reliance on informal lending, cash flow issues, and inventory management challenges are the local causes of the credit management problem among sari-sari store owners in Navotas City. On a global scale, comparable small businesses encounter obstacles to adopting digital financial solutions, economic vulnerabilities, and trouble obtaining affordable financing (Quijano, 2024).

. This study aims to know how owners handle their relationship with their customers and how they build trust with customers. Researchers want to know how they maintain a debt record with minimal errors.

1.2 Statement of Objective

This study aims to explore the experiences of sari-sari stores or small business owners from Navotas City in managing credit relationships such as unpaid debts, poor record-keeping, and unbalanced

flow of money caused by the creditor's inability to pay for his credit. The researchers also want to know how they face other challenges they encounter, and the strategies they implement to ensure financial stability.

1.3 Significance of the Study

The significance of this study focuses on the benefit of the small business owners through identifying shared characteristics among this study's participants to improve their financial management skills and reduce their business risk. This study will help them bridge gaps in financial access and education, it will also give support for small businesses to empower them.

Sari-sari store owners. This study will benefit the sari-sari store owners through the new inputs and ideas that are used by other owners regarding the credit management that they can utilize and adapt into managing their own businesses.

Customers. This study will also be beneficial for customers who are interested in starting their own business, especially those who might be unfamiliar with the challenges and strategies in handling credit.

Corporations. This study will be beneficial for corporations by having ideas at how to maintain their credit relationship effectively, both customers and suppliers, as well as with financial institutions, and can ensure the financial stability, growth, and success of the company.

Future researchers. This study can be referenced by the future researchers in structuring and strengthening their own study that also delves on the topic of credit risk and management among sari-sari store or small business owners.

1.4 Scope and Delimitation

This study will only be limited on the experiences of sari-sari stores in Navotas City and how they manage their credit relationship with their customers. This research will explore the business knowledge from selected store owners in their own ways and strategies in managing finances and operations within their business. This study will only include sari-sari store owners from Navotas City that offer and list the products that they lend to their customers. This will not include other types of small businesses or large retails. This research will not focus on the educational background and training of store owners but

on the business knowledge and experiences they possess alone.

2. METHODOLOGY AND RRL

2.1 Review of Related Literature

2.1.1 Synthesis

The studies on credit relationships and small businesses, particularly sari-sari stores, highlight important findings. Moratta, et al., (2016), the study emphasizes the crucial role of credit relationships between banks and firms, showing that these relationships do not follow a uniformly distributed but from a vital foundation. Campanella et al,. (2013) performed an empirical study that supports some assumptions in relationship lending literature, particularly indicating that large bank managers have a different approach to information compared to small business managers. This study also contributes to the knowledge of small businesses, and suggestions to policy makers are provided to promote women-owned businesses. In the study of Mojica (2024), they reveal how much family support, being creative in managing the business, and the trust that matters to their family. The central theme is *Pamilya* emphasizing the sacrifices and responsibility family members make in operating the store. The unifying aspect among these studies is the manner in which sari-sari store owners run their businesses, gain the trust of their customers, and to expand their business. However, the most significant research gap, which is the absence of information regarding their daily income as a sari-sari store, in budgeting practices and their monthly profit. Understanding these financial aspects would provide a clearer image of their economic sustainability.

2.2 Methodology

2.2.1 Research Design

The research will explore the experience and the strategies that some of the sari-sari store owners from Navotas City utilize in dealing with their credit relationships with their customers. Using this research Qualitative research was applied to collect in depth information regarding personal experiences, opinions and perceptions of sari-sari store owners. By using this, the researchers will collect information through the use of interviews using open-ended questions with the respondents.

2.2.2 Population Sampling

This would provide valuable support to owners of sari-sari stores by enabling them to enhance their credit management plans, which is crucial for maintaining a healthy cash flow. By implementing more effective strategies, they can reduce the risk of accumulating bad debts and preserving stronger, more trusting relationships with their clients. To ensure the credibility of the study,

the researchers used a purposive sampling technique in selecting the respondents. This method was chosen to identify sari-sari store owners in Navotas City who have firsthand experience in managing credit relationships with their customers. A total of fifteen (15) sari-sari store owners were interviewed in this study, such as their length of business operation, experience in handling credit transactions.

2.2.3 Research Instrument

The research employed interviews as a research tool to obtain data directly from respondents. The interview was held face to face and online. Researchers made sure that the information shared from respondents will be kept confidential. The researchers personally approached the sari-sari store owners to solicit their permission needed for conducting questions regarding interviews with the subject for them. Then the researchers will draft the questions that were asked based on that. The researchers have done a one-on-one interview while ensuring their privacy and to have an ongoing and very dependable discussion with them.

2.2.4 Data Gathering Procedure

The procedure is carried out to gather the required number of responses to the researchers during the data collection process. The data was collected through both face-to-face and online interviews with selected participants. To ensure their privacy, participants will first be asked for their consent to participate in the interview.

3. RESULTS AND DISCUSSION

This chapter presents the results from the researchers' interviews, which were taken with open-ended questions. The information collected through the interviews is presented and shown in different tables that both show the similarities and differences in the participants' responses.

Table 1: Strategies

Questions	Common Themes	Code Frequency
1. How do you track your customers' credit?	a. Record Keeping b. Reminding System	a. 13 b. 1 c. 1

Question 1: Intends to explore how sari-sari stores track their customer's credit, the responses indicate that the most common method is record keeping, with 13 respondents highlighting this method, other methods are reminding system 1 (respondent) and schedule payment (1 respondent) totalling 15 respondents.

Table 2: Challenges

Questions	Common Themes	Code Frequency
2. What are the common problems you encountered in managing credit relationship	a. Customer Resistance b. Financial Strain c. Stress and Frustration d. Delayed Payments e. Customer Behavior f. Difficulty in repayment	a. 2 b. 1 c. 2 d. 4 e. 5 f. 1
3. How do you handle delayed payments from customers?	a. Persistent Reminders b. Cost Cutting c. Establishing Credit Limits d. Interest Management e. Understanding Financial Difficulties f. Distrust and Suspicion g. Tolerance for Late Payment h. Proper Communication	a. 7 b. 2 c. 1 d. 1 e. 1 f. 1 g. 1 h. 1
4. Have you ever had an experience where credit issues affected your business operations?	a. Reduced Profitability b. direct impact on supply c. Delayed Payments d. Frequent Payment Problems e. Not Affected by the store	a. 1 b. 10 c. 2 d. 1 e. 1
5. How do credit relationships affect your relationships with the customers?	a. Negative Customer Behavior b. Personal Relationship Strain c. Stricter Credit d. Not Affected with the Customers e. Financial Difficulties	a. 8 b. 3 c. 1 d. 2 e. 1

Question 2: Seeks to address the problems that sari-sari store owners face in

managing credit relationships. The respondents identified various challenges, including customer resistance (2), financial strain (1), stress and frustration (2), delayed payments (4), and the most frequently mentioned issue, customer behavior (5), with a total of 15 respondents.

Question 3: Aims to explore the problems that sari-sari store owners face in managing credit relationships. The respondents identified various challenges, including customer resistance (2), financial strain (1), stress and frustration (2), delayed payments (4), and the most frequently mentioned issue, customer behavior (5), with a total of 15 respondents.

Question 4: Explores whether sari-sari store owners have experienced credit issues affecting their business operations. The responses indicate that the most common issue is a direct impact on supply, with 10 respondents highlighting this concern. Other challenges mentioned include delayed payments (2 respondents), reduced profitability (1 respondent), frequent payment problems (1 respondent), and no impact on the store (1 respondent). These findings suggest that disruptions in supply chains are the most significant operational consequence of credit-related issues among store owners.

Question 5: Examines how credit relationships influence store owners' relationships with their customers. The majority of respondents (8) reported that credit issues often lead to negative customer behavior, which can strain business operations. Personal relationship strain was the second most common response, mentioned by 3 respondents. Other effects include stricter credit policies (1 respondent), customers not being affected (2 respondents), and financial difficulties (1 respondent). This highlights how credit relationships can create tension and affect customer interactions, with negative behavior being the most prominent challenge.

Table 3: Experiences

Questions	Common Themes	Code Frequency
6. Do you have a positive or negative experience about credit	a. Dichotomy of Credit Experiences b. Positive Credit Experience	a. 9 b. 3 c. 2 d. 1

relationship	c. Positive Credit Experience d. No Negative Experiences	
7. What advice would you give to sari-sari store owners managing their credits?	a. Importance of Patience b. Limiting Lending c. Positive and understanding d. Financial Management Debt Tracking e. Selective Lending f. Preparedness	a. 4 b. 6 c. 2 d. 1 e. 1 f. 1

Question 6: Focuses on whether store owners have had positive or negative experiences with credit relationships. The data reveals that most respondents (9) experience a dichotomy of credit experiences, meaning they encounter both positive and negative aspects. Meanwhile, 3 respondents shared purely positive credit experiences, 2 respondents highlighted on-time payments, and only 1 respondent claimed to have no negative experiences. These responses show that while credit relationships are complex, many store owners recognize both the benefits and challenges associated with offering credit.

Question 7: Investigates the advice sari-sari store owners would offer to others managing credit. The most common piece of advice, suggested by 6 respondents, is to limit lending to reduce risks associated with unpaid debts. Four respondents emphasized the importance of patience when dealing with credit customers, while two highlighted the need for positivity and understanding. Other recommendations included proper financial management and debt tracking (1 respondent), selective lending practices (1 respondent), and preparedness (1 respondent). These insights indicate that store owners believe careful lending strategies and strong financial management skills are essential for maintaining healthy credit relationships.

4. CONCLUSION AND RECOMMENDATION

The purpose of this study is to examine the experiences of sari-sari store owners in managing their credit relationships in Navotas City. It aims to understand how the

owners deal with difficulties, develop strategies for handling credit, and present their views and beliefs. Through the application of Purposive sampling technique, the researchers were able to obtain the right participants for the interview.

The results of the interview show that most sari-sari store owners share similar strategies and methods when it comes to managing customer credit. The majority of the owners rely on record-keeping as the simplest and most convenient means to monitor their customers' credit. They usually apply written logs on notebook to record their credit transactions, which helps them to maintain accurate records of what is owed and the corresponding payment dues dates. This manual method, although basic, provides a reliable means of keeping track of their financial dealings with the customers. On the other hand, the store owners also highlighted the differences in their approaches, explaining how each owner employs their own unique method and strategies fitted to their specific business needs.

The study also established that sari-sari store owners also employ various methods of how they can handle delayed customers. Some owners prioritize proper communication with the customers to avoid misunderstanding and to gain a better understanding of the customers' financial difficulties.

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Financial Budgeting Strategies of Senior High School Students Transitioning from Public to Private School: A Case Study of San Jose Academy

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Abstract: This study explored the financial budgeting strategies of senior high school students transitioning from public to private school at San Jose Academy. The main objective was to identify these financial strategies, understand the challenges faced, and assess the impact of financial literacy on their financial management skills. Using a qualitative research design, detailed insights were gathered from 30 randomly selected Grade 11 students through open-ended survey questions. The study aimed to understand students' budgeting strategies, the challenges they encountered, and the influence of financial literacy on their ability to manage finances. The study revealed diverse financial capacities among students, with varying weekly budgets. While many managed to save money, others struggled. The research highlighted the importance of budgeting and effective communication in navigating financial and social adjustments. Reasons for transitioning included the pursuit of quality education and the influence of family and peers. Managing school-related expenses emerged as a significant challenge, with students employing various budgeting strategies like saving money and tracking expenses. The study concluded that enhancing financial literacy programs and providing adequate support were essential for helping students manage their finances effectively. Financial literacy and disciplined financial habits were crucial for achieving financial stability and ensuring a smoother transition to private education.

Key Words: Transition to Private School; Budgeting Strategies; Financial Challenges; Financial Literacy; Student Financial Management

1. INTRODUCTION

1.1. Background of the Study

In this generation, many students experience transitioning from public to private school that often presents financial challenges for students. According to Crawfurd and Hares (2021), private schools, also known as independent schools, often offer a unique and high-quality educational experience, specialized

curricula, and a focus on academic excellence. This shift typically involves higher tuition fees, additional costs for school supplies, uniforms, and other expenses associated with private education. As students make this transition, budgeting enters and becomes essential to manage their finances to ensure a smooth adjustment. Students differ in their financial situations and living arrangements, which can significantly impact their budgeting strategies and financial management. These differences highlight the need for personalized budgeting approaches to effectively manage their unique financial circumstances.

Budgeting is a good way to monitor spending and determine whether you are using too much money. It is also important to be aware of personal finance. Establishing a budget while in high school can help students understand where the money goes each month. Nowadays, students are often faced with a difficult choice when it comes to budgeting. Nonetheless, students need to understand that these decisions can have serious consequences, so it is important for them to take each decision-making process seriously (Peralta et al., 2023).

According to Nwe Ni Aung & Hla Hla Mon (2020), a person's ability to manage money is essential for being successful in life. Effective financial management strategies are important for all members of society, including students. Stating that students are always in a deep dilemma, since they have constrained allowances to cover high monthly expenses, specially other consumptions. Therefore, it is vital for them to properly manage their money.

There are many budgeting strategies that students could choose, which could fit their financial capability. These budgeting strategies have a significance in the transition, as it helps them to take control on their finances. Understanding these strategies can lead to greater financial stability and independence, ensuring a smoother and more successful transition.

1.2. Statement of Objectives

The objective of this study is to explore the financial budgeting strategies of senior high school students transitioning from public to private schools at San Jose Academy. Specifically, this research seeks to identify the financial strategies used by these students, understand the challenges they face, and examine the role of financial literacy in their ability to manage finances effectively. Additionally, it aims to highlight the importance of personal finance awareness and discover budgeting practices that can be shared with other students in similar situations. The research will provide practical recommendations to help students better manage their unique financial circumstances, ensuring a smoother and more successful transition.

1.3. Significance of the Study

The goal of this research is to identify and gather the experiences of students who have transitioned from public schools to private schools, specifically focusing on San Jose Academy. The study aims to explore their unique backgrounds and examine the budgeting strategies they employ. Examining these experiences, the research seeks to offer insights into various financial aspects. The study will benefit the following:

To Students. This research provides valuable insights into the financial strategies and coping mechanisms that students from public school backgrounds adopt to manage the increased financial demands of attending a private school. Understanding these strategies can help students navigate financial challenges and develop effective budgeting skills.

To Families. The study will serve families to gain a deeper understanding of the financial pressures that their children may experience during the transition from public to private schools. It offers strategies and recommendations to provide better financial support

and assistance to their children, ensuring a smoother and more manageable transition.

To Schools. The findings of this research inform the development of financial literacy programs within private schools. These programs can foster the specific needs of students transitioning from public schools, providing them with the necessary tools and knowledge to manage their finances effectively.

To Future Students. The research serves as a valuable resource for future students who may face similar transitions from public to private schools. Understanding the experiences and strategies of previous students, future students can better prepare themselves financially and make informed decisions to ensure a successful transition.

To Future Researchers. This study lays the groundwork for future research on financial strategies and literacy in educational transitions. It offers a foundation for further exploration and expansion of knowledge in this area. Future researchers can build upon these insights to investigate similar transitions in different contexts, helping to deepen the understanding of how students manage finances across various educational settings.

1.4. Scope and Delimitation

This case study aims to explore students' budgeting strategies for managing the financial changes associated with transitioning from public to private school. The study is limited to senior high school students at San Jose Academy, specifically those in Grade 11. The respondents are 30 randomly selected students, and the study will employ qualitative research methods, specifically using surveys. The study will focus on

The budgeting methods used by students to manage their increased financial responsibilities;

The financial challenges faced by students during the transition from public to private school; and the

Effectiveness of financial education.

This research will be limited to senior high school students who have transitioned from public schools to private schools, making it ideally suited for exploring their experiences during this transition. Through focusing on this specific group, the study aims to gain a deeper understanding of the financial challenges and budgeting strategies employed by these students. Additionally, the research seeks to identify common patterns and themes in their budgeting approaches.

2. METHODOLOGY and RRL

2.1. Review of Related Literature

Private schools, also known as independent schools, offer specialized curricula and a high-quality educational experience, funded primarily through tuition and donations rather than government resources (Crawfurd & Hares, 2021). Their role in education systems emphasizes academic excellence and highlights the need for policies that can improve outcomes for students attending private institutions. In contrast, public schools, governed by laws and regulations, expand access to education and are funded by national government resources and local government units (DepEd, 2021). Financial management practices in public schools are crucial for improving educational quality, with school heads playing a key role in managing resources effectively (Wadasen, 2024). The shift from public to private schools, influenced by the introduction of the K-12 system, is often driven by perceived better educational opportunities and financial aid programs, like the Senior High School Voucher Program (SHS VP), which aims to reduce the financial burden on students (Acacin & Calogne, 2019). However, students often face financial challenges when transitioning,

particularly with budgeting for additional education-related expenses (Gurobat & Lumbu-an, 2021).

Financial literacy is an essential skill for managing personal finances, especially in a context where students transition from public to private schools, incurring higher educational costs (Lusardi, 2023). A study by Gabay et al. (2024) showed that senior high school students in the Philippines generally have moderate to high financial literacy, but still struggle with budgeting and managing financial resources. Effective financial management, including strategies for income management, expense tracking, and budgeting, is vital for students attending private schools, who often face higher costs due to tuition and additional fees (Nazara et al., 2025).

2.1.1. Synthesis

The studies reviewed shared themes regarding the high-quality educational experience, specialized curricula, and academic excellence offered by private schools (Crawfurd and Hares, 2021). As students transition to private education, budgeting becomes essential to manage the associated higher costs. Effective financial management strategies are crucial for students, who often face financial constraints and need personalized budgeting approaches to manage their unique financial circumstances (Peralta et al., 2023). According to Nwe Ni Aung & Hla Hla Mon (2020), managing money is essential for success, and students need to adopt appropriate budgeting strategies to achieve financial stability and independence. However, research gaps exist in identifying effective practices that can be shared with other students to improve their financial management during this transition, as well as in understanding how financial literacy affects students' budgeting strategies and overall financial well-being.

2.2. Methodology

This chapter outlines the research design, sampling techniques, data collection instruments, and data analysis procedures. The aim is to provide a clear and detailed description of the methods used to ensure the reliability and validity of the findings. By thoroughly detailing the research process, this chapter lays the groundwork for comprehending the derivation of the study's conclusions.

2.2.1. Research Design

The research design for this paper is a qualitative survey that aims to explore how students manage their finances during the transition from public to private education. Utilizing open-ended survey questions, this design seeks to gather detailed insights into the financial strategies employed by students. Through a thorough examination of these strategies, the research aims to identify effective practices. This qualitative approach allows for an in-depth understanding of students' experiences and the complexity of their financial decision-making processes. A method is crucial to study the perspectives, experiences, opinions and beliefs of individuals.

2.2.2. Population Sampling

The research targets senior high school students at San Jose Academy who are transitioning from public to private education. Specifically, the study focuses on Grade 11 students who have recently made this transition.

A total of 30 students will be randomly selected to participate in this study. This sample size has been carefully chosen to have a balanced manageability and representativeness. It allows for an in-depth exploration of the students' financial budgeting strategies, challenges, and the influence of financial literacy on their ability to manage finances

during this transition. A smaller, focused sample size ensures that each participant's experience is thoroughly examined, while still providing sufficient data to identify common patterns and themes.

A random sampling technique will be employed to select participants. This approach is chosen to ensure that each student within the target population has an equal opportunity to be included in the study. With the help of this method, the research will achieve a representative sample that captures a diverse range of experiences and perspectives.

2.2.3. Research Instrument

The research instrument used in this study is a survey questionnaire, designed to gather comprehensive insights into the financial budgeting strategies of senior high school students at San Jose Academy during their transition from public to private education. This instrument aims to explore the methods employed by students to manage their finances, identify the challenges they face, and assess the impact of financial literacy on their financial management skills.

2.2.4. Data Gathering Procedure

The data collection method for this study involved administering a survey questionnaire to a balanced sample of Grade 11 students at San Jose Academy. To ensure a comprehensive and diverse representation of the student population, the researchers selected 30 random respondents from different strands within the Grade 11 cohort, specifically ABM, HUMMS, and STEM. Through distributing the surveys evenly across the various strands, the study aimed to capture a wide range of experiences and perspectives, thus providing a more holistic understanding of the financial budgeting strategies employed by the students.

3. RESULTS AND DISCUSSION

This chapter presents the findings and analysis of the financial budgeting strategies used by Grade 11 students at San Jose Academy during their transition from public to private education. The target number of 30 participants was successfully achieved, encompassing students from various strands (ABM, HUMSS, and STEM). The collected data has been analyzed to identify common themes, patterns, and trends, which are discussed in detail.

Table 1. Weekly Budget.

Budget	Frequency	Percentage
Php 1000+	9	30%
Php 500+	17	56.67%
Php 100+	4	13.33%
Total	**30**	**100%**

Table 1. presents the students' demographic data, starting with their weekly budget. Among the respondents, 30% have a weekly budget of more than Php 1,000, indicating a higher spending capacity. The majority, about 56.67%, fall into the moderate spending category with a weekly budget of more than Php 500. A smaller group, approximately 13.33%, has a weekly budget of more than Php 100, reflecting a lower spending capacity.

Table 2. Ability to Save Money.

Ability	Frequency	Percentage
Yes	19	63.33%
No	11	36.67%
Total	**30**	**100%**

Table 2. investigates whether students manage to save money from their weekly budget. The results highlight that saving is achievable for most, as 19 students confirmed they could save part of their allowance. However, 11 students stated that saving was difficult, pointing to the challenge of balancing limited funds with daily expenses.

Table 3. Transition Experiences.

Questions	Themes	Frequency
Q1a. Did you encounter any adjustments during your transition?	a. Adapting New Environment b. Managing School Expenses c. Adhering to School Rules d. Navigating Grading System	a. 12 b. 15 c. 2 d. 1

Table 3. focuses on the adjustments students faced during their transition. Managing school expenses emerged as the most significant adjustment, mentioned by 15 students. Adapting to a new environment also proved challenging for 12 students. Fewer students noted adjusting to school rules (2) mentions and understanding the grading system (1) mention. The responses reflect how financial and social adjustments weigh heavily during school transitions.

Table 4. Coping Mechanisms.

Questions	Themes	Frequency
Q1b. How did you cope with these adjustments?	a. Adjusting to Changes b. Effective Communication c. Budgeting Strategies	a. 13 b. 9 c. 6

Table 4. examines the coping strategies students used to handle these adjustments. The majority, with 13 mentions, emphasized adapting to changes as their primary strategy. Effective communication was the second most common response (9) mentions, followed by applying budgeting techniques (6) mentions. These findings suggest that adaptability and interpersonal skills play a key role in overcoming transitional challenges.

Table 5. Reasons for Transition.

Questions	Themes	Frequency
Q2. What were the reasons for your transition to San Jose Academy?	a. Pursuing Quality Education b. Benefit of Great Facilities c. Influence of Family and Friends d. Impact of Location	a. 13 b. 3 c. 12 d. 2

Table 5. delves into the reasons behind students' decision to transfer to San Jose Academy. Pursuing quality education was the top reason, with 13 students highlighting it as their motivation. Family and peer influence closely followed with 12 mentions. Additionally, a few students cited better school facilities (3) mentions and location convenience (2) mentions as contributing factors. This indicates that academic reputation and personal networks strongly influence school transfers.

Table 6. Financial Challenges During the Transition.

Questions	Themes	Frequency
Q3. Did you experience financial challenges during the transition? If yes, what challenges?	a. No b. Yes, School Expenses	a. 9 b. 21

Table 6. investigates whether students encountered financial challenges during their transition. The majority, 21 students, reported struggling with school-related expenses, making it the most frequently mentioned challenge. Conversely, 9 students shared

that they did not experience any financial difficulties. This highlights how educational costs remain a primary concern for most students.

Table 7. Budgeting Strategies.

Questions	Themes	Frequency
Q4. What budgeting methods do you use to manage your finances during this transition?	a. Money-Saving Technique b. Tracking Expenses c. Lacks on Budgeting Skills d. Separating Needs and Wants	a. 17 b. 7 c. 2 d. 4

Table 7. focuses on the budgeting methods students use to manage their finances. Saving money was the most common method, mentioned by 17 students, indicating that disciplined saving is a preferred approach. Other strategies included tracking expenses (7) mentions, distinguishing between needs and wants (4) mentions, and applying budgeting skills (2) mentions. These responses suggest that students rely on practical financial habits to navigate their expenses.

Table 8. Effectiveness of Budgeting.

Questions	Themes	Frequency
Q5. How did this help you in managing finances?	a. Financial Support for School Expenses b. Saves Money c. Reducing Spending	a. 20 b. 7 c. 3

Table 8. explores how budgeting has helped students in handling their finances. The majority of students (20) mentioned that budgeting allowed them to cover school-related expenses effectively. Other benefits included saving for future needs (7) mentions and reducing unnecessary spending (3) mentions. This shows that budgeting plays a crucial role in promoting financial independence among students.

Table 9. Budgeting Methods and Tips.

Questions	Themes	Frequency
Q6. Are there any specific budgeting strategies or tips that you found particularly helpful?	a. Uncertainty in Budgeting b. Bringing Food to Save Money c. Wise Spending Habits d. 50, 25, 10, 5 Budgeting Method	a. 13 b. 12 c. 4 d. 1

Table 9. examines the budgeting strategies or tips students found most useful. Bringing food to school was a popular tip, mentioned by 12 students, as it helped cut daily expenses. Interestingly, 13 students expressed uncertainty about effective budgeting strategies, indicating a need for more financial literacy support. Additionally, some students highlighted practicing wise spending habits (4) mentions and using the 50-25-10-5 budgeting method (1) mention. These responses reveal both practical budgeting tactics and areas where financial guidance could be beneficial.

4. CONCLUSION AND RECOMMENDATION

4.1. Conclusion

The study draws to a close with the conclusion that students transitioning from public to private schools face significant financial challenges, though many employ effective coping mechanisms such as budgeting and saving. Despite these efforts, a notable portion of students struggles with saving money, pointing to a need for better financial literacy. The transition period involves adjusting to new

environments, with factors such as school expenses and adapting to different academic and social settings being critical. The study highlights that factors like quality education, family influence, and school facilities strongly influence the decision to transition. Ultimately, the findings stress the importance of financial literacy and support to help students manage the financial aspects of this shift more effectively.

4.2. Recommendations

Based on the study's findings, several recommendations are proposed. To communities, the development of financial assistance programs, such as scholarships or low-interest loans, is crucial in reducing the financial burdens on students. Additionally, engaging families in financial education initiatives can empower parents to support their children's financial literacy. Schools should integrate financial literacy into the curriculum, providing students with the necessary tools to manage their finances effectively. Students are encouraged to take the initiative to educate themselves on financial concepts and develop good financial habits. Finally, future researchers to expand the sample size and conduct deeper investigations into the specific challenges students face during their transition, particularly related to financial stress and the effectiveness of current educational programs.

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Shopping Patterns of SnJA Senior High School Students in E-commerce

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ABSTRACT

This study focused on the shopping patterns of SnJA senior high school students in e-commerce and the factors influencing their decision-making. This utilized a qualitative research design, a survey as our methodology, and a survey questionnaire as our research instrument to gather data from the participants. 23 senior high school students of San Jose Academy are the participants of this study. The findings provided insights into students' online shopping patterns. The study found that students only shop online if necessary; if the students really need something essential or necessary for them to buy, that's when they will shop online. The types of products that students typically purchase online are cosmetics, school supplies, clothes, and accessories. Students usually found out about new products or online stores because of the emerging online advertisements and promotions nowadays. Students chose to shop online because it's more easier and convenient to them as they don't have to go outside their home, it saves time. Online shopping has more cheap and affordable products or services that help the students to also save money. According to the students, compared to physical stores, online shopping has a wide range of products, which have more product options students can choose from. However, students experienced issues while shopping online, such as a delayed delivery, damaged product, etc. Factors including discounts and vouchers influenced the decision-making of the students, which according to the students can lead to addiction. This study suggested that students should control their spending habits and avoid unnecessary purchases. Students should be wise and practical to avoid any issues when purchasing a product or service online.

Key Words: Shopping Patterns; E-commerce; Online Shopping; Factors; Decision-making

CHAPTER 1
INTRODUCTION

BACKGROUND OF THE STUDY

Shopping patterns refer to the why and how behind consumer purchase decisions. They are habits and routines that consumers establish through the products and services they buy. Buying patterns are defined by the frequency, timing, quantity, etc. of said purchases. Each consumer follows their own set of buying patterns, whether they recognize it or not (Decker, 2020).

Internet shopping is a phenomenon that is growing rapidly nowadays. A quick look into the exponential growth of the main players in this industry indicates there is still a large reservoir of market potential for e-commerce. The convenience of online shopping makes it an emerging trend among consumers. Shopping in a store was once the predominant way to shop, online shopping was already becoming a preferred way to shop for consumers around the globe and the trend only accelerated during the global pandemic.

E-commerce or electronic commerce refers to buying and selling of goods and services, or the transmitting of funds or data, over an electronic network, primarily the internet (Hashemi-Pour & Lutkevich, 2023). E-commerce is powered by the internet. Customers use their own devices to access online stores. They can browse products and services those stores offer and place orders. In the last two decades, e-commerce platforms -- such as Amazon and eBay -- have contributed to substantial growth in online retail. In 2011, e-commerce accounted for 5% of total retail sales according to the U.S. Census Bureau. By Q2 2020, after the start of the COVID-19 pandemic, e-commerce accounted for 16.5% of retail sales. Since then, it has fallen slightly to about 15% as physical stores reopened.

Shopping patterns are important to recognize, analyze, and measure because they help businesses better understand and potentially expand their target audience. Buying patterns also fall in step with the customer journey, although they connect more with the psychology and motivations behind each stage. This study is also important due to the increasing prevalence of online shopping and the influence of social media on consumer shopping patterns.

According to Icek Ajzen's Theory of Planned Behavior, intentions are predictive of behavior; the stronger the intentions are, the more likely it is that a behavior will be performed. When talking about consumer behavior, buying intentions often reflect a logical consequence of beliefs and motivations. While buyers are less likely to be reflective when making unplanned purchases, there are still significant factors in play that influence or disrupt the consumer decision making process. Buying intentions are affected by three fundamental factors, such as attitude, subjective norms, and perceived behavioral control. With the explosion of e-commerce in the past decade, different buying patterns and preferences have emerged for customer groups and other demographics.

These patterns have been measured and collected by numerous independent marketing, business and even academic studies to understand how consumers connect

with the new adventure of e-commerce. The appearance of the internet does not only bring changes to consumption patterns, but also to the business modes of companies, as a result of which the internet has become a perfect sales channel. When a consumer shops online, s/he might be influenced by a huge variety of factors.

This study aimed to understand the shopping patterns of SnJA Senior High School students in e-commerce. This study also aimed to identify the factors that affect the student's shopping patterns in e-commerce.

STATEMENT OF OBJECTIVES

E-commerce has brought the shopping experience to their fingertips via desktop and mobile devices, completely changing the way consumers shop.

The biggest impact e-commerce has had on consumer shopping habits is that consumers can shop from anywhere, anytime. They no longer have to wait until store hours to make a purchase. While the ability to research and shop online has been around for a while, mobile has taken e-commerce to the next level because shoppers can use the device at any point during the sales cycle.

This study aimed to answer the question: What are the shopping patterns of SnJA Senior High School students in e-commerce?

Specifically, this study aimed to answer the following:

1.1. How frequently do students at SnJA Senior High School purchase goods or services online?

1.2. What are the factors that affect the decision-making of the senior high school students at SnJA in e-commerce?

SIGNIFICANCE OF THE STUDY

This study is significant because it discussed the shopping patterns of senior high school students of San Jose Academy. Also identified the factors that affect the student's decision-making in shopping online, which will benefit everyone involved in the shopping and e-commerce ecosystem. This is also a step towards improving the shopping experience for consumers, especially students.

Upon completion, this study benefited the following:

Students: This study helped students learn how to use its benefits wisely and understand their spending limits.

Parents: This study helped parents understand their children's shopping behavior so they can monitor the proper use of their allowance and keep track of their children's shopping habits.

Sellers: This study helped to gather information from student buyers and better understand the preferences and needs of students.

Digital Marketers: Digital marketers benefited from this study because it helped them to create markets or products that are

frequently purchased by students on platforms that students always use.

Future Researchers: This study helped to answer the shopping patterns of students in e-commerce. Future researchers may learn and expand the idea about purchasing decisions, such as which brand, price, and what is more convenient.

SCOPE AND DELIMITATIONS

This study only focused on Senior High School students for the academic year 2024-2025 at San Jose Academy, Navotas City.

The key variables or aspects that this study focused on are the (1) age; (2) gender; (3) allowance; (4) technology usage; (5) device access; (6) platform preference; (7) buying behaviors; (8) purchase frequency (how often students shop online, weekly, monthly, or during sales season).

This study is not focused on (1) non-students; (2) offline shopping; (3) external factors; (4) non-e-commerce.

Only the shopping patterns of SnJA senior high school students are discussed in this study, along with the factors that influenced the students' decision-making when they buy products or services online. Other topics, such as the effects, drawbacks, and other issues that are not related to the students' e-commerce shopping patterns, are not covered in this study.

The study only included a small group of students, the results may not reflect the broader population of SnJA Senior High School students.

The study focused only on a specific geographical area or a single school, the results may not be applicable to other regions or schools with different demographics.

CHAPTER 2
REVIEW OF RELATED LITERATURE

This chapter presented the literature related to this study using a thematic approach. In this chapter we discussed the different themes that are included or mentioned in our study.

Online Shopping

According to Calvero et al. (2024) online shopping is the act of buying over the internet.

Consumers who shop online are recommended to be wiser in making transactions to prevent experiencing various online shopping risks. This is highly relevant during the time of pandemic and post-pandemic, when more individuals and families have resorted to online shopping. Spending habits and the way of shopping preferences of the customer profiles are important to be scrutinized for the sake of online shopping and e-commerce sites. Online shopping sites and banks should act sensitively in this regard as credit card usage is preferred for online shopping (Kılıç & Ateş, 2019).
Delivery errors were the most frequent experience while sellers' inability to handle complaints and dissatisfaction with the product was the least (Calvero et al., 2024).

E-commerce

E-commerce is a set of dynamic technology,

application and business processes which connects certain companies, consumers and communities through electronic transactions. Trade of goods, services and information is performed electronically (Prameswari et al., 2017).

E-commerce is a big platform and customers from every age like shopping from different online shopping sites (Kılıç & Ateş, 2019).

Due to the COVID-19 pandemic, there is an evident increase of online retail sellers and demand in e-commerce (Abgelina et al., 2020).

With internationalization of commerce and business and with increased use of e-business and e-commerce, it is important to ensure that these systems can be effectively utilized across cultural boundaries (Lightner et al., 2002).

The most susceptible age groups to e-commerce are younger, while gender, geographical location, and income level all play significant roles (Rosales et al., 2024).

Online Consumers

Kılıç and Ateş (2019) stated that online customers' purchase preferences were gender biased, and their lifestyles had an impact on online customers' monthly spending amounts as well. There was a statistically significant positive relationship between the amount of time and money spent on the internet.

Consumers who were highly satisfied with the purchase made were more likely to make a repeat purchase. The consumer was also inclined to endorse the product to other students and friends. If the consumer was not fully satisfied, he/she was more likely to consider other brands first before making a repeat purchase of the product first bought (Belmes, 2015).

Customer reviews have the most significant effect on consumer's online preference, followed by customer loyalty, price, advertisement, and hedonic motivation (Abgelina et al., 2020).

Students

Increasing number of the students at undergraduate level are now using the internet for purchase. It also observed that between male and female students, male students are purchasing products online more than female students (Rahaman, 2014).

Students prioritized buying the needed school supplies, food and drinks, grooming aids, accessories, personal items and clothes, and their prevailing buying behavior concentrated on problem recognition, consumer information processing, evaluation of alternatives and purchase and post purchase evaluation (Belmes, 2015).

Students as consumers who like to buy goods or products online should be wise in using online shopping applications, and students should be able to distinguish what items are needed and what items are included as wants, so that students are not wasteful and can consider and think twice to buy the item. So that consumptive behavior in online shopping can be minimized (Agustin & Navilah, 2023).

Products

The products that were mostly bought by online customers were clothing, stationery products, online tickets and electronic devices (Kılıç & Ateş, 2019).

Consumptive Behavior

According to Agustin and Navilah (2023) consumptive behavior is a person's action in buying goods excessively, the purchase is in accordance with the wishes, not in accordance with the needs. More students behave consumptively. This consumptive behavior is caused by several factors, namely perceptions about online shopping, discount factors, online shopping because it follows fashion trends, online shopping to maintain appearance, and online shopping because it is influenced by friendship groups. The strategy used by students to minimize consumptive behavior is by making a list of needs or priorities, managing finances properly, getting into the habit of saving, not using online loans such as shopee paylaters, having to be able to control or control yourself, and not frequently opening the shopee application.

Online Shopping Scams

According to Acoba et al. (2023) the development of social media and electronic commerce platforms, or e-commerce platforms, created an opportunity for business owners and customers to participate in online transactions, even in the comfort of their homes. As e-commerce platforms develop in due course and more people engage in online shopping, it is inescapable for consumers to encounter online shopping scams. From false advertisements to feigning to be legitimate sellers, online scammers use e-commerce platforms to mislead buyers into purchasing. These encounters result in buyers having challenges avoiding online shopping scams. As e-commerce platforms became more well-known to the general public, many people began to encounter specific and odd circumstances, particularly during engagements concerning online purchasing on e-commerce platforms. After all, scams involving online purchasing can take many different forms, such as fake websites, emails, fraudulent advertisements, and fake sellers. Most students frequently experience online shopping scams, which include obtaining incorrect and defective products and losing contact with the seller or business. To avoid scams in online transactions, these students must first verify the integrity and legitimacy of the shop, seller, and product.

Synthesis

This literature highlighted the shopping patterns of SnJA senior high school students. According to Calvero et al. (2024) online shopping is the act of buying over the internet. Consumers who shop online are recommended to be wiser in making transactions. E-commerce is a set of dynamic technology, application and business processes which connects certain companies, consumers and communities through electronic transactions. Trade of goods, services and information is performed electronically (Prameswari et al., 2017). Due to the COVID-19 pandemic, there is an evident increase of online retail sellers and demand in e-commerce (Abgelina et al., 2020). If the consumer was not fully satisfied, he/she was more likely to consider other brands first before making a repeat purchase of the product first bought (Belmes, 2015). Customer reviews have the most significant effect on consumer’s online preference, followed by customer loyalty, price,

advertisement, and hedonic motivation (Abgelina et al., 2020). Students prioritized buying what they needed (Belmes, 2015). Consumptive behavior in online shopping can be minimized (Agustin & Navilah, 2023). The products that were mostly bought by online customers were clothing, stationery products, online tickets and electronic devices (Kılıç & Ateş, 2019). According to Agustin and Navilah (2023) consumptive behavior is a person's action in buying goods excessively, the purchase is in accordance with the wishes, not in accordance with the needs. According to Acoba et al. (2023) the development of social media and electronic commerce platforms, or e-commerce platforms, created an opportunity for business owners and customers to participate in online transactions, even in the comfort of their homes. This literature didn't further discuss how the factors mentioned in this study influenced the students, and how it can affect the shopping patterns or behaviors of the students.

CHAPTER 3
METHODOLOGY

The methods used in the study will be covered in this chapter. It outlines the type of research design that is employed and the research instrument that is utilized as a medium to collect data from the participants. The respondents and how they will be sampled are also described in this study. Additionally, the researchers described the methods for gathering data and the techniques for analyzing the collected data.

Research Design

This study employed a qualitative design, specifically a descriptive qualitative design, to examine and characterize the e-commerce shopping patterns of senior high school students at SnJA as well as the factors influencing their decision-making. This study relied on primary sources.

Research Instrument

This study utilized survey questionnaires to gather information from the participants. The survey questionnaire included an informed consent form at the beginning, demographic profile of the participants, such as name (optional), grade level and section, age, gender, and allowance. The survey questionnaires contained 10 open-ended questions for the participants to answer.

Data Gathering Procedure

This study aimed to analyze and describe the shopping patterns of SnJA senior high school students in e-commerce and the factors that affect their decision-making through a survey method that is conducted in this study to gather data from the participants. The researchers provided a hard copy of the survey questionnaires for the participants during class hours. The participants are given 1-2 hours to answer the survey questionnaires. After the participants answered the survey questionnaires, the researchers collected it within the given time.

Sampling

The participants of this study are the senior high school students of San Jose Academy for the academic year 2024-2025. From the population, only 30 students are selected to be the sample of this study. The study used simple random sampling to select our participants from grade 11 and 12 ABM,

HUMSS, STEM, and GAS strand students.

CHAPTER 4
RESULTS AND DISCUSSION

This chapter presented the findings of the survey questionnaire that we conducted. In this chapter we discussed and analyzed the responses that we have received from our participants. This chapter addressed the research questions: What are the shopping patterns of the SnJA senior high school students in e-commerce, and the factors that influence their decision-making when shopping online. Only 23 students are able to answer the survey questionnaire.

Table 1. Frequency of shopping online

Question	Common Themes	Code Frequencies
1. How often do you shop online?	a. If only necessary b. Once to four times a month c. Every week or twice to thrice a week d. Once every two to four months e. Everyday	a. 7 b. 6 c. 5 d. 3 e. 2

Table 1 presented question 1 about how often senior high school students of SnJA shop online, there were five (5) common themes: if only necessary had the highest frequency as it had 7 mentions, students only shop online when they really need a particular product or service, once to four times a month had 6 mentions, students only shop online monthly, every week or twice to thrice a week had 5 mentions, students only shop online weekly, once every two to four months had 3 mentions, and lastly, everyday had 2 mentions, there are some students who love to shop online.

Table 2. The last time students ordered online

Question	Common Themes	Code Frequencies
2. When was the last time you ordered a product online?	a. Last week b. Few days ago c. Few months ago	a. 9 b. 7 c. 7

Table 2 presented question 2 about when was the last time a student ordered a product online, there were three (3) common themes: last week had the highest frequency as it had 9 mentions, students at least have a few weeks break before they start to buy a product or service online again, while few days ago and few months ago both had 7 mentions, most of the students usually purchased a product or service online after a few days or few months ago.

Table 3. Types of products purchased online

Question	Common Themes	Code Frequencies
3. What types of products do you typically purchase online?	a. Cosmetics b. School supplies c. Clothes d. Accessories	a. 8 b. 6 c. 5 d. 4

Table 3 presented question 3 about what types of products do students typically purchase online, there were four (4) common themes: cosmetics had the highest frequency as it had 8 mentions, cosmetics are only part of the student's wants, but students typically purchased this type of product online, on the other hand, school supplies that are very necessary and essential to the students only had 6 mentions, it showed here that the student's wants are more powerful than their needs, clothes had 5 mentions, and accessories had 4 mentions, these can be the student's wants or needs.

Table 4. Expenditure on online shopping

Question	Common Themes	Code Frequencies
4. On average, how much do you spend on online shopping each month?	a. 100 pesos to 499 pesos b. 500 pesos to 1,000 pesos c. 2,000 pesos to 4,000 pesos d. 12,000 pesos	a. 11 b. 8 c. 3 d. 1

Table 4 presented question 4 about how much do students spend on online shopping each month, there were four (4) common themes: 100 pesos to 499 pesos had the highest frequency as it had 11 mentions, 500 pesos to 1,000 pesos had 8 mentions, 2,000 pesos to 4,000 pesos had 3 mentions, and lastly, 12,000 pesos only had 1 mention. It showed how different students spend their money on online shopping each month based on their allowance. The more the allowance of the students, the more money they spent on online shopping.

Table 5. Advantages of online shopping

Question	Common Themes	Code Frequencies
5. Why do you choose to shop online?	a. Easier and and convenient b. Saves money and time c. More product options	a. 13 b. 8 c. 2

Table 5 presented question 5 about why students choose to shop online. There were three (3) common themes: it is much easier and convenient, compared to physical shopping. Students found online shopping more easier and convenient because they don't have to go outside their house. It had the highest frequency as it had 13 mentions, it saved money and time had 8 mentions, students stated that online shopping helped them to save money, because products are more affordable, and time because with just one click you can already purchase a product or service online, and more product options had 2 mentions, online shopping platforms offered more products options that students can choose from, compared to physical stores that have limited products.

Table 6. Preferences

Question	Common Themes	Code Frequencies
6. If you are buying something really expensive,	a. Physical store, to avoid getting scam and other issues	a. 22 b. 1

would you purchase it online, or would you rather go to the store to buy that particular product? Explain your answer.	b. Online, for the discounts and vouchers	

Table 6 presented question 6 regarding if the students are buying something really expensive, would they purchase it online, or would they rather go to the physical store to buy that particular product, there were two (2) common themes: 22 students mentioned that they would rather go to the physical store to avoid getting scam and other issues, many students are afraid to purchase something expensive online because of the conflicts they can experience while shopping online, such as scams, damaged products, misplaced of products, etc. While only 1 student mentioned that she would purchase it online for the discounts and vouchers.

Table 7. Benefits of online shopping

Question	Common Themes	Code Frequencies
7. Do you think online shopping is more beneficial to you? Why?	a. Saves time b. Affordability c. Wide range of products	a. 18 b. 4 c. 1

Table 7 presented question 7 about whether students think online shopping is more beneficial to them and their reasons for it, there were 3 common themes mentioned: 22 students answered yes, because they don't need to go outside their house and it saves time, students are able to managed and saved time because online shopping is more easier and convenient to them. 4 students answered yes, because it's more affordable, online shopping offered cheaper and affordable products or services, and only 1 student mentioned yes, because of the wide range of products to choose from, online shopping has more product options that students can choose to purchase.

Table 8. Discover new products/online stores

Question	Common Themes	Code Frequencies
8. How do you usually find out about new products or online stores?	a. Online advertisements and social media promotions b. Peers	a. 18 b. 5

Table 8 presented question 8 about how students usually find out about new products or online stores, there were two (2) common themes: online advertisements and social media promotions had the highest frequency as it had 18 mentions, there were already various online advertisements and social media promotions online, that helped the students to found out new products or online stores, and from peers had 5 mentions, peers also have a big role on how students found out about new products or online stores, it can be a word of mouth like recommending some new products or online stores.

Table 9. Issues with online shopping

Question	Common Themes	Code Frequencies
9. Have you ever experienced any issues while shopping online?	a. Delayed delivery, wrong items, damaged product, etc. b. Never	a. 15 b. 8

Table 9 presented question 9 regarding if the students have ever experienced any issues while shopping online, there were two (2) common themes: 15 students mentioned yes, such as, delayed delivery, wrong items, damaged product, etc. It proved that online shopping is not always properly working, because students also experienced different conflicts while shopping online. While 8 students mentioned they never experience any issues while shopping online, there are some students who are lucky enough that they never experienced any issues while shopping online, it can be coincidence or maybe the students are really wise when purchasing a product or service online.

Table 10. Factors of online shopping

Question	Common Themes	Code Frequencies
10. What factors do you consider most important when deciding to make a purchase online? (prices, reviews, sales, etc.) why?	a. Reviews and sales b. Prices	a. 16 b. 7

Table 10 presented question 10 about what factors do students consider the most important when deciding to make a purchase online, there were two (2) common themes mentioned, 16 students answered reviews and sales to see if it's good quality, which means that reviews and sales played a significant role when students are deciding to make a purchase online, and 7 students answered prices, to know if it's good for its price, also to manage and saves money.

Table 11. Influence of discounts/promotions

Question	Common Themes	Code Frequencies
11. How often do discounts or promotions influence your decision to purchase a product online?	a. Frequently b. Sometimes c. Not too often	a. 12 b. 8 c. 3

Table 11 presented question 11 about how often do discounts or promotions influence the decision of the students to purchase a product online, there were three (3) common themes mentioned, 12 students answered frequently, because discounts will help them to saves money, students are always influenced by discounts or promotions as it helped them a lot in budgeting their money, 8 students answered sometimes, when it offers discounts and vouchers such as free shipping, students sometimes being influenced by discounts or promotions as i helped them to also saves money, while 3 students answered that discounts or promotions doesn't influence their decision making too often, which means that discounts or promotions didn't influenced

the students too often.

Table 12. Decision-making process

Question	Common Themes	Code Frequencies
12. What steps do you take when considering an online purchase? Describe your decision-making process.	a. Considering the product itself first, and then reading the reviews before buying b. Check the price first, and then the reviews c. Reading the reviews first, then look for more cheaper option d. Check the number of sales first, and then reading the reviews after	a. 15 b. 5 c. 2 d. 1

Table 12 presented question 12 about what steps do students take when considering an online purchase, their decision-making process are also included here. There were four (4) common themes mentioned, 15 students answered that they are considering the product itself first, and then reading the reviews before buying, 5 students mentioned that they check the price first, and then proceed to read the reviews, 2 students answered that they are reading the reviews first, then look for more cheaper option, and lastly, 1 student answered that he check the number of sales first, and then reading the reviews after.

Table 13. Shopping habits

Question	Common Themes	Code Frequencies
13. How do you see your online shopping habits changing in the next few years?	a. Addiction b. Visionless c. Practical and considerate	a. 8 b. 8 c. 7

Table 13 presented question 13 about how students see their online shopping habits changing in the next few years, there were three (3) common themes: I will be more addicted to online shopping in the next few years had 8 mentions, same with I don't really see how my online shopping habits will change in the next few years with 8 mentions also, I will be more practical and considerate had 7 mentions. Some students will most likely be addicted to online shopping in the next few years, which are caused by factors that influenced the decision-making of the students. Some students can't see how their online shopping habits will change in the next few years, and lastly, some students will most likely be practical and considerate when deciding to purchase a product or service online.

Table 14. Features

Question	Common Themes	Code Frequencies
14. Are there any specific features that you wish e-commerce platforms would offer in the future?	a. Satisfaction b. Reliability and legitimacy c. Discounts and vouchers	a. 11 b. 10 c. 2

Table 14 presented the last question about are there any specific features that the students wish e-commerce platforms would offer in the future, there were three (3) common themes mentioned: 11 students answered that they can't really think of anything, and already satisfied, 10 students answered that e-commerce platforms need to be more reliable and legitimate, because nowadays online shopping scams and other issues are emerging more, that's why e-commerce platforms need to be more reliable and legitimate to avoid or prevent these issues from happening, and lastly, 2 students answered that e-commerce platforms need to add more discounts and vouchers, the more e-commerce platforms offered a discounts or vouchers can help the students when saving and budgeting their money.

CHAPTER 5
CONCLUSIONS, AND RECOMMENDATION

Conclusions

This study analyzed the shopping patterns of SnJA senior high school students in e-commerce, and the factors that affect their decision-making when shopping online. This study is focused on why students choose to shop online instead of going to the physical store, how often do students shop online, and what are the factors influencing their decision to purchase a product or service online.

Based on the findings of the study, these conclusions are drawn: The online shopping habits of senior high school students at SnJA reflected a range of the frequencies. Most students shop online only when necessary, with a smaller portion making purchases weekly or a few times a month. A few students shop online once every two to four months, while a very small number shop everyday. This suggested that students tend to shop online infrequently and primarily for specific needs rather than as a regular habit.

The students chose to shop online because it is easy to use and more convenient in terms of accessibility and buying process. Because for them, online shopping is more beneficial to them, as they don't need to go outside their house, and saves time. They preferred online shopping for the reasons that it's more affordable compared to the products or services in physical stores. It helped the students to save their money. Compared to physical stores, students think online shopping is more beneficial to them because of the wide range of products to choose from. The products that students purchased are cosmetics, school supplies, clothes, and accessories. As these are part of their personal needs and wants.

The students preferred to buy expensive products in physical stores rather than online to avoid being scammed and experience defective products. Because most students experienced issues while shopping online, such as delayed delivery, wrong items, damaged products, etc.

The students usually found out about a new product or store on online advertisements and

social media promotions. The students considered the product itself whether they really need it, reading the product reviews and sales is an important factor for the students before deciding to make a purchase.

Discounts or promotions are shown to be a significant factor affecting the decision-making of the students when shopping online. Students are frequently being influenced by the discounts or promotions, as it helps them to save money, but it also shows a threat to the students that they can get addicted to online shopping in the next few years.

Recommendations

For Students: Students should control their spending habits and avoid unnecessary purchases. As it can help them to manage their money properly, and avoid impulsive buying. Students should be wise and practical to avoid any issues when purchasing a product or service online. Lastly, make proper use of the offers from sellers, such as vouchers and free shipping fees in online shopping.

For Parents: Parents should provide proper guidance to their children in handling and spending money as they have more understanding in terms of budgeting and managing the money properly. It will help to avoid falling into debt and buying unnecessary items.

For Teachers: Teachers should teach students to be responsible in their shopping decisions as they have more knowledge about money. Teachers should encourage students to take their time before making a purchase, to weigh the necessity and its impact on their budget.

For Sellers: Sellers should have a better understanding of the shopping patterns of the students since they have different shopping habits, different needs, and unique preferences. Sellers should develop better marketing strategies, products, and services that students can use more effectively.

For Future Researchers: Future researchers should do further study about how students use their money and what their expenditures are. Understand how students shop and how they utilize the offers provided by sellers. Future researchers can also further discuss student's methods or strategies to avoid or cope with any issues or conflicts when shopping online, such as impulsive buying and scams. Lastly, how the factors mentioned in this study can affect the shopping behaviors of the students.

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Examining the Use of Social Media as a Marketing Strategy for Small Food Business Owners at Navotas City

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Abstract: In the present time, social media has played a pivotal role in the lives of many individuals. It is used to communicate, interact, and share information with one another. Social media evolved through decades and digital marketing was developed. Furthermore, online marketing and social media have played a major role in order to promote and sell products, mainly in food industry. In an instance, Filipinos use this platform to sell products instead of sticking with the traditional way. This study aims to examine how social media is used as a marketing strategy by small food business owners at Navotas City. The respondents were collected through a purposive sampling technique and used open-ended questionnaires for the interview. Through this method, the researchers were able to gather information, experiences, and perspectives from business owners which helped in answering the 1) social media platform used in marketing, 2) challenges faced by the business owners, and 3) strategies used in promoting the business. This study concluded that social media had a pivotal role when it comes to marketing products online as it can be used by a wide range of users. Facebook was one of the most common platform used by the business owners, personalizing a page specifically for their business. However, the results had a difference when it comes to strategies as some of the business focuses on the product promotion while some focuses on customer service. Despite this, some of the population still used mixed methods in order to gain a better experience in the business.

Key Words: Social Media Marketing; Marketing Strategies; Small Food Business Owners

1. INTRODUCTION

1.1 Background of the Study

Online Marketing served a vital role to the business field as it became a great marketing strategy for most of the business owners (Tsvetanova & Veleva, 2020). Small businesses took advantage of the technology to stay on the level of competition within the field. However, technology does not solve every solution the business has (Herhausen et al., 2020).

According to Betia et al., (2021), in the Philippines, food businesses are considered as one of the major source of income, believing that they can gain more money than from other jobs. Due to modernizations, Filipinos mostly used social media to buy foods and other products which

allowed other businesses to sell online than the traditional way. However, these businesses still face numerous challenges, including high competition, rising operational costs, changing consumer preferences, and limited access to capital.

This study aims to examine the maximized scope and ability of social media in helping business owners in promoting their products. By understanding these approaches, aspiring entrepreneurs can learn best practices to establish and sustain profitable ventures in a highly competitive market. On the other hand, disadvantages may serve as a guide for businesses and for them to know what they should do in order to face different issues related to this strategy.

1.2 Statement of Objectives

In modern time, social media has been used as to promote businesses and products online (Chatterjee and & Kar, 2020). This study seeks to answer the question: *How do small food business owners use social media as a marketing strategy?*

Specifically, this research seeks to answer the following questions:

- What social media platform is commonly used by small food business owners in Navotas City?
- What challenges do small food business owners face when using social media as a marketing strategy?
- What strategies are employed by the small food business owners of Navotas City including the advertising, creating content and consumer interaction?

1.3 Significance of the Study

This study aims to examine the use of social media as a marketing strategy for small food business owners in Navotas City. Furthermore, it will provide information to different individuals which will serve as a guide specially when building a business or by supporting one. Different beneficiaries are provided:

For business owners. Business owners can gain insights on how to effectively use social media to attract and engage customers, increasing sales and expanding their market reach.

For customers. This study enables customers to know what social media platform they can use to find quality products and learn different methods on how to properly engage with the owner themselves.

For the government. This study may help the higher levels of government such as the department of the Trade and Industry (DTI) and the Food and Drug Administration (FDA) to create laws and projects such as trainings and seminar for small-scale businesses.

For students. This research will help students who study business marketing to gain knowledge in regards to how they can properly promote their businesses.

For teachers. This research will be a source of literature for professors who deal with business management and technology.

For future researchers. This research will help develop a good base for further study of social media marketing using the gaps.

1.4 Scopes and Delimitations

The study is limited only to small scale—less than 10 employees—food businesses at Navotas City and will not include larger food businesses due to the fact that they have different strategies in doing their business. Furthermore, this will not discuss deeper the offline marketing strategies because this study will only be focused on social media strategies.

This study took place within the City of Navotas for the school year 2024-2025. The researchers interviewed 13 small business owners who have an ongoing business for at least a year to present. There will be no specific age, gender, and social status for the respondents.

2. METHODOLOGY

2.1 Review of Related Literature

Marketing is a process that involves selling, promoting, and distributing products and services beneficial to meet the needs and wants of consumers (Chari et., 2019). It includes targeting markets, understanding consumer behavior and creating value using a strategic blend of product, price, place and promotion. As the world requires adjustments and developments, marketing had its own innovation, digital marketing. Bala & Verma (2018) stated that digital marketing is a form of promoting brands and products with the use of digital channels. This type of marketing involves the use of technology in order to sell, buy, and trade products or services globally. The use of the internet is not the only way to use this marketing, this can also be applied by using mobile phones, display advertising, and other forms of digital media.

In modern times, social media continue to rise and provide numerous benefits, whether direct or indirect. As stated by Gurung and Prasant (2018), business owners, specifically, claimed that social media has become an essential tool as a marketing strategy, offering a unique platform to connect with their audience in real time. Moreover, it is considered as one of the most recent and significant e-marketing tools— providing consumer involvement which is crucial as it promotes good communication and strong relationship with your buyer (Bautista & Belandres, 2022).

Filipinos came up with an innovative movement, a new business was widely done in the country, the franchising. Betia et al., (2021) specified that it is a process of having an approval from the owner to sell their products in your hand. This legal action includes signing of papers that state the agreement of both parties: the franchisor and the franchisee, as well as the duration of agreement . Through this, the franchisee is able to own the income of their franchise from the owner's brand. However, all of the supplies must be the same supplier as the original to maintain the quality of the product under the name.

2.1.1 Synthesis

Social media can be used widely, whether it's for personal, community, fields, or industry. Similar to this, marketing also have a wide range of information. However, this study online focused on digital marketing and how social media is utilized, specifically by small food business owners in the Philippines. Related literatures has shown the connection of each variables, general to specific, highlighting the importance in this study.

2.2 Methodology

2.2.1 Research Design

This research aims to examine how small food business owners at Navotas City use social media as a marketing strategy. With that, descriptive and qualitative Research was employed in this study as it required experiences, opinions, and perspectives of the respondent. Through this method, the researchers gathered information through interviews with open-ended questions.

2.2.2 Population Sampling

To ensure the credibility of the study, the researchers used a purposive sampling technique to get the respondents. This

approach ensures that all the respondents who participated in the study fit the criteria of the researchers—small food business owners that use social media to promote their business. Moreover, the researchers also considered that the business owner must be running their business for a year to present. Due to unavailability of some business owners, only thirteen (13) small food business owners were interviewed in this study. Most of the owners were busy with their physical stores as well as the management of their online businesses.

2.2.3 Research Instrument

The study used interviews as a research instrument to gather data directly from the respondents. This interview was done face-to-face and online. Confidentiality forms were provided for the respondents which requires their signatures to ensure that the information shared in the interview will remain private. Through this form, the researchers are able to ensure the safety of the respondents, as well as their business, and the researchers themselves.

2.2.4 Data Gathering Procedure

In order to successfully finish the data gathering, the researchers allotted a week to find respondents as well as interview with them. The face-to-face interview were done on weekends and after class to give focus on each respondents. However, before the interview, the researchers seek an approval from the research adviser for the questionnaires and consent form. During the interview, the researchers ensure the signature of each respondent on the consent form to protect their privacy.

3. RESULTS AND DISCUSSION

In order to properly discuss and analyze the informations obtained from the interview, tables are used to show the common themes or codes from the respondents' answers and frequencies—number of times the themes were mentioned. The questions were divided into 3 major sections in order to answer the statement of the problem, which is represented and explained per table.

Table 1. Social Media Platform Used

Questions	Themes	Frequency
What social media application do you commonly use?	a. Facebook b. Instagram c. Tiktok	a. 12 b. 3 c. 3
Do you use your personal account, own page, post on group pages, or collaborate with other businesses?	a. Personal Account b. Own Page c. Group Page d. Collaborations	a. 6 b. 10 c. 1 d. 1
When did you start using social media to promote your products?	a. Pre-Launch b. Account Development	a. 11 b. 2
How often do you use social media to promote your products? (daily, weekly, others)	a. Daily b. Weekly c. By Schedule	a. 8 b. 5
Who are your target audiences?	a. Students b. Workers c. General	a. 9 b. 3 c. 1
Dos the use of you personal account, page, post on group pages, or collaborations	a. Customer Discovery b. Customer Engagement	a. 3 b. 13

help you to get a wider reach?

Question 1 aims to answer what social media applications are commonly used by small food business owners; there are 3 common themes. The most commonly used platform is Facebook which has the highest frequency as it has 12 mentions, Instagram and TikTok both had 3 mentions.

Question 2 aims to answer what account do business owners use to promote their products; there were 4 common themes mentioned. Most of the business owners had their own pages which had 10 mentions, personal accounts had 6 mentions, and was followed by collaboration and group pages which had 1 mention.

Question 3 aims to answer when food business owners start using social media platforms to promote their products, there were 2 common themes mentioned. Pre-launch—creating an account before starting the business—had the highest frequency which had 12 mentions, followed by account development—transition from personal account and creating a page—which only had 2 mentions.

Question 4 aims to answer how often do food business owners use social media to promote their products. There were 2 common themes. Daily has the highest frequency which has 8 mentions and weekly has 5 mentions.

Question 5 aims to identify the target audience and do the owners reach them. There were three common themes. Which were students with 9 mentions, followed by workers with 3 mentions, and general audience with 1 mention.

Question 6 aims to answer if the use of a specific account helps to get a wider reach. There were 2 common themes mentioned, customer engagement which got 13 mentions and customer discovery with 3 mentions.

Table 2. Challenges and Experiences

Questions	Themes	Frequency
What are the challenges in using social media as a marketing strategy?	a. No Experience b. Content Creation c. Competition d. Customer Service	a. 2 b. 3 c. 6 d. 2
How do you handle challenges such as scammers and cancelled orders?	a. Proactive Verification b. Product Advantages	a. 13 b. 1

Question 7 aims to answer the challenges that small business owners usually face. There were 4 common themes mentioned. Competition, against other businesses, had 6 the highest frequency, followed by content creation—ideas for visually appealing posts—with 3 mentions, and no challenge experienced and customer service both had 2 mentions.

Question 8 aims to answer the solutions of business owners when it comes to challenges. There were 2 common themes which are proactive verification—pre-confirmation of orders—which has the highest frequency with 13 mentions and product advantages— which had 1 mention.

Table 3. Strategies

Questions	Themes	Frequency
Is there a significant	a. Sales Retention	a. 1 b. 13

increase in your sales?	b. Increase	
What are the methods you use when advertising? (Videos, pictures, infographics, etc.)	a. Visually-Driven Method	a. 13
Have you tried other strategies before other than social media?	a. Stick with Online b. Physical Advertisement c. Direct Marketing	a. 5 b. 3 c. 6
Tips for fellow small business owners on how they can use social media as their marketing strategy.	a. Consistency b. Customer Connection	a. 8 b. 5

Question 9 aims to answer the information about the profit. There were 2 common themes. Increase had a highest frequency which had 13 mentions followed by sales retention—an unstable increase or decrease of sales—which only had 1 mention.

Question 10 aims to answer what are the methods used when advertising like video, pictures and infographics. There was only 1 common theme which is a visually-driven—visual methods to attract customers— that got 13 mentions.

Question 11 aims to evaluate the other marketing strategies used by small business owners in promoting their products. There were 3 common themes mentioned. Direct marketing—a well-directed communication to customer—had 6 mentions which had the highest frequency, followed by stick with online which had 5 mentions, and physical advertisement—such as posting of tarpaulin—which only had 2 mentions.

Question 12 aims to get the tips of the respondents for their fellow small business owners when it comes to using social media for promoting their product. There were 2 common themes. Consistency is the highest frequency which had 8 mentions and customer connection which had 5 mentions.

4. CONCLUSION AND RECOMMENDATION

4.1 Conclusion

In the interview, it has shown that social media had a huge impact in promoting their business. Different strategies and methods were explained by the owners as well as the benefits and disadvantages of it. Most of the respondents focuses more on the independent image of their brand's name by proper techniques of postings as well as having a better connection with the consumers. Nevertheless, some owners still use mixed methods to boost their businesses better. When it comes to challenges, majority of the population seek solution from fellow owners to get ideas on how to deal with different conflicts.

The findings of this study had found more people are promoting their product using social media which can boost their product for sale. Social media helps to strengthen the brand's name as well as the business owners themselves. Moreover, future small food business owners may use this strategy to promote their product so that many people enjoy their product.

4.2 Recommendations

The researchers mainly suggest that future researchers may study how social media is used for different fields. This can be taught in schools to let students and teachers know the benefits of the platform. As per the

government, they must focus on ensuring the development of the businesses within the community through implementation of projects. However, the community must not the only one creating a movement, but the owners and consumers too. This study will help different stakeholders to know how to effectively use social media for the benefit of one and all.

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A Path Towards Financial Stability: The Budgeting Strategies of Carinderia Owners in Navotas City

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Abstract: This study explores the budgeting strategies employed by carinderia owners in Navotas City to achieve financial stability. Carinderias play a vital role in the local food industry by offering home cooked meals, but they face financial challenges such as rising costs, inconsistent income, and competition. This research aims to identify the budgeting practices, financial decision-making processes, and resource utilization strategies that contribute to their business sustainability. A qualitative phenomenological research approach was used to gain deeper insights into the carinderia owners' experiences. The data was collected through semi structured interviews with 15 carinderia owners, selected via convenience sampling. Thematic analysis was employed to categorize the findings or results into key themes. Results indicate that carinderia owners employ budgeting strategies such as income allocation, bulk purchasing, pricing adjustments, and controlling portions. The most common financial challenges were rising ingredient costs and unpredictable earnings, which owners address through budget flexibility, borrowing, and seasonal price adjustments. Despite the lack of formal financial education, many carinderia owners expressed their interest in learning financial management to improve their business operations. The study concluded that effective budgeting is essential for carinderia owners to maintain financial stability. Providing accessible financial literacy programs could enhance their financial management skills. Future research should expand to other locations and explore quantitative methods to measure the impact of budgeting strategies on business performance.

Key words: Budgeting Strategies; Financial Stability; Carinderia Owners; Small Business Management; Financial Literacy

1. INTRODUCTION

1.1 Background of the Study

Carinderias are small, family-run food establishments in the Philippines that provide affordable meals, particularly in Navotas City. These carinderias are confronted with challenges such as increasing food prices, irregular income, and competition. Financial stability is a paramount for small businesses to cover costs and remain competitive in the sector. Budgeting and financial literacy are important to ensure success, yet most carinderia owners do not have formal financial training and depend on experience. This study seeks to explore the budgeting strategies used by carinderia owners in Navotas City, analyzing how they allocate resources, manage expenses, and overcome financial difficulties. The research aims to provide insights into how small food businesses maintain financial stability and what improvements can be made through financial education and support programs.

1.2 Statement of the problem

As economic challenges arise and the prices of daily necessities rise, carinderias have been one of the major affordable food providers in Navotas City, marking themselves as one of the most prevalent in the informal food industry. As these problems and prices become obvious, this study seeks to answer the question: What budgeting strategies do the carinderia owners in Navotas City use to manage their finances?

Specifically, this research seeks to address these following questions:

1. What are the factors that influence the budgeting decisions of carinderia owners in Navotas City?
2. How do the carinderia owners perceive the impact of budgeting or financial education to their businesses?
3. What financial coping strategies do carinderia owners in Navotas City use to manage challenges in their businesses?

1.3 Statement of Objectives

The objective of this study is to examine the budgeting strategies used by carinderia owners in Navotas City to identify areas for improvement and provide recommendations for enhancing business performance. Specifically, this research will explore current budgeting practices, financial management techniques, and decision-making processes, and analyze their impact on profitability and sustainability. The goal is to offer insights that will help these small business owners improve financial management, optimize resources, and achieve long-term success in the competitive food industry.

1.4 Significance of the study

This research is critical in addressing the financial challenges faced by carinderia owners, who often operate in a very dense competitive market. Understanding budgeting strategies and financial literacy would help in identifying gaps and areas where small business owners need to improve upon regarding their financial stability.

This study benefits carinderia owners by providing insights into budgeting strategies, aspiring entrepreneurs by guiding financial decision-making, existing entrepreneurs by encouraging better financial management, the community by highlighting the value of carinderias, and future researchers by serving as a reference for related studies.

1.5 Scope and Delimitation

This research focuses on the budgeting strategies of carinderia owners in Navotas City, exploring the factors influencing their decisions and the impact of financial education. The study targets 15 carinderia owners and emphasizes budgeting strategies, excluding other aspects like financial status or day-to-day life.

1. METHODOLOGY AND RRL

2.1 Review of Related Literature

The literature review emphasizes the importance of financial literacy, strategic budgeting, and business sustainability. Studies highlight the challenges SMEs face, such as rising costs and inconsistent income, and the budgeting methods they use to mitigate these issues.

2.1.1 Synthesis

Prior research suggests that financial literacy and budgeting strategies are essential for small businesses. However, there is limited research on how carinderia owners specifically navigate financial challenges. This study fills that gap by examining the financial practices unique to carinderias in Navotas City.

2.2 Methodology

2.2.1 Research Design

A qualitative phenomenological research approach was used to understand the financial experiences of carinderia owners.

2.2.2 Population Sampling

A total of 15 carinderia owners from Navotas City were selected through convenience sampling.

2.2.3 Research Instrument

This study used in-depth interviews for data collection, starting with a consent form to ensure participants understand and consent to the process. Participant information has been kept confidential, and only willing, voluntary participants have been selected.

2.2.4 Data Gathering Procedure

Interviews were conducted, transcribed, and analyzed using thematic analysis to identify common budgeting practices.

2. RESULTS AND DISCUSSION

Findings indicate that carinderia owners use income allocation, bulk purchasing, and pricing adjustments as budgeting strategies. The biggest challenges reported were rising costs and inconsistent income, which owners address through budget flexibility and borrowing. Most owners lack formal financial education but express interest in learning.

Table 1. Age

Age Group	Frequency	Percent
20-29	4	26.67%
30-39	2	13.33%
40-49	3	20.00%
50-59	1	6.67%
60+	5	33.33%
Total	**15**	**100%**

This table shows that the respondents range from 21 to 72 years old, with most aged 60+ (33.33%), followed by 30-39 (13.33%) and 50-59 (6.67%).

Table 2. Sex assigned at birth of respondents

Indicators	Frequency	Percentage
Female	10	66.67%
Male	5	33.33%
Total	**15**	**100%**

Most carinderia owners are female (66.67%), with 33.33% male, showing women dominate the industry.

Table 3. Number of Years Owning a Carinderia

Ownership Duration	Frequency	Percent
0-5 years	6	40%
6-10 years	4	26.67%
11-20 years	3	20%
31+ years	1	6.67%
Prefer not to say	1	6.67%
Total	**15**	**100%**

40% of carinderia owners have been in business for 0-5 years, 26.67% for 6-10 years, 20% for 11-20 years, and 6.67% for 31+ years. Two respondents (13.33%) didn't disclose their years of ownership.

Table 4. Expected Earnings in a Month

Expected Earnings	Frequency	Percent
Under 20 k	2	13.33%
20 k-30 k	5	33.33%
31 k-50 k	3	20.00%
51 k-100 k	0	0.00%
101 k+	3	20.00%
Prefer not to say	2	13.33%
Total	**15**	**100%**

Most respondents (43.75%) expect to earn between 20k-30k per month, while 20% expect to earn 101 k+. This indicates modest earnings for most, with some anticipating higher income but noting that higher earnings come with higher expenses.

Table 5. Budgeting Strategies of Carinderia Owners

Questions	Common Themes	Frequency
How do you manage the daily budget for your carinderia?	a. Income Allocation	a. 11
	b. Bulk Purchasing	b. 9
How do you track your income and expenses?	a. Record-Keeping	a. 10
	b. Mental Tracking	b. 5
What strategies do you use to control expenses and maximize profits?	a. Portion Control	a. 8
	b. Pricing Adjustments	b. 13

Carinderia owners in Navotas City commonly manage finances through income allocation (11), bulk purchasing (9), and record-keeping (10). To control expenses, they frequently adjust prices (13) and use portion control. Some also track expenses mentally (5).

Table 6. Financial Challenges Faced by Carinderia Owners

Question	Common Themes	Frequency
What are the biggest financial challenges in running your carinderia?	a. Rising Costs	a. 14
	b. Inconsistent Income	b. 9
How do you handle situations when expenses exceed your budget?	a. Budget Adjustments	a. 10
	b. Borrowing Money	b. 7
Have rising food costs affected your business	a. Profit Reduction	a. 12

The main financial challenge for carinderia owners is rising costs (14 respondents), followed by inconsistent income (9). When expenses exceed their budget, most adjust their budget (10), while some borrow money (7). Rising food costs have led to profit reduction for 12 respondents.

Table 7. Resource Utilization and Decision Making

Question	Common Themes	Frequency
How do you decide how much to save and reinvest in your business?	a. Saving for Bills	a. 11
	b. Reinvestment	b. 8
Do you adjust your budget based on demand?	a. Seasonal Adjustments	a. 9
How do you handle competition from other food businesses?	a. Product Quality	a. 12
	b. Customer Engagement	b. 10

Most carinderia owners prioritize saving for bills (11 respondents) and make seasonal budget adjustments (9 respondents). To handle competition, they focus on product quality (12 respondents) and customer engagement (10 respondents).

Table 8. The role of Financial Education

Question	Common Themes	Frequency
Have you attended financial literacy programs?	a. Lack of Formal Training	a. 13
Would you be interested in learning more about financial management?	a. Interest in Learning	a. 10
Do you think formal education is better than experience?	a. Experience Over Education	a. 12
	b. Combination of Both	b. 8

Most carinderia owners have not attended financial literacy programs (13 respondents) but are interested in learning more (10 respondents). While 12 prioritize experience, 8 believe a mix of both education and experience is best.

3. CONCLUSION AND RECOMMENDATIONS

4.1 Conclusion

This study examined the budgeting strategies, financial challenges, and resource use of carinderia owners in Navotas City. Key strategies include income allocation, bulk purchasing, and pricing adjustments, influenced by factors like income, rising costs, customer demand, competition, and financial literacy. Carinderia owners recognize the value of budgeting and financial education in improving profitability and sustainability. They use strategies like pricing adjustments, portion control, and budget flexibility to cope with financial challenges, with some resorting to borrowing money or adjusting expenses based on demand.

4.2 Recommendations

The study recommends the following initiatives:

To the Community: Implement budgeting workshops to enhance financial literacy and improve economic sustainability for small food business owners.

To Schools: Introduce financial literacy programs that teach essential money management skills to students, preparing them for future financial challenges.

To Future Researchers: Expand the sample size to better capture diverse budgeting strategies and extend the research beyond Navotas City to include other regions. A quantitative study on carinderia owners' awareness of budgeting's effects would also provide valuable insights.

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Pitch Perfect: Analyzing Promotional Tactics Used by Grade 12 ABM, HUMSS, and GA Capstone Businesses

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Abstract: This study, titled "Pitch Perfect: Analyzing Promotional Tactics Used by Grade 12 ABM, HUMSS, and GA Capstone Businesses," investigates how Grade 12 students at San Jose Academy employed promotional strategies in their capstone projects, which serve as comprehensive initiatives applying theoretical knowledge to real-world business challenges. The research aims to identify the promotional tactics utilized, evaluate their effectiveness, explore challenges faced during implementation, and assess how these experiences prepare students for future entrepreneurial endeavors. Utilizing qualitative methods, the study involved semi-structured interviews with advisory teachers and online surveys with former students from the 2023–2024 school year. Findings indicated that students primarily relied on digital marketing strategies, particularly social media marketing and engaging visual content, which significantly enhanced customer engagement and brand visibility while contributing to project success. However, challenges such as financial constraints and teamwork issues were also noted. The study concludes that these promotional tactics not only fostered the success of capstone businesses but also equipped students with valuable skills for their future careers, emphasizing the importance of experiential learning in educational frameworks.

Key Words: Promotional Tactics; Capstone Projects; Digital Marketing; Entrepreneurial Skills; Market Analysis

1. INTRODUCTION

1.1 BACKGROUND OF THE STUDY

Promotional tactics are essential for business success, as they help increase product or service demand and attract consumer attention. Claudia (2024) defines a promotion strategy as the plan and tactics implemented in marketing to enhance demand. Bondarenko et al. (2023) emphasize that promotional marketing is crucial for fostering consumer loyalty and gaining a competitive edge. Business owners utilize promotional strategies to effectively communicate their offerings and meet target demands, especially in a competitive landscape. Mahat et al. (2018) highlight these strategies as vital tools for achieving financial gains and stabilizing sales.

For Grade 12 students at San Jose Academy, particularly in the Accountancy, Business, and Management (ABM), Humanities and Social Sciences (HUMSS), and General Academics (GA)

strands, promotional tactics are integral to their capstone business projects. National University (n.d.) describes capstone projects as comprehensive academic experiences requiring students to apply their knowledge to real-world challenges.

This research aims to analyze how Grade 12 ABM, HUMSS, and GA students employed promotional tactics in their capstone businesses, exploring their relevance within small business contexts. It seeks to understand the potential advantages of these strategies, particularly in leveraging modern technology such as social media marketing and digital ads.

The study is timely as it sheds light on young entrepreneurs' strategies for achieving business objectives through capstone projects. By examining these promotional tactics, the research aims to provide insights into the growth of student-led businesses and how these approaches can inspire other small businesses in today's competitive environment.

1.2 STATEMENT OF OBJECTIVES

The study seeks to answer the question: How did Grade 12 ABM, HUMSS, and GA students utilize promotional tactics in their capstone project?

Specifically, the study aims to answer the following:

1. What promotional tactics did Grade 12 ABM, HUMSS, and GA use in their capstone businesses?
2. How did promotional tactics contribute to Grade 12 ABM, HUMSS, and GA capstone projects?
3. What challenges did Grade 12 ABM, HUMSS, and GA encounter in utilizing promotional tactics for their capstone project?
4. How did implementing promotional tactics in their capstone projects prepare Grade 12 ABM, HUMSS, and GA students for future business ventures?

1.3 SIGNIFICANCE OF THE STUDY

The results of this study hold significant relevance for various stakeholders. For students, the findings offer in-depth information about promotional tactics that can assist future learners in the ABM, HUMSS, and GA strands with their capstone research. Teachers can benefit by gaining insights into these promotional strategies, which they can incorporate into their lessons to enhance students' understanding of business concepts. This knowledge may also enable educators to develop more engaging teaching methods that spark students' curiosity and interest in marketing and business-related topics. For San Jose Academy, the study's findings can be utilized to improve its approach to business education, particularly in guiding students through their capstone projects. Additionally, the research may help the institution explore effective promotional tactics to attract and encourage prospective students to enroll. Business owners can gain a broader understanding of promotional tactics and their critical role in achieving business success. Finally, for future researchers, this study may serve as a valuable reference for investigating promotional tactics in educational or business contexts, providing a foundation for further studies and advancements in the field of business and marketing research.

1.4 SCOPE AND DELIMITATIONS

This study focused on the promotional tactics employed by Grade 12 students from the ABM, HUMSS, and GA tracks in their capstone projects. Data was collected through an online survey with 15 former students, evenly representing each strand, and face-to-face interviews with two class advisers from the HUMSS and GA strands. The

research specifically targeted Grade 12 learners for the School Year 2023-2024, excluding the STEM track due to its lack of capstone projects and ensuring that only participants from the most recent academic year were included for relevance. The study aimed to understand how these students utilized promotional tactics in their projects without evaluating their effectiveness.

2. METHODOLOGY

The study "Pitch Perfect: Analyzing Promotional Tactics Used by Grade 12 ABM, HUMSS, and GA Capstone Businesses" employed a qualitative research design to explore the promotional tactics utilized in capstone projects by Grade 12 students at San Jose Academy in Navotas City, Philippines. Utilizing purposive, convenience, and snowball sampling methods, the researchers selected two advisory teachers and gathered insights from former students through semi-structured interviews and online surveys. Data collection involved face-to-face interviews with the teachers and an online questionnaire distributed via Google Forms to fifteen former students, aimed at understanding their experiences and the effectiveness of various promotional strategies. The researchers meticulously analyzed the data by transcribing interviews, coding responses, and identifying recurring themes to draw meaningful conclusions regarding the impact of promotional tactics on the growth of small businesses in the context of capstone projects.

The literature highlights that effective promotional strategies vary by industry and period but share common themes of customization and integration into overall marketing strategies. Early studies (Park & German, 2000) indicated that certain promotions may not significantly boost sales. However, later research (2010-2015) emphasized the importance of tailored promotions that align with the target audience's preferences (Veronika, 2010; De Jesus & Fajardo-Ibarra, 2010). The effectiveness of sales promotions is also tied to the type of product being promoted (Tuten & Ashly, 2011). In the context of beach resorts, strategic placement and quality offerings are crucial (Festijo, 2013). More recent studies (2018-2023) show the importance of quality services and marketing in the education sector, with social media being a key tool (Iqbal & Nijaguna, 2018). Effective competitive marketing strategies involve gathering comprehensive information about competitors and leveraging promotional marketing to attract and retain customers (Alvarez, 2020; Bondarenko & Vyshnivska, 2023). Strategic advertising and creative marketing are essential for business success (Moreno et al., 2023), and social media plays a significant role in promoting products and services (Zulfikar, 2023). Sales promotion, especially targeted ones, are preferred by specific demographics and can drive profitability (Jimenez & Limos-Galay, 2024). Personal selling and targeted marketing strategies are also crucial for customer engagement and sales (Campos et al., 2024).

The literature and studies agree that one of the most important factors in a company's success is its promotional techniques. As firms compete for customers' attention and try to persuade them to purchase their goods, marketing tactics and customer focus are important aspects of the business environment. Since almost everything is done online, the literature and studies also recognise the important role that social media plays as a tool for advertising methods.

3. RESULTS AND DISCUSSION

The information gathered from interviews and surveys was reviewed and processed in order to produce the data. The researchers identified common themes they discovered throughout the interview and organized them into a tabular format in order to convey the processed data efficiently and clearly. The table includes code frequencies and recurring themes from the respondents' answers that have been mentioned at least two (2) times across the ten (10) interview questions. Two teachers participated in the

interview, which contained ten questions in total, and was categorized into (4) major sections. Teachers

Table 1. Promotional tactics used by Grade 12 ABM, HUMSS, and GA in their capstone businesses

Questions	Themes	Frequencies
Based on your observations, how did your former Grade 12 students choose and implement promotional tactics in their capstone projects?	a. Strategic Digital Marketing b. Creative and Cost-Effective Decision-Making c. Results-Oriented Approach d. Social Impact and Support	a. 1 b. 1 c. 1 d. 1
In your opinion, what factors influenced the students' decision in choosing which promotional tactics to use for their capstone projects?	a. Relevance and Market Trends b. Balancing Cost and Customer Appeal c. Creative Sparks	a. 1 b. 1 c. 1
What do you think were your former grade 12 students' considerations regarding their choice on the promotional tactics that they will use for their capstone project?	a. Relevance and Market Trends b. Market Segmentation c. Investment Opportunities d. Customer Acquisition	a. 2 b. 1 c. 1 d. 1

Table 1 summarizes the promotional tactics utilized by Grade 12 students from the ABM, HUMSS, and GA tracks in their capstone projects. In addressing how students selected their promotional tactics, five main themes emerged: strategic digital marketing, creative and cost-effective decision-making, results-oriented approaches, and social impact and support. When exploring the factors influencing these decisions, three key themes were identified: relevance and market trends, balancing cost with customer appeal, and creative sparks. Additionally, when considering what to prioritize in their promotional tactics, students highlighted themes such as relevance and market trends, market segmentation, investment opportunities, and customer acquisition. Overall, the table emphasizes the significance of digital marketing strategies, awareness of market trends, and customer appeal while underscoring the necessity for businesses to adapt to seasonal changes and shifting market conditions.

Table 2: Contribution of promotional tactics to Grade 12 ABM, HUMSS, and GA capstone projects

Questions	Themes	Frequencies
How did you encourage your former Grade 12 students to promote their capstone project using promotional tactics, both face to face and online?	a. Real-World Readiness b. Career Influence c. Decision-Making	a. 1 b. 1 c. 1
In your opinion, how did using promotional tactics help your former Grade 12 students achieve their capstone project goals?	a. Market Expansion b. Demand Growth c. Social Interaction	a. 1 b. 1 c. 1
In your opinion, are there	a. Promotion-	a. 1 b. 1

significant benefits to using promotional tactics for the capstone project of grade 12 students?	a. Driven Sales Growth b. Market Expansion c. Digital Presence	c. 1

Table 2 explores the contributions of promotional tactics to the capstone projects of Grade 12 students, drawing on themes such as Real-World Readiness, Career Influence, Decision-Making, Market Expansion, Demand Growth, Social Interaction, Promotion-Driven Sales Growth, and Digital Presence. In response to Question 4, three key themes emerged: Decision-Making, Career Influence, and Real-World Readiness, each mentioned once. Question 5 focused on the benefits of promotional strategies for former students, revealing themes of Social Interaction, Market Expansion, and Demand Growth, also cited once each. Lastly, Question 6 assessed the significant benefits of using promotional tactics in capstone projects, identifying themes of Market Expansion, Promotion-Driven Sales Growth, and Digital Presence, with each theme addressed once. Overall, Table 2 highlights the diverse advantages that promotional strategies provided to students in their capstone endeavors.

Table 3: Challenges of Grade 12 ABM, HUMSS, and GA in utilizing promotional tactics for their capstone project

Questions	**Themes**	**Frequencies**
What common challenges did students face when developing and implementing promotional tactics?	a. Teamwork and Organizational Issues b. Operational Barriers c. Financial Struggles d. Engagement Challenges	a. 1 b. 1 c. 1 d. 1

Table 3 examines the challenges faced by Grade 12 students from the ABM, HUMSS, and GA tracks in implementing promotional tactics for their capstone projects. In response to Question 7, four common themes were identified: Teamwork and Organizational Issues, Operational Barriers, Financial Struggles, and Engagement Challenges, with each theme mentioned once. The table highlights the prevalent difficulties students encountered while developing and executing their promotional strategies, emphasizing the need for support in these areas to enhance their capstone project experiences.

Table 4: Promotional tactics that can prepare students for future business ventures

Questions	**Themes**	**Frequencies**
How did you encourage students to think outside the box with their promotional tactics	a. Service Excellence b. Customer-Centric Approach c. Personal Stories	a. 1 b. 1 c. 1
How did you guide your former Grade 12 students in identifying and evaluating different types of promotional tactics they could use for their capstone projects?	a. Inclusive Decision-Making b. Motivational Leadership c. Personal Development	a. 1 b. 1 c. 1

What advice on promotional tactics did you give to your former grade 12 students that could help in the upcoming grade 12 students who are doing their capstone research?	a. Content Strategy b. Structured and Engaging Marketing c. Empathy and Connection d. Timing and Relevance e. Measurable Outcomes	a. 1 b. 1 c. 1 d. 1 e. 1

Table 4 investigates how the implementation of promotional tactics in capstone projects prepared Grade 12 students from the ABM, HUMSS, and GA tracks for future business ventures through three questions. In response to Question 8, which focused on encouraging creative thinking, three themes emerged: Service Excellence, Customer-Centric Approach, and Personal Stories, each mentioned once. Question 9 explored how respondents guided students in identifying and evaluating promotional tactics, revealing themes of Inclusive Decision-Making, Motivational Leadership, and Personal Development, also cited once each. Finally, Question 10 sought advice on promotional tactics for future students, resulting in five themes: Content Strategy, Structured and Engaging Marketing, Empathy and Connection, Timing and Relevance, and Measurable Outcomes, with each theme noted once. Overall, Table 4 highlights the various ways in which promotional tactics fostered critical skills and insights beneficial for students' future business endeavors.

Students

To present the information concisely and effectively, the researchers used a tabular format to highlight common themes or codes found in participants' survey responses, along with their frequencies — the number of times each theme was mentioned. Given the diversity of responses, only themes mentioned at least two times were included. Since there are twelve (12) questions, they were grouped into (4) major sections.

Table 1. Promotional tactics used by Grade 12 ABM, HUMSS, and GA in their capstone businesses

Questions	**Themes**	**Frequencies**
What promotional tactics did your group use for your Grade 12 capstone project?	a. Digital and Visual Engagement b. Interpersonal and Direct Promotion	a. 13 b. 6
How were these promotional tactics implemented during your project?	a. Digital Communication and Engagement b. Collaborative Outreach and Research	a. 12 b. 19
What factors influenced your choice of promotional tactics during the project?	a. Budgetary and Resource Considerations b. Target Audience Insights c. Effecti	a. 5 b. 8 c. 6

	veness, Reach, and Trends	
What role did social media platforms play in the promotional tactics of your capstone project?	a. Promotion and Engagement b. Audience Reach and Interest Generation c. Market Expansion and Relevance	a. 13 b. 6 c. 4

Table 1 analyzes the promotional tactics employed by students in their Grade 12 capstone projects, revealing several key themes. In response to Question 1, which examined the promotional tactics used, two primary themes emerged: Digital and Visual Engagement (mentioned 13 times) and Interpersonal and Direct Promotion (mentioned 6 times). Question 2 focused on the implementation of these tactics, identifying Digital Communication and Engagement (mentioned 12 times) and Collaborative Outreach and Research (mentioned 19 times) as significant themes. For Question 3, which explored the factors influencing the choice of promotional tactics, three themes were identified: Budgetary and Resource Considerations (mentioned 5 times), Target Audience Insights (mentioned 8 times), and Effectiveness, Reach, and Trends (mentioned 6 times). Finally, Question 4 examined the role of social media platforms in promotional tactics, highlighting three themes: Promotion and Engagement (mentioned 13 times), Audience Reach and Interest Generation (mentioned 6 times), and Market Expansion and Relevance (mentioned 4 times). Overall, Table 1 underscores the importance of digital strategies and audience insights in shaping effective promotional efforts for the students' capstone projects.

Table 2: How did promotional tactics contribute to Grade 12 ABM, HUMSS, and GA capstone projects?

Questions	**Themes**	**Frequencies**
In your opinion, what is the relevance of promotional tactics in a capstone project or business?	a. Customer Engagement and Brand Awareness b. Goal Achievement and Sales and Enhancement c. Value Communication and Strategic Reach	a. 9 b. 8 c. 3
How did promotional tactics contribute to your capstone project, and what benefits did they provide?	a. Sales and Support Growth b. Awareness and Interest Generation c. Engagement and Connection d. Goals Achievement	a. 7 b. 6 c. 6 d. 4

	and Funding	
In your opinion, how helpful are promotional tactics to other students doing their capstone project?	a. Enhancing Project Visibility b. Sparking Ideas and Creativity c. Skill Development and Learning d. Perceived Lack of Helpfulness	a. 6 b. 3 c. 3 d. 3

Table 2 examines the benefits students gain from using promotional strategies in their capstone projects, revealing several key themes. In response to Question 5, which assessed the relevance of promotional tactics, three prominent themes emerged: Customer Engagement and Brand Awareness (mentioned 9 times), Goal Achievement and Sales Enhancement (mentioned 8 times), and Value Communication and Strategic Reach (mentioned 3 times). Question 6 explored how these tactics contribute to the capstone projects, identifying four themes: Awareness and Interest Generation (mentioned 7 times), Engagement and Connection (mentioned 6 times), Sales and Support Growth (mentioned 6 times), and Achievement and Funding (mentioned 4 times). Finally, Question 7 focused on the perceived helpfulness of promotional tactics for other students, revealing four themes: Enhancing Project Visibility (mentioned 6 times), Sparking Ideas and Creativity (mentioned 3 times), Skill Development and Learning (mentioned 3 times), and a Perceived Lack of Helpfulness (mentioned 3 times). Overall, Table 2 highlights the various advantages promotional strategies provide, including increased engagement, improved visibility, and enhanced learning opportunities for students.

Table 3: What challenges did Grade 12 ABM, HUMSS, and GA encounter in utilizing promotional tactics for their capstone project?

Questions	**Themes**	**Frequencies**
What challenges have you encountered in implementing the promotional tactics for your capstone project?	a. Audience Engagement and Interest b. Time Management and Continuity c. Resource and Effort Constraints d. Communication Challenges e. Emotional and Psychological Strain	a. 5 b. 5 c. 3 d. 2 e. 2
Can you share a promotional tactic that your group tried but didn't implement as planned?	a. No Unimplemented Tactics b. Physical Promotion Tactics c. Creati	a. 6 b. 5 c. 4

	ve Marketing Approaches & Feedback and Engagement Strategies	
What promotional tactics do you think you should have used but could not implement due to time constraints of the research?	a. Content-Based Strategies b. Sales and Advertising Approaches c. None	a. 6 b. 5 c. 4

Table 3 investigates the challenges faced by students when implementing promotional tactics for their capstone projects, highlighting several key themes. In response to Question 8, which explored the difficulties encountered, five common themes emerged: Audience Engagement and Interest (mentioned 5 times), Time Management and Continuity (mentioned 5 times), Resource and Effort Constraints (mentioned 3 times), Communication Challenges (mentioned 2 times), and Emotional and Psychological Strain (mentioned 2 times). Question 9 focused on promotional tactics that students attempted but did not implement as planned, revealing three themes: Unimplemented Tactics (mentioned 6 times), Physical Promotion Tactics (mentioned 5 times), and Creative Marketing Approaches & Feedback and Engagement Strategies (mentioned 4 times). Finally, Question 10 sought to identify promotional tactics that students believed should have been used but were not due to time constraints, resulting in four themes: Content-Based Strategies (mentioned 6 times), Sales and Advertising Approaches (mentioned 5 times), and None (mentioned 4 times). Overall, Table 3 underscores the various obstacles students faced, including engagement issues, time management challenges, and the inability to implement certain strategies effectively.

Table 4: How did implementing promotional tactics in their capstone projects prepare Grade 12 ABM, HUMSS, and GA students for future business ventures?

Questions	**Themes**	**Frequencies**
Can you elaborate on how other students could use promotional tactics in their capstone project, based on your personal experience?	a. Engaging Content and Promotion b. Audience Understanding and Targeting c. Strategic Platform Use and Adaptation	a. 6 b. 4 c. 3
What tips or advice would you give to incoming Grade 12 students who are about to implement their own Capstone businesses, particularly when it comes to creating effective promotional strategies?	a. Strategic Planning and Organization b. Understanding and Targeting your Audience c. Adaptability, Teamwork, and Creativity d. Effecti	a. 8 b. 6 c. 5 d. 4 e. 4

	e. ve Use of Social Media and Visual Appeal Engagement and Customer Incentives	

Table 4 explores the insights and advice regarding promotional tactics for capstone projects, derived from student responses to two questions. In response to Question 11, which examined how students could utilize promotional tactics based on personal experience, three key themes emerged: Engaging Content and Promotion (mentioned 6 times), Audience Understanding and Targeting (mentioned 4 times), and Strategic Platform Use and Adaptation (mentioned 3 times). Question 12 sought tips for incoming Grade 12 students planning their capstone businesses, identifying five prominent themes: Strategic Planning and Organization (mentioned 8 times), Understanding and Targeting Your Audience (mentioned 6 times), Adaptability, Teamwork, and Creativity (mentioned 5 times), Effective Use of Social Media and Visual Appeal (mentioned 4 times), and Engagement and Customer Incentives (mentioned 4 times). Overall, Table 4 highlights the importance of strategic planning, audience engagement, and adaptability in developing effective promotional strategies for capstone projects.

4. CONCLUSION AND RECOMMENDATION

The study "Pitch Perfect: Analyzing Promotional Tactics Used by Grade 12 ABM, HUMSS, and GA Capstone Businesses" concludes that Grade 12 students effectively utilized various promotional strategies, particularly emphasizing digital marketing techniques like social media and engaging visual content, alongside interpersonal methods such as word of mouth. These tactics not only contributed to the success of their capstone projects by increasing customer engagement and brand awareness but also prepared students for future business endeavors. However, challenges such as teamwork issues, financial constraints, and time management difficulties were prevalent, highlighting the complexities involved in executing effective promotional strategies. The findings underscore the importance of integrating practical experiences like capstone projects into educational frameworks to enhance students' entrepreneurial skills.

To build on these insights, the study recommends organizing workshops and seminars for students that focus on relevant promotional tactics and include guest speakers from the marketing industry. Teachers should integrate the study's findings into their curriculum through case studies and project-based learning opportunities while engaging in professional development to stay updated on current marketing strategies. San Jose Academy is encouraged to develop a strategic marketing plan to attract prospective students and establish a mentorship program for guiding students through their capstone projects. Additionally, business owners can benefit from workshops on effective promotional strategies and networking events to share experiences. Future researchers are advised to broaden their participant range and begin identifying respondents early in the research process to enhance data quality. Implementing these recommendations can maximize the study’s impact and deepen understanding of promotional tactics in both educational and business contexts.

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Unraveling the Financial Literacy of Navotas Fisherfolk: Navigating Budget Constraints and Family Needs

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Abstract: Navotas City is famously known as the Fishing Capital of the Philippines, wherein it is full of aquatic resources that have become the main livelihood of the residents especially the community of fisherfolk in the city. Despite being known for its rich resources, fisherfolk in Navotas still experience a lot of challenges, in terms of handling money from their hard-earned work they still face problems due to lack of knowledge with financial literacy; budgeting, saving, debt management, and investments. The study explores how Navotas fisherfolk handle their money, specifically their ability to balance income for personal and family needs. A qualitative approach was used to gather data from fifteen (15) selected participants through face to face interview. The findings have shown that the lack of knowledge with financial literacy is a big impact towards the financial stability of the fisherfolk. One of the factors were the lack of seminars attended or education on managing their finances. Specifically, the researchers also found out that the financial literacy knowledge of the fisherfolk in Navotas just comes purely from themselves or informal sources for financial knowledge, leading to inefficient financial management practices. This hinders the fisherfolks from effectively saving for the future, making informed financial decisions, and securing financial stability. The study highlights the need for financial education programs tailored to the fisherfolk community to enhance their financial well-being and long-term economic sustainability.

Key Words: Financial Literacy; Fisherfolk; Fishermen; Savings; Budgeting,

1. INTRODUCTION

1.1 Background of the Study

Fishing plays a crucial role in the Philippine economy. Through fishing, there is food security as well as it can affect the trading system in the Philippines as it exports a variety of fish and seafood products, which

helps earn foreign exchange and support the balance of trade.

The fishing industry is a key pillar of the Philippine economy, supporting millions of people and contributing to national food security and economic growth. This means that the fishery sector is significant.

Navotas City has been known as the Fishing Capital of the Philippines deriving different livelihood opportunities for its citizens directly and indirectly from fishing and its related industries. Fishing is the primary living in Navotas, approximately 70% of the population derives their livelihood from fishing and related industries.(Gan & Rotz, 2017) This is the way for them to get their food for everyday living, and especially for daily expenses. Even though their income is not enough for their primary living, they are still obliged to have an alternative income to meet their family needs every day. (Lumaque, 2015).

As the fishing capital of the Philippines, it plays a significant role in the fishing industry. Despite the economic distribution, many residents face financial challenges in the city of Navotas. The city's households belong to the urban poor. The average family income per year is P60,000 for an average family size of 4.65 with an income per capita of P12,903.22 (Gan & Rotz, 2017).

Being financially literate involves addressing the financial knowledge of fisherfolk in Navotas, who often face challenges in managing their money due to limited income from daily catches. Understanding these factors can help support fisherfolk in better managing their resources.

Financial literacy entails enhancing one's understanding of how to manage their salary and distribute it across various categories such as education for their children, healthcare, money management, daily necessities, and savings. Additionally, having awareness and improving their economic stability in society can help them better manage what they already have. The researchers seek to assess the current financial literacy of fisherfolk in Navotas City and provide education to enhance their understanding of financial management.

1.2 Statement of Objectives

The objective of this study is to examine the financial knowledge of fisherfolk in Navotas City, focusing on how they navigate financial challenges, particularly during fish shortages, adverse fishing conditions, and disasters. This study seeks to answer the question: What is the level of financial literacy among fisherfolk in Navotas?

It specifically seeks to answer the following questions.

1. What are the financial challenges that Navotas fisherfolk face?

2. What strategies do fisherfolk use to save money?

3. What is the impact of disasters or adverse fishing conditions on their financial well-being?

1.3 Significance of the Study

This study aims to highlight the importance of financial literacy among fisherfolk and to determine the current knowledge level of our fisherfolk in Navotas City, known as the fishing capital of the Philippines. The results of the study will benefit the following:

Fisheries Businesses. It helps them gain a better understanding of the fish market, develop effective pricing strategies, manage money wisely on a daily basis, plan long-term investments, make smarter decisions, minimize risks, and optimize financial performance.

Educators. The findings can guide the development of targeted financial literacy programs for fishermen, focusing on their unique needs, such as managing seasonal income and saving for emergencies. It also helps incorporate financial education into training programs in coastal communities.

Policymakers. The findings can help design policies to improve financial inclusion for fishermen, such as providing easier access to subsidies. Data-driven interventions can ensure sustainable livelihoods and prevent debt traps or overdependence on informal lending**.**

Fishermen Improved financial knowledge helps them save, invest, and reduce risks during off-seasons.

Communities. Empowered fishermen contribute to local economies and promote sustainable practices.

Financial Institutions. Insights from this research enable the creation of tailored financial products to support fishermen.

Future Researchers. This study provides a foundation for exploring the broader socio-economic impacts of budgeting, such as its effects on education, health, and overall quality of life in fishing communities.

1.4 Scope and Delimitations

The focus of this study is on the Financial Literacy of fisherfolk in the City of Navotas, specifically on how they manage their income, allocate expenses, and support their families despite irregular income. It also examines the difficulties they encounter, unstable fish market prices, unpredictable weather conditions, and limited access to financial resources.

This research is only limited to Navotas City and does not represent the financial behaviors of fisherfolk in other areas. It relies on self-reported data gathered from interviews, which may be influenced by personal biases and recall limitations. Additionally, this research takes a qualitative approach, limiting statistical analysis.

Furthermore, this study does not consider market rules and government policies. Despite these limitations, this study aims to provide insights that could guide financial literacy programs and interventions of policies to

improve the economic resilience of the fisherfolk in Navotas.

2. METHODOLOGY and RRL

2.1 Review of Related Literature

According to Loppies (2023), there is a significant relationship between financial literacy, financial knowledge, financial attitudes, and financial management behavior. Financial Literacy helps different fishing industries to better understand the fish market, including the price trends, consumer demand, and competition in local and international markets. This understanding will help them to identify the opportunities they can adapt for their production to fluctuating market demand.

Based on the study of Onsay, E., et la.(2022) Fisherfolks satisfy the recording and classifying phases of accounting. However, their recordkeeping practices are not effective and efficient. Their practices are incomplete, lack processes, and do not have sufficient knowledge about accounting/recordkeeping. Considering the preceding, the researchers recommended that an intervention mechanism from the government and academic institutions be proposed and conducted to enhance the knowledge and aptitude of the fisherfolks concerning accounting/blue economy literacy.

The study showed the average gross income of fisherfolk in Rosario, Cavite is P365 a day, 26% of the participants have gross income of P500 and only 1% of them were earning P275, P400, P650, P750, and above. It also showed that Sixty three percent of the fisherfolks have no savings while only 37% have savings. The data revealed the average propensity to save of the fisherfolk of Rosario, Cavite and showed that they have zero to low levels of APC. Fisherfolks who have savings mentioned that their family is their main reason to save money. (Tadeo, 2018).

According to Cadiz, Sanchez & Evangelista (2024) the situations of small-scale fisherfolks on selected barangays near Laguna in the NorthernWest Bay showed indicators that contribute to the vulnerability of fisherfolk in terms of exposures, which involves hydrometeorological hazards, water quality, and biological indicators. The study hopes to contribute to applicable input to understand the vulnerability of fisherfolk and assess its impacts on fishing communities. Factors that are considered were the weak areas and reflect the increase in the vulnerability of small-scale fisherfolks should be addressed earlier with intensive support or actions from community officials.

The study highlights the economic vulnerability of fishing-dependent households in Laguna Lake, emphasizing their high reliance on food expenditures, low income elasticity, and lack of economic diversification. While open fishing remains an unstable livelihood, aquaculture presents a viable alternative, significantly increasing household income and reducing food

shortages. However, household capital—whether physical, financial, or social—does not substantially impact income generation due to its low availability. Additionally, the government's conditional cash transfer program (4Ps) helps augment household consumption but does not significantly alleviate food shortage vulnerability. To ensure long-term economic resilience for these communities, it is essential to complement financial assistance programs with livelihood development initiatives and environmental conservation efforts (Palanca-Tan, 2020).

The reviewed literature highlights the importance of financial literacy in preparing students for financial independence. Csiszárik-Kocsir and Varga (2019) found that many students entering higher education lack financial knowledge, leading to poor money management and debt accumulation. Studies emphasize that integrating financial education into school curricula improves budgeting, saving, and investing skills. Financial literacy also promotes responsible financial behavior, reducing reliance on debt and fostering economic stability. Therefore, financial education is essential for equipping students with the skills needed to navigate financial challenges effectively.

The research area is Chellanam, a village by the sea in District of Ernakulam. In this community, fishing and related activities are the primary occupations of the residents, in conclusion Covid: 19 has made living circumstances worse the current study intends to determine whether financial inclusion has been successful and to examine the financial requirements of fishermen in Chellanam Panchayath. Out of the 100 sample households, 14 depend on money lenders for finance. Whatever surplus generated in the fishermen sector is not absorbed back for productive purposes in the sector. Instead, this surplus is used for servicing the interest cost of money lenders which ranges from 30% to 96% per annum. (Amenuku, 2018)

The study found that fisherfolks who used mobile money services for saving had seen increase in their savings. It also showed that mobile money services had a positively impacted the savings of fisherfolks who use it for savings, and the results are like other research studies around this topic. This study also concluded that fisherfolks have adequate income to save after paying major expenses. (Obiorah, 2020)

According to the study of Badiola, J.A.R, et al.(2021) the lack of capacity among financial service providers to effectively meet the credit, savings, and payment needs of small-scale fishers (SSF). The results indicate that most SSF who successfully obtained loans are members of fishers' organizations or cooperatives, while those without access to credit services typically do not belong to such groups.The average income of the majority of SSF falls below the poverty line of USD 2,500 per year. To promote economic growth

and sustainable fishing operations, SSF require better access to financial and insurance services. However, less than 50 percent currently have access to financial services, and only 30 percent hold a savings account with a bank.

The study shows that humans are essentially storytellers (p. 7). This was seen during the observation of fisherfolk' paghahayuma where common themes emerged from their narration during the said activity. Fisher's concept of Homo Narrans was justified in that it does not only explain a human as an essential storyteller but it illustrates that, it someone who tells their stories and uses their stories to establish and promp others of a certain commonality in ther way of living. The story that they narrates, like that in the paghahayuma is particularly activity where fisherfolks can share their story that creates and develops a community, and relates himself to the community. (Skreekutty, 2022)

According to Amadu, Armah, Aheto (2021) the livelihood resilience of artisanal fisherfolk in three communities in Ghana—Elmina, Axim, and Jamestown—against the backdrop of declining fish catches. The findings indicate that higher levels of education contribute to greater resilience, with male fisherfolk demonstrating more resilience than their female counterparts across all educational levels. Sociodemographic factors such as age, gender, fishing experience, group membership, etc. interventions significantly influence resilience. This study highlights the need for interventions that consider both individual and contextual factors to enhance the livelihoods of fisherfolk.

2.2 Methodology

2.2.1 Research Design

The researchers used a qualitative-phenomenological research design to explore the lived experiences of fisherfolk in Navotas regarding financial literacy, budget constraints, and family needs. In-depth interviews are conducted to gather firsthand insights into their financial decision-making, challenges, and coping strategies. The data collected was analyzed using thematic analysis to identify recurring patterns and significant themes. This design is suitable because it allows the researchers to deeply understand the perspectives and lived experiences of the fisherfolk, providing rich, descriptive insights into their financial behaviors.

2.2.2 Population Sampling

The study mainly focuses on Navotas fisherfolk who rely on fishing as their main source of income for everyday life. The researchers used purposive Sampling, wherein participants were selected based on criteria such as their dependence on fishing, household financial responsibilities, and willingness to share their experiences. A sample size of 15 participants was chosen to

ensure diverse perspectives while maintaining data saturation.

2.2.3 Research Instrument

The study used a survey administered through interviews developed by the researchers as the primary instrument for data collection. The interview was designed to gather insights from the fisherfolk in Navotas City regarding their financial literacy, specifically their ability to balance income for personal and family needs. The researchers formulated twelve questions focusing on fundamental financial concepts such as budgeting, savings, debt management, and investment. Each of the interviews was expected to last approximately five to ten minutes, allowing participants to provide detailed responses based on their experiences. The instrument aims to assess their financial knowledge and decision-making strategies in managing their daily financial challenges.

2.2.4 Data Gathering Sample

The researchers of the study used an face to face interview in collecting the data for in-depth information and encourage honest responses. The interview instrument is composed of question that the researchers formed from related research and studies. The researchers made sure that the set of interview questions are enough to provide sufficient data needed in the study. Also, these questions were validated by Ms. Shane Del Rosario to make sure of their effectiveness and modified to address all the corrections of each question. The study was conducted in Navotas City, before the interviews began the researcher explained certain terms to the respondents to ensure they fully understood their role in the study and could answer the questions accurately. The Researcher made sure that the personal information and identity of each respondent remained confidential to maintain accuracy and non bias the whole interview.

3. RESULTS AND DISCUSSION

To present the information concisely and effectively, the researchers used a tabular format to highlight common themes or codes found in participants' responses, along with their frequencies — the number of times each theme was mentioned. Given the diversity of responses, only themes mentioned at least three times were included. Since there are twelve (12) questions, they were grouped into (4) major sections.

Table 1. Fishing background

QUESTIONS	COMMON THEMES	FREQUENCY
1. Ilang taon na po kayong nangingisda/ nagtitinda ng isda?	a 3-5 years b. 40 years c. 9 years d. 10 years e. 15 years f. 25 years g. 28 years h. 1 years i. 50 years	a. 5 b. 2 c. 1 d. 1 e. 1 f. 1 g. 1 h. 1 i. 1
2.Ano po ang nagtulak sa	a. Poverty b. For family	a. 8 b. 4 c. 2

inyo para maging mangingisda /magtinda ng isda?	c. Everyday life d. Additional Income e. Financial Problems	d. 1 e. 1
3. Ilang oras po kayong nangingisda sa isang araw?	a.12 hours b. 5-8 hours c. 3 hours d. 14 hours e. More than 24 hours f. Only if there's a catch	a. 5 b. 3 c. 2 d. 1 e. 1 f. 1
4. Magkano po ang karaniwang kita niyo sa isang araw o linggo?	a.400-700PHP (per day) b.1000-1500 PHP (per day) c. 5000PHP (per week) d. 10,000PHP (a month) e. 2000PHP (per week)	a. 7 b. 3 c. 1 d. 1 e. 1

Table 1 presents information about the respondents' fishing background.

For question 1, which examines the duration of respondents' engagement in fishing or fish selling, the most frequently mentioned response was 3-5 years (5 mentions). Other responses varied with 40 years (2 mentions), showing a mix of a new and experience fisherfolks.

Question 2 explores the reasons for choosing fishing as a livelihood. The most common theme reason was poverty (8 mentions), meaning they have no other job option, other choice it due to family support (4 mentions), likely because they need a money to support their family needs or they already in the fishing business.

For Question 3, which examines how many hours respondents spend fishing daily, the most common theme response was 12 hours (5 mentions), it show how demanding the job is. Other responses included 5-8 hours (3 mentions), which may depend on the catch and conditions of the sea.

While Question 4 focuses on the typical earnings of the fisherfolk. The most common theme response was 400-700 pesos per day (7 mentions), followed by 1000-1500 pesos per day (3 mentions). This suggests that income varies based on the factors like catch size, market price, and numbers of buyer.

Table 2. Perceive Financial Challenges of the fisherfolk when there is no fish

QUESTIONS	COMMON THEMES	FREQUENCY

5. Anu-anong hamon pampinansyal ang kinaharap niyo tuwing may kakulangan sa isdang ibebenta o di kaya kapag hindi kayo nakakapagtinda?	a. Lack of Capital b. Food Insecurity c. Lack of Budget for Family d. High price of goods	a. 5 b. 4 c. 2 d. 1
6. Naaapektuhan po ba ng pabago-bagong presyo ng isda ang inyong kabuhayan? Kung oo, sa paanong paraan?	a. Yes b. No	a. 13 b. 3

Table 2 explores the financial challenges fisherfolk face when there is a shortage of fish to sell.

Question 5 examines financial struggles during low fish availability. The most common challenge was lack of capital (5 mentions), meaning they don't have enough money to buy fishing gear, fuels, or other supplies. Another common theme is food insecurity (4 mentions), which means they struggle to afford enough food for their families when they can’t catch enough fish.

Question 6 explores the impact of fluctuating fish prices. Most respondents (13 mentions) reported financial instability, because fish prices go up and down. This makes their income unpredictable, making it hard for them to budget for their daily expenses. While a few (3 mentions) stated no impact, likely due to alternative income sources or they have financial support.

Table 3. Financial Coping Strategies During Non-Fishing Periods

QUESTIONS	COMMON THEMES	FREQUENCY
7. Ano po nag ginagawa ninyo kapag hindi posibleng mangisda dahil sa masamang panahon o pagbabawal	a.Alternative Income Sources b.Savings and Budgeting c.Borrowing money and goods - d. Stay at home	a. 7 b. 3 c. 2 d. 2 e. 1

sa pangingisda?	e. Mussel thief	
8. Mayroon po ba kayong estratehiya sa pag-iimpok o pag-titipid kapag malaki ang kita? Kung oo, anu-ano ang mga ito?	a. Saving Money b. Avoid unnecessary expenses	a.11 b. 4

Table 3 summarizes the outcomes and effects of fisherfolk techniques on their incomes.

Question 7, asks what does the fisherfolk do when it is not possible to sell fish or go fishing due to unpredictable weather. The result shows the most frequent response from the fisherfolk, wherein they find alternative income sources (7 mentions), like doing a small job or a park time job for them to earn money and provide for their daily expenses. While the others said they save and budget their last income (3 mentions), meaning they try to make their previous earnings last until they can fish again.

Question 8, talks about the strategies that the fisherfolk do when they have big income. The most frequent response was by Saving money (11 mentions), so they have something to use during tough times. While other respondents said Avoid unnecessary expenses (4 mentions), meaning they spend only on important things to make their money last longer.

Table 4. **Impact of Disasters and Market Conditions on Financial Well-Being:**

QUESTION	COMMON THEMES	FREQUENCY
9. Paano niiyo hinahawa-kan o pinamamaha laan. ang pera niyo sa pang-araw-araw?	a. Budgeting b. Saving	a.12 b. 3
10. May natanggap na ba kayong payo tungkol sa paghawak ng pera? Kung oo, saan o kanino ito galing?	a. No Financial Advice Received b. From the elders and fellow fishermen c. Attended a Seminar d. Learned in school	a.10 b.3 c.1 d.1

11. May na-attendan na ba kayong financial literacy seminar? Kung oo, saan at ano ang natutunan niyo rito?	a. No Seminar attended yet b. Attended a Seminar	a.13 b. 2
12. May mga maibabahagi po ba kayong tips sa inyong mga kapwa mangingisda / nagtitinda g isa kaugnay sa paghawak ng pera?	a. Yes b. None	a. 11 b. 4

Table 4 shows how disasters and market conditions affect the financial situation of the fisherfolk.

Question 9 asks about how they handle or manage their money on a daily basis. In their responses, 12 of them said budgeting, meaning they plan their expenses to make sure their earnings last. While 3 said saving, setting aside extra for emergencies or future needs.

In question 10, which asks if they have received any financial advice, or advice on handling money, in their responses, 10 of them said they have not received any financial advice, meaning they figure out money management on their own. 3 said it came from the elders and fellow fisherfolks, getting tips from those with more experience.

In question 11, it asks if they have attended a seminar on financial literacy, the result showed that 13 of them have not participated in any such program, meaning they have not had formal training on managing money. Only 2 person have attended financial program.

Lastly, question 12 asks if they have any advice or tips to share with their fellow fishermen and vendors regarding handling money. Results showed that 11 of them said yes, they are willing to share financial tips. Their common advice is to save money for future needs, working hard to earn more, spending wisely to avoid wasting money, and not buying unnecessary things. While 4 said they do not have advice to share.

4. CONCLUSION AND RECOMMENDATION

4.1 Conclusion

The primary objective of this study is to examine the financial knowledge of fisherfolk

in Navotas City, focusing on how they navigate financial challenges, particularly during fish shortages, adverse fishing conditions, and disasters.

The researchers found that many fisherfolk in Navotas City have limited financial knowledge and low financial literacy, primarily due to a lack of seminars or education on managing their finances. These causes come from various aspects of the fisherfolk community, such as the challenges they face in handling the income they earn from their livelihood, especially with the fluctuating market price of the fish they sell from the catch and to the vendors. Due to this uncontrollable market price, it affects the fisherfolk to meet their family needs for their daily life. To overcome these challenges, the fisherfolk community has various ways to cope by juggling multiple jobs when fishing is prohibited due to bad weather just to meet their family's basic needs, they use different strategies to save money when they earn such a big income; saving money and avoiding unnecessary things that they don't need for their daily lives. This study also presents how affected the fisherfolk community is towards disasters and market conditions, budgeting their daily income is one of the things they do to handle their money to meet their needs for daily basis.

Meanwhile, the researchers discovered that the fisherfolk community lacks knowledge when it comes to financial literacy, as most of them have not received any financial advice nor attended any financial literacy seminar. Specifically, the researchers found out that the financial literacy knowledge of the fisherfolk in Navotas just comes purely from themselves. On the other hand, fisherfolks still manage to meet their family's basic needs but still lack knowledge with financial literacy. Therefore, the results show that the financial literacy knowledge of Navotas fisherfolk is significantly low in terms in formal way, they have developed their own ways of managing their finances based on their experience. However, having access to financial education programs could further enhanced their financial decisions. Rather than replacing their existing strategies, such program could improved their knowledge, helping them to achieve financial stability and security in the long run.

4.2 Recommendations

Based on the findings of the study, the researchers recommend that the local government Navotas City implement financial literacy seminars specifically for the fisherfolk. These seminars would help enhance their ability to manage finances, budget for daily essentials, and make informed financial decisions. By equipping them with the necessary financial knowledge, this initiative could improve their overall economic stability, reduce financial struggles, and foster a more sustainable livelihood. Additionally, strengthening financial literacy within the fisherfolk community could contribute to the economic growth of Navotas City as a community.

The researchers recommend future researcher to focus on studying the effectiveness of fisherfolks, and determine if they are beneficial for them. Research could also delve on how typhoons or climate change affect fishermen, and to find out what other livelihoods can be pursued in case fishing and selling fish are not possible due to storms. Lastly, how fishermen sell their caught fish along with its prices to find out the solutions for fisherfolks to earn better, with proper access to the market, strategies, and pricing.

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Unraveling the Financial Literacy of Navotas Fisherfolk: Navigating Budget Constraints and Family Needs

Submitted by Mabulac, Johndere, Fernandez, Maro Vicente, SubingSubing, Mark Vincent, del Carmen, Almira Grace, Prudenciado, Shanara, Santos, Angela Elliz in partial fulfillment of the requirements for Practical Research 1 for School Year 2024-2025.

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Exploring Customer Relationship Strategies of Mobile and Tenant Business Operators in Navotas City,

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Abstract: Street vendors serve as vital contributors to local economies(Sarker et al., 2019), particularly in cities. They do, however, face an array of challenges that can have an impact on both their daily operations and their long-term success. This study looks into the elements that influence street vendor performance, with a focus on customer relationship strategies of mobile and tenant business operators. The study gives insights into the techniques used by these vendors to overcome barriers in an unpredictable market by studying how they handle external disruptions while maintaining economic viability. A qualitative approach was used to gather data from fifteen (15) participants through interviews. The study employed a qualitative methodology to collect data through interviews with fifteen (15) participants. The findings indicate that in order to sustain client connections, a majority of mobile and tenant company owners in Navotas City rely on word-of-mouth advertising, customized customer engagement, and consistent and clean products.

Key Words: Customer Relationship; Market Challenges; Strategies; Mobile Business Operators; Tenant Business Operators

1. INTRODUCTION

1.1. Background of the Study

Mobile and tenant business operators are known as "a vital piece of the economic framework of the poor who mostly belong to the deprived class of society" (Sarker et al., 2019). They are the ones who cater to the needs of the lower middle class (Hermawati, 2017). In the Philippines, 75% of the labor force are part of the informal economy (World Bank, 2013) in order to maintain survival. This includes street vendors as they are known as "the most visible face of the informal economy" (international labor organization, 2006) and small-scale economic units without corporate form (international labour office, 2005) like tenant business operators.

However, even with their major contribution to the accelerating growth of

the economy leading to urbanization , their importance is highly disregarded (Researching Reality Internship, 2010). One of the major studies in this field, conducted by Ronaldo (2024) revealed the different factors that affect the business of street vendors and their coping mechanisms. Their adaptability into different situations or scenarios, different communication and marketing strategies and how these factors affect customer loyalty. More than that, a study about the relationship between consumer interest, satisfaction, location, and capital on street vendor income conducted by Tahir and Tahir (2023) shed light about the variables that these business operators have to maintain continuously in order to maintain their business performance. Despite these findings, there is a significant gap in understanding these street vendors' individual experience and limited understanding of the diverse challenges they face and how they approach these challenges.

This study sought to understand how these businesses engage with customers, build loyalty, and address challenges in the absence of a fixed address. The goal is to identify the tools, practices, and approaches they use to ensure customer satisfaction and foster long-term relationships. In doing so, this study aimed to provide new insights and strategies for business operators to enhance customer loyalty. Furthermore, it contributes to the academic understanding of customer relationships in non-traditional business settings, offering a fresh perspective on existing literature. Finally, this research aimed to raise awareness about the challenges these businesses face.

1.2. Statement of the Objectives

This research aimed to investigate how mobile and tenant business operators build and sustain customer relationships, by focusing on identifying the challenges they encounter in fostering customer loyalty and trust, as well as exploring the creative approaches they use to improve customer engagement. The study seeks to evaluate these strategies in maintaining long-term relationships with customers and to offer recommendations for enhancing customer relationship management in such business contexts.

In line with its objectives, the study sought to answer the question: How do mobile and tenant business operators maintain customer relationships?

Specifically, it aimed to answer the following questions:

1. *What challenges do mobile and tenant business operators face in maintaining relationships with their customers?*
2. *What are the different marketing strategies mobile and tenant business operators use to build and sustain customer relationships?*
3. *How do these businesses adapt their strategies to meet the*

changing needs and expectations of their customers?

1.3. Significance of the Study

This study is anticipated to contribute valuable information to a range of individuals and organizations.

MOBILE TENANT BUSINESS OPERATORS: This study will immediately aid mobile and tenant business operators by offering insights into efficient tactics for preserving client relationships despite the difficulties of operating without a permanent base. It will provide them with practical knowledge and methods for developing strong customer loyalty, increasing retention rates, and ultimately driving corporate success.

CONSUMERS: The study will help consumers better understand how mobile and tenant firms function and prioritize client connections. This knowledge will enable consumers to make informed decisions about where they shop, ensuring they receive high-quality products and services while contributing to a positive and sustainable business environment.

COMMUNITY: The study will help to build a thriving and vibrant community by giving light on the distinct problems and opportunities that mobile and tenant businesses confront. This understanding can inform community development initiatives, help local enterprises, and create a more inclusive and supportive environment for entrepreneurship.

LOCAL GOVERNMENT: The study will provide local government with useful data and insights for developing policies and regulations that promote the growth and success of mobile and tenant enterprises. Understanding the sector's distinct demands and difficulties allows municipalities to support innovation, economic development, and job creation.

FUTURE RESEARCHERS: This study will serve as a foundation for future research into mobile and tenant enterprises, customer relationship management, and the effect of location on business success. It will give a comprehensive framework and data collection that can be utilized to explore new paths of investigation, test different theories, and contribute to a deeper understanding of this dynamic and changing business sector.

1.4. Scope and Delimitation

This study is limited to examining how mobile and tenant business operators maintain customer relationships. A qualitative study presents valuable insights into the effects of remote service delivery on customer relationships. However, there are several limitations to consider.

The study compares results from face to face interviews. While this provides a diverse perspective, it may not account for other cultural factors that could influence customer perceptions and expectations in different Cultural Contexts. The findings might not be applicable to countries outside of this sample. Moreover, the study did not explore other important factors that could influence customer loyalty, such as repurchase intention or the handling of customer complaints but the customer and business owner relationship. This omission means that the research may not fully

capture the full picture of what drives customer loyalty in marketing.

2. METHODOLOGY and RRL

2.1. Review of Related Literature

This chapter reviews journals, articles and other documents that are essential in the discussion of the research topic. This paper focuses on the challenges and coping mechanisms faced by those who are part of the informal economy such as street vendors and tenants business operators.

Darmayasa and Partika (2024) discusses the concept of permanent establishment in relation to taxation and legal frameworks. While their study focuses on tax policies, it also highlights the challenges faced by businesses that lack a fixed address. Similarly, mobile and tenant businesses must find ways to establish credibility and maintain customer trust despite not having a permanent space. It also emphasizes that businesses without a permanent location can build customer trust through strong branding and clear communication. Establish familiarity by consistently using the same logos, colors, and messaging across various platforms. Keeping customers informed about locations, operating hours, and special offers through social media and messaging apps ensures ongoing engagement and reliability.

Similarly, a study conducted by Osarenkhoe and bennani (2007) explores the essential elements of Customer Relationship Management (CRM) and its strategic implementation, based on a case study of a large Swedish firm. Through open-ended interviews with key informants at various levels, the research, consequently, delves into both technical and cognitive aspects of establishing a sustainable CRM strategy. The findings, as a result, highlight that relationships play a crucial role in buyer-seller exchanges, thereby emphasizing the strategic importance of CRM beyond mere tactical applications.

One proposed solution to this was introduced by Bose and Chen (2009) by using mobile service data to help businesses understand customer preferences and behavior. Their findings suggest that analyzing customer interactions can improve engagement and personalization. Mobile and tenant businesses can leverage digital tools, such as CRM software and social media analytics, to stay connected with customers even without a permanent physical location. also stress that digital engagement plays a vital role in maintaining customer connections. Mobile and tenant businesses can enhance communication through chatbots, SMS updates, and push notifications. Encouraging feedback through surveys and interactive content allows businesses to better understand customer preferences and improve their services. By maintaining a strong online presence, these businesses can create a

sense of reliability and connection despite their lack of a fixed location.

Furthermore, this study explores the potential business opportunities that can be derived from analyzing mobile services data of customers. Specifically, through an inter-cluster analysis approach, the authors examine how mobile service data can be used to segment customers and identify distinct clusters with varying needs and behaviors. As a result, their study demonstrates the value of leveraging customer data to uncover insights that can guide business strategies, such as personalized marketing and service offerings. Moreover, by utilizing data-driven methods, businesses can enhance customer satisfaction and more effectively target specific market segments. In conclusion, the research underscores the importance of data analysis in understanding customer preferences and making informed decisions, particularly within the context of mobile services.

Farncombe and Waller (2007) has also explored how simulation techniques can help businesses make better rental and space planning decisions. Their research shows that businesses must strategically manage rented spaces to improve customer experience. Mobile businesses, such as pop-up stores and food trucks, can apply these principles by selecting locations that attract more customers while keeping costs low. further highlight the importance of adapting to customer behavior when selecting business locations. Mobile and tenant businesses can strengthen relationships by identifying peak hours and high-traffic areas to serve customers more effectively. Establishing a consistent schedule, such as appearing at specific locations on set days or times, allows customers to anticipate their presence, fostering trust and repeat visits.

Kobernick (2010) argued that strong vendor relationships are essential for successful biomedical equipment service management. Customers prioritize cost effective, high quality service with minimal downtime, while vendors strive for profitability and customer loyalty. These competing goals can lead to conflict. To overcome these challenges and ensure consistent healthcare technology support, a strong customer-vendor partnership is required. To maintain this vital relationship, both parties must carry out their responsibilities.

Romero (2024) shed light on the individual challenges that street vendors in Manila face as a part of the informal economy yet one of the vital parts of urban livelihoods. It is also stated how street vendors are often unrecognized with their contribution to the everyday livelihoods of the people. The results reveal that factors affecting street vendors relate to interpersonal dynamics, family dynamics and obligations, educational aspirations, financial vulnerability, market competition, operational challenges, supply chain

dependency, health and labor, and enforcement of regulations. In order to manage these factors, vendors have adopted mechanisms to combat these issues through debt and financial management, operational adaptation, community assistance and support, adaptation to regulation, and emotional resilience. This research was also driven with the intent of economic empowerment through improved access to financial services, microcredit, and financial literacy programs while introducing social security measures in order to protect them from exploitation but rather foster positive perception and highlight their contribution to the economy.

According to Roever and Skinner (2016), the discriminatory regulations and procedures that frequently target street vendors, including those with licenses. The article emphasizes the negative impact of labor insecurity, harassment, and product confiscation on vendors' livelihoods. The authors promote more inclusive municipal policies that recognize and value street vendors' contributions to cities. This research lays the groundwork for understanding the systemic barriers that street vendors face, as well as the need for policy change. The limitations of the research include a lack of granular detail about the specific manifestations of discriminatory practices, as well as a scarcity of evidence-based policy recommendations. Future research should include comparative case studies of successful policy interventions implemented in a variety of municipal settings.

Consequently, Solidum (2023) research provides a detailed analysis of the current state and problems encountered by street vendors in a specific area. A survey of 101 street vendors served as the basis for this research, which identifies common traits of Filipino street vendors, including years of experience, household size, and income. Additionally, the report emphasizes how these elements significantly influence the difficulties that vendors encounter, especially with regard to governance, legal concerns, and socioeconomic issues. A request for local governments to successfully handle these particular issues is made in the study's conclusion. The current investigation highlights the significance of customized support programs and interventions led by local governments. The geographically restricted scope of the study limits its generalizability. To guarantee the reliability and external validity of the results, future studies must include a larger sample size and geographic representation.

In contrast, Rivera and Gozun (2024), shift the focus to the opportunity for entrepreneurial growth in the street vending sector. They argue that expansion strategies such as product development, innovation, and diversification, particularly in international markets, can significantly contribute to street vendors' success. The

investigation emphasizes the significance of external participation, including access to international clients and export opportunities, in order to achieve promoting entrepreneurial growth. In order to help street vendors expand their businesses and take advantage of new opportunities, the study presents a strong argument for supporting initiatives that foster innovation and make it easier to access international markets. The practical barriers to street vendors' access to foreign markets are not critically examined in the analysis. The logistical, financial, and regulatory obstacles that come with expanding a business internationally should be carefully examined in future studies.

Nwosu and Umeh (2021) further supports the claim of how micro, small, and medium enterprises (MSMEs) play a crucial role in the boost and continuous growth of the global market. In the Philippines, Almost 62.9% percent of employment were from MSMEs and in which 30.3% were from microenterprises (DTI, 2017).

The research explains key reasons on the importance of MSMEs on the economic development of the country. The study also proposes ways in order to boost MSMEs productivity by improving the export mechanism of the country. In order to encourage entrepreneurs to widen business opportunities and untapped resources in the rural and hinterland area in the country (Nwosu and Umeh, 2021).

2.1.1. Synthesis

This research focuses on the challenges and coping mechanisms of informal economy workers, particularly street vendors and tenant business operators. The study synthesizes insights from various scholars to highlight key issues and potential solutions. It advocates for improved access to financial services, data-driven decision-making, and strategic branding as essential survival mechanisms. Related research suggests that future studies should explore broader case studies and the feasibility of international market expansion for micro-businesses.

It highlights several significant challenges faced by individuals operating in the informal economy, particularly street vendors and tenant business operators. These challenges stem from legal, financial, operational, and social factors that hinder business stability and growth. The informal businesses are interconnected, requiring a multi-faceted approach to address them. Issues such as lack of a permanent location, limited access to technology, regulatory hurdles, and financial instability contribute to the overall vulnerability of street vendors and tenant business operators. Addressing these challenges requires policy reforms, financial inclusion, business training programs, and technological integration to help these businesses achieve sustainability and growth.

2.2. Methodology

2.2.1. Research Design

The researchers used a qualitative method using a multiple-case study design to investigate customer relationship management strategies among mobile and tenant business operators in Navotas City. Data was collected through semi-structured interviews with business owners and customers and participant observation of business operations and customer interactions. Thematic analysis was used to identify recurring themes in the challenges encountered, marketing strategies implemented, and adaptations made by these businesses to maintain customer loyalty. The study is guided by Relationship Marketing Theory, which emphasizes the importance of developing long-term customer relationships. Purposive sampling will be used to select participants, ensuring a diverse range of business types and customer demograprhics. The researchers strictly followed ethical guidelines such as informed consent and data privacy.

2.2.2. Population Sampling

The target population for this study consists of mobile and tenant business owners in Navotas City. These include food stall vendors, market sellers, small-scale retailers, and entrepreneurs operating within rented spaces. The study aims to gather insights from business owners who interact directly with customers on a daily basis.

In this study, convenience and purposive sampling will be combined to ensure a more effective selection of respondents. Since mobile business owners frequently change locations, convenience sampling will be used to gather data from those who are readily available and willing to participate at the time of data collection. This method allows researchers to efficiently reach vendors and shopkeepers without disrupting their daily operations. At the same time, purposive sampling will be applied to select key business owners who have been operating for at least five years. These entrepreneurs can provide valuable insights into long-term customer relationship strategies, challenges, and business adaptations over time. By combining these two methods, the study ensures that data is collected from both easily accessible respondents and those with significant business experience, leading to a well-rounded analysis of customer relationship strategies in Navotas City.

2.2.3. Research Instrument

In this research, 15 individuals were interviewed in person. Participants were chosen according to their business type, specifically: (1) mobile or street vendors and (2) business owners under temporary leases. Participants' and researchers' availability and willingness will also be considered in order to guarantee effective

data collecting. A varied representation of various business forms, areas, and challenges within each category will also be guaranteed by the participant selection process. All participants will also be asked for their informed consent to guarantee that ethical standards are upheld during the interview.

2.2.4. Data Gathering Procedure

The researcher designed a structured interview questionnaire to collect relevant data from participants. The survey included questions aimed at gathering information from mobile and tenant business operators about exploring their customer relationship strategies. The researchers identified and selected a business mix of mobile and tenant businesses that are willing to participate in the study.The researchers will conduct a survey administered over a limited time frame. During this time, researchers engaged with the business operators to gather their insights and experiences related to mobile and tenant businesses. After collecting the data, the researchers started coding and categorizing the data that has been gathered. Analyzing and interpreting coded data in order to draw conclusions and answer research questions.

3. RESULTS AND DISCUSSION

This chapter contains presentation, analysis, and discussion of the data collected by the researchers during the data collection. The findings were organized into sub-themes that were derived from the objectives and research question in which is stated on chapter 1. The frequency table below was attached in order to present the findings from the derived responses of the respondents on the various questions from the interview conducted.

3.1. Business Background

Table 1. Type of Business

Question	Common themes	Code frequency
Can you describe your business in a more detailed explanation, including the type of products or service you offer?	1. Street food and snacks 2. fresh produce 3. retail and essential	1. 7 2. 5 3. 3

Results from Table 1 shows that 7 out of 15 participants were street food and snacks vendors. On the other hand, 5 out of 15 for fresh produce such as fruits and vegetables. Meanwhile, 3 out of 15 were business operators that sell retail and essential products.

Table 2. Years In Business

Questions	Common themes	Code frequency

How long have you been operating in Navotas City?	1. 4-6 years	1. 7
	2. 1-2 years	2. 3
	3. 9-10 years	3. 3
	415-20 years	4. 2

Table 2 shows the varying lengths of time businesses have been operating in Navotas City. The most common response is 5 years, with 3 business owners indicating this duration. Some businesses have been operating for 10 years and 1 year showing both long-term and relatively new establishments. Other durations include 6 years, 9 years, 15 years, 20 years, 2 years and 4 years, each with 1 respondent. This variation highlights the presence of both experienced and emerging businesses in Navotas City.

Table 3: Importance of Customer Relationship

Question	Common Themes	Code frequency
How important do you think customer relationships are in the success of your business? Why?	1. Business reputation	1. 9
	2. Revenue generations	2. 3
	3. Essential for sales	3. 3

table 3 presents that 15 respondents emphasized that a good reputation fosters trust and long-term customer loyalty. One participant stated, “Customers come back because they trust us. If people hear good things about us, they are more likely to buy from us.” This highlights the role of reputation in maintaining a stable customer base. Additionally, some respondents linked customer relationships to sales growth, explaining that positive interactions often lead to repeat purchases and word-of-mouth referrals. While revenue generation was mentioned less frequently, it remains a secondary benefit of maintaining strong customer connections, as satisfied customers are more likely to continue supporting the business.

3.2. Customer Loyalty Issues

Table 4: Challenges in Maintaining Customer Loyalty

Questions	Common Themes	Code frequency
What are the biggest challenges that you face in maintaining or achieving customer loyalty? Why?	1. Product and Pricing concern	1. 7
	2. Customer related challenges	2. 6
	3. External market challenges	3. 2

As seen on Table 4, the interview identified "outside marketplace challenges" as a huge obstacle, suggesting that elements together with competitor movements and economic instability affect retaining clients. "Product and pricing concern" suggests that consumer choice is closely encouraged with the aid of fee sensitivity and product attractiveness. Lastly, "Customer-associated challenges" spotlight verbal elements that affect loyalty, together with communication, carrier quality, and the enjoyment of customers.

Table 5. Customer dispute

Question	Common themes	Code frequency
Have you ever lost a long-time customer due to a dispute or issue? If so, what lessons did you learn from that experience?	1. Not yet	8
	2. Yes	7

Based on Table 5, the majority of the respondents believed that maintaining operational stability helps businesses avoid major disputes, as some do not encounter important issues by adapting and managing challenges effectively. Customer interaction is important in dealing with different reactions, such as frustrations with delayed payments or disagreements with fluctuating prices. Clear communication and patience help resolve disputes while ensuring business integrity. Additionally, a commitment to product quality emphasizes the importance of delivering consistent value without compromising, as prioritizing quality builds long-term customer trust. While recognizing that "the customer is always right," businesses also recognize the need to uphold their principles when necessary.

3.3. Market competition

table 6. Presence of large and established business

Question	Common themes	Code frequency
Have you faced difficulties in keeping customers engaged due to the presence of larger or more established businesses?	1. Sales competitors	1. 5
		2. 4
	2. Resources limitation	3. 4
	3. Strong Market presence	4. 2
	4. external challenges	

Table 6 presents data on the challenges faced by customers, such as the presence of larger or more established businesses. Strong Market Presence requires businesses to attract and retain customers by ensuring visibility and

reliability in a competitive environment. However, external challenges such as economic shifts, changing customer preferences, and supply chain disruptions can impact growth and stability according to the respondents. For example, rising product prices can make it difficult to maintain profitability. "Yes, we struggle, especially when the price of a product rises." The presence of competitors adds further pressure, requiring businesses to differentiate themselves through strategic pricing, unique offerings, and exceptional service. Some business owners do not feel heavily affected by competition, as they have built strong relationships with regular customers, "I don't find my business difficult because I already have regular customers, They know me so well." Others, however, face challenges due to the number of sellers offering similar products, which can slow down business, "Yes, since there are so many sellers with similar products, it can slow down the business when there are competitors." Additionally, limitations on resources such as financial constraints, staffing shortages, or limited product availability, can create obstacles that demand efficiency and adaptability. Successfully navigating these challenges while staying competitive ensures long-term sustainability and continued success in the market.

3.4. Operational Constraints

table 7. Non-permanent business location

Question	Common themes	Code frequency
Do you think not having a permanent storefront makes customers less likely to trust your business? Why or why not?	1. product over location 2. Product Consistency 3. community ties 4.operational disruption	1. 10 2. 2 3. 2 4. 1

Table 7 presents data on the effect of having a non permanent location. However, Despite concerns about trust, 10 out of 15 respondents believed that product quality matters more than location. This reflects the idea that trust is built through consistent quality rather than a fixed physical presence. However, a few respondents mentioned the importance of consistency in operations, noting that businesses with a stable location may appear more reliable. Some also pointed out that having stronger community ties helps maintain customer trust, as familiarity within the community creates a sense of reliability. One vendor explained, Even if I don’t have a permanent store, people trust me because they know me and have bought from me before. While location stability can influence customer trust, the findings suggest that product reliability and relationships matter more in maintaining a loyal customer base.

3.5. Customer Relationship Strategies

Table 8. Strategies in building customer trust

Question	Common themes	Code frequency
What specific strategies do you use to build trust with your customers?	1. Positive personality 2. Responsiveness 3. Personalization 4. empathy	1. 6 2. 4 3. 3 4. 2

Table 8 highlights the relative importance of every method via means of displaying particular techniques used to advantage clients' trust. "Customer relationship" is the maximum generally used technique, providing six times. This suggests a prime awareness on constructing long-time period connections with customers, cooperating with them, and growing information approximately their personal needs. Personal correspondence, proactive follow-up, and loyalty applications that recognize normal corporation enterprise are some examples of this. With 4 evaluations, "Responsibility" highlights the importance of activate and green conversation withinside the constructing fee. Trust and nice are proven via means of speedy and efficaciously responding to patron questions and concerns. Three references to "capitalization" spotlight the significance of Prasad's interplay and tailoring to every patron's preferences. This will be personalised product recommendations, targeted advertising, or one-on-one assistance.

Table 9. Negative experiences to opportunity

Questions	Common themes	Code Frequency
How do you turn negative experiences into opportunities to strengthen customer relationships ?	1. Positive mindset 2. Customer Relationship Building 3. Adaptability and Continuous improvement 4. Organization Business and Ethics 5. Customer Satisfaction and Retention	1. 4 2. 4 3. 3 4. 3 5. 3

Table 9 presents data on….Achieving business success involves creating a welcoming atmosphere, maintaining

organized operations, and being responsive to customer feedback. By infusing humor into interactions and staying positive, they make customers feel comfortable and valued. Keeping your "business well-organized" and treating customers with respect fosters strong relationships and encourages repeat patronage. Listening to feedback and making necessary adjustments, such as refining product offerings, demonstrates a commitment to quality and continuous improvement. These practices not only enhance "customer satisfaction" but also build trust and loyalty, contributing to long-term success.

Table 10. Customer satisfaction

Question	Common themes	Code Frequency
How do you ensure customer satisfaction and encourage repeat transactions?	1. Trust and comfort 2. product quality 3. Positive customer interaction. 4. Trust and comfort	1. 3 2. 3 3. 4 4. 5

Table 10 shows that Maintaining customer satisfaction is closely linked to trust and comfort, which was the most frequently mentioned factor. A respondent explained, “When customers feel comfortable, they keep coming back. They trust that I will always give them good service.” This highlights the importance of creating a welcoming and trustworthy environment. Positive customer interaction also plays a crucial role, as customers appreciate businesses that engage with them warmly. Personalized service further enhances satisfaction, with one respondent saying, “I remember my customers’ preferences, and they love that.” Lastly, product quality remains a key factor in encouraging repeat transactions. Customers are more likely to return if they are confident in the quality of the goods or services offered. Together, these elements create a strong foundation for customer retention and long-term business success.

Table 11: Tips for fellow business owners

Questions	Codes	Frequency
What are the tips that you could share to fellow business owners on how they can achieve customer loyalty?	1. Service and product excellence 2. pricing and customer incentives 3. strategic business decisions	1. 11 2. 3 3. 1

A planned method is vital to assemble sturdy patron loyalty. The respondent ranked first the "Service and product excellence" due to the fact that the most tremendous component is emphasizing the need for a well-defined industrial company plan, market research, and long-term objectives. "Pricing and client incentives" underlines how critical loyalty programs and competitive pricing are for attracting and preserving customers. Although this respondent placed the alternative items higher, the "company and product excellence" approach is that wonderful customer service and incredible gadgets and services are also required. To install client loyalty, the ranking (11, 3, 1) indicates that high-level planning and incentives are more critical than company excellence.

4. CONCLUSION AND RECOMMENDATION

This chapter presents a comprehensive summary of important findings drawn from the data analysis completed in the previous chapter. Its main objective was to explore how mobile and tenant business operators manage client relationships in Navotas City. The study addresses the challenges that they experienced, their different marketing strategies, and how they adapted these strategies to meet the expectations of their customers.

The study revealed several customer relationship strategies that are used by Navotas City's mobile and tenant business owners. One important strategy involves personalized customer interaction, in which entrepreneurs establish trusting relationships with clients by interacting openly, expressing warm greetings and offering reward systems for loyalty. By establishing familiarity and trust, this strategy promotes repeat transactions and raises satisfaction among consumers. Furthermore, Consumers have been identified to lean towards establishments which serve food that has been prepared hygienically, with flavor, and with freshness. According to numerous vendors, the two main factors that keep clients coming back are product cleanliness and consistency in taste.

A further significant approach is word-of-mouth marketing, that's vital for attracting and keeping customers. Due to a lack of resources for promotional activities, businesses depend on satisfied consumers to introduce them to other people, which helps them draw in potential customers for free. Additionally, companies are able to alter their offering in alignment with consumer preferences by using informal conversations and conversations to get feedback from customers, which raises customer happiness and competitiveness. Regardless of these measures, the economy's uncertainty, growing competition, and changing consumer habits make it difficult to retain customers. Certain businesses find it difficult to keep up long-term client connections, hence it's essential that they continuously develop

and enhance their strategies. Personalized interaction, social media promotion, and word-of-mouth recommendations are all useful, but long-term success needs constant change to satisfy changing consumer demands and industry trends.

The Navotas City authorities should focus on improving internet infrastructure, especially in areas with many small businesses. They can also offer subsidized training on customer relationship management (CRM) and digital marketing to help small business owners grow.

For Business Owners:

- Treat customers as individuals and build personal relationships to encourage loyalty and word-of-mouth referrals.
- Offer good value for money with competitive prices, high-quality products, and excellent customer service.

For Future Researchers:

- Future studies can build on this research to better understand customer relationship management in Navotas City's business environment.
- Focus on strategies that are practical, long-term, and suited to the needs of local businesses.
- Before applying any solution, consider its possible effects and make sure it addresses the most pressing issues.

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"Exploring Customer Relationship Strategies of Mobile and Tenant Business Creators in Navotas city"

Submitted by Dela Cruz, Marlyn Mielle, Abayan, Eizzle, ,Barbie Cruz, Jaybell Olaera Mahusay, and Ishean Matthiue Ajedo in partial fulfillment of the requirements for Practical Research 1 for School Year 2024-2025

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"Exploring San Jose Academy Grade 11 and 12 Parents Preference for Payment Methods in School Expenses"

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Abstract: This study aims to identify the preferred payment methods of Grade 11 and 12 parents in San Jose Academy. As payment schemes become more common in today's society, it is important to know parental preferences so that schools can offer convenient and effective payment schemes. An expense is simply defined as the cost one is required to spend on obtaining something. On the other hand, School expenses means tuition and fees required for the enrollment or attendance of a student at an eligible educational institution, and expenses for fees, books, supplies, and equipment required for courses of instruction at an eligible educational institution. The method used in this study is qualitative approach with the process of gathering, analyzing, and making accurate interpretation about the data for the purpose of discovering underlying meanings of preferred payment method in paying the expenses in school. It focuses on exploring the experiences of 30 parents of Grade 11 and 12 students in San Jose Academy by conducting a survey. Based on a comprehensive survey, this study provides that some parents prefer cash payments due to their direct nature, while others find digital wallets and online transactions more efficient. The primary consideration of the parents is the convenience, as many prefer methods that are practical, hassle-free, and easy to access. Security also plays a significant role as having an official receipt provides an added layer of assurance, giving them confidence in their chosen method. To increase the findings' applicability, future researchers who are interested in parents' preferences for school expense payment methods could broaden the study by include a broader and more varied sample, such as parents from other grade levels or schools.

Key Words: Payment methods; school expenses; parents preferences;Benefits of payment methods; Mode of payments

1. INTRODUCTION

1.1 Background of the Study

An expense is simply defined as the cost one is required to spend on obtaining something. On the other hand, School expenses means tuition and fees required for the enrollment or attendance of a student at an eligible educational institution, and expenses for fees, books, supplies, and equipment required for courses of instruction at an eligible educational institution.

In today's society, different payment methods are still expanding. According to Damen, A. (2022), a payment method is a way consumers pay for products or services. Ranging from cash to credit or debit cards to mobile wallets to prepaid cards, and more, nowadays, there's a range of options available for both physical and online payments.

There are many different types of payment methods. One of the payment methods that people mostly use is cash. The longest-standing form of payment is cash.

Credit cards are becoming a must-have, it allows customers to pay for a product even if they don't have money in their account. Instead, the customer's bank covers the cost and the customer pays the bank later. The debit card is also one of the most common online payment, it look similar to credit cards and the payment process is also comparable, but with a debit card, a customer pays for a product using money in their account. This is the customer's own money, not the banks' so nothing is owed later and customers don't have to pay any interest on their purchase. People mostly use mobile payments now, when people want to pay, they simply tap or wave their mobile phone or smartwatch. Customers can send and receive money with services from a mobile device through a linked bank account or card. It makes transactions quick and easy. Customers can use their smartphone camera to scan a QR code, check the transaction amount, and complete the payment. People can use their phone to accept QR code payments anywhere.

Customers already know how they want to pay. Digital wallets are becoming more and more popular, in order to keep up with consumer behavior and your competition, it's crucial to accept customer-preferred payment methods, accept as many payment methods as possible (Alexis Damen, 2022)

According to Selin (2024), the rapid evolution of digital finance and e-commerce has introduced a range of payment options that offer consumers enhanced flexibility and convenience. Introducing new payment methods, however, requires careful planning and alignment with the unique characteristics of specific markets.

According to Bian et al (2023), e-wallets, also known as digital wallets, contain software that enables users to make payments on their computers or mobile devices using linked bank cards, balance and savings accounts from wallet providers, or new liquidity and credit products. The past decade saw phenomenal growth in the world-wide usage of online payment. The combination of digitalization and the social distancing engendered by the COVID-19 pandemic have further accelerated consumers' adoption of e-wallets for contactless payments.

According to Crowe et al (2006), a workhorse traditional payment method - paper check-writing - is heading out to pasture. Paper checks are being replaced by a host of new electronic payment methods emerging from the technological revolution in information processing. Most payments experts have a good handle on why the electronic payment methods are efficient, fast, and convenient. But few payments experts have a good handle on why specific individuals choose the particular payment methods they use.

In this study, we aim to know what is the best and most used payment methods that helps the parents to decide whether on how they will pay the school expenses of their children in San Jose Academy such as tuition, books, uniform, and other school expenses. When paying school expenses, common payment methods include: cash, credit card, bank transfer, online payment portals, and mobile wallets (like GCash). The quick spread of technology has introduced a

wide range of different ways how to pay that offers to the parents an enhanced convenience.

1.2. Statement of the Problem

This study aims to explore the payment method preferences of Grade 11 and 12 parents at San Jose Academy in managing school-related expenses. It sought to answer the question:

What are the payment method preferences of Grade 11 and 12 parents at San Jose Academy in managing school-related expenses?

Specific Questions
1.What is the demographic profile of the respondent:
1.1 Name (optional);
1.2 Age;
1.3 Gender;
1.4 Child's grade level;

2. What are the primary factors that influence the choice of payment method for school expenses?

3. How do they perceive the convenience, security, and accessibility of the payment methods provided by the school in terms of:

a. convenience;
b. security; and
c.accessibility

4. What challenges do they encounter when using their preferred payment methods for school-related expenses?

5. What improvements or additional options would they suggest to enhance the payment process for school-related expenses?

1.3. Significance of the Study

The study on "Exploring San Jose Academy Grade 11 and 12 Parents' Preference for Payment Methods in School Expenses" is of utmost importance to understand the financial dynamics and preferences of parents when it comes to managing their children's educational expenses. This research focuses on the various payment methods preferred by parents of Grade 11 and 12 students, revealing insights into their financial behaviors and decision-making processes within the academic setting.

PARENTS: Parents whose children attend San Jose Academy in Grades 11 and 12 will be the direct users of the results. Understanding their payment preferences may allow financial procedures to be tailored, reducing financial stress and improving the overall experience with school fees.

SCHOOL ADMINISTRATORS: The research findings will be helpful to school administrators in making informed decisions about the payment systems and methods. In understanding the preference of parents, administrators can make financial processes smoother, improve communication, and offer more convenient ways of payment, thus improving parent-school relationships**.**

POLICY MAKERS: Policymakers in the education sector are also likely to be impacted by the study findings. Informed choices in terms of policies that pertain to the financial management of schools may result in guidelines that can support parents in their effort to raise money for the educational needs of their children.

FUTURE RESEARCHERS: Future researchers can benefit from the methodology

applied to understand parental preferences in school payment methods. They can learn from the study design, data collection techniques, and analysis methods applied in this research to inform their own studies on similar topics.

1.4. Scope and Delimitation

This research seeks to explore the payment method preferences of parents with children in Grade 11 and 12 at San Jose Academy, specifically for school-related expenses. The study aims to understand why parents choose particular payment methods, whether it be cash, online transfers, mobile apps, or installment plans. To gather data, a survey will be conducted with at least 30 parent respondents. The research focuses on uncovering insights into the factors influencing their decisions, such as convenience, trust in the payment system, and any challenges they encounter. This study is limited to the 2023-2024 school year.

This study focuses solely on parents of Grade 11 and 12 students at San Jose Academy, excluding other grade levels and schools. Since this is qualitative research, the results will be based on individual opinions and experiences, making them less applicable to a wider population. The small sample size is another constraint, as participation will depend on the availability and willingness of parents. Additionally, factors such as biased responses or incomplete answers might affect the richness of the data gathered. External influences, like unexpected economic shifts or rapid technological advancements, are also outside the study's scope.

2. METHODOLOGY and RRL

2.1. Review of Related Literature

As digital payment methods continue to reshape financial transactions, schools are also adapting to these changes to provide more convenient options for parents. The preference for specific payment methods, whether traditional (cash, checks, bank deposits) or digital (credit/debit cards, mobile wallets, online banking), is influenced by factors such as accessibility, security, transaction costs, and ease of use.

This review of related literature is a study of existing researches on the preferred payment methods of educational institutions, factors that affect parents in choosing their preferred mode of payment, and the influence of digital payment systems on the management of school finances and satisfaction of parents. Through the prior research, this study aims to provide a firm foundation for understanding the payment behavior of parents at San Jose Academy for Grades 11 and 12.

This section discusses the different viewpoints on the adoption of payment systems in schools, the pros and cons of different payment methods, and how new financial technologies have impacted educational transactions. These discussions will help put the study in context and illustrate the need to provide flexible and efficient payment solutions for parents.

Payment Methods

FOREIGN STUDIES

Consumers make their payment choices based in part on personal preferences. In particular, cost, technology, regulation, and merchant acceptance of payment instruments contributes on consumers' choices of how to pay. Over time, technology has expanded the number of options for consumers to make payments. The awareness of technology is only a piece of the complete payment choice, and the authors find that characteristics of the transaction also affect payment choice. Personal preferences play a role in the payment decisions that consumers make. Cost, technology,

regulations, and business acceptance of payment methods all influence how customers choose to make payments. There are now more ways for customers to pay because of the technological advancements. Technology awareness is simply one aspect of the overall payment decision, they also discover that transactional factors influence payment choice (Stavins, J., 2017).

The e-commerce environment get influenced by methods of payment, throughout the years, consumers had to adapt to the usage of credit cards and internet bank accounts to pay for goods and services. In recent years, market, technological, and legal developments have contributed to an increase in the number of innovations and changes in payment methods available over the Internet, including the development of new payment methods and the changes of current ones. These online payment methods have gained popularity and have provided customers more choices than the standard payment methods (Ally, M., 2010).

In the US, electronic and card payments have replaced paper checks as the method of payment. Changes in consumer demand, as people have grown more to the options accessible to them, as well as advancements in technology that enabled advancements, it contributes a lot to the shift. Paper checks have been replaced by other payment methods, such as debit cards and electronic payments, such as online banking bill payments, even though the majority of American consumers still write checks and the number of checks written has been decreasing (Stavins, J., 2017).

There are many different ways to pay using a mobile device, it is a new way to pay. Those who use smartphones focus more on mobile payment, as the number of people using smartphones rises. There are three primary considerations for smartphone users when making a mobile payment, that is security, cost, and convenience. This study analyzes users of smartphones' opinion and preferences toward mobile payment methods in Korea and the U.S. Among the three primary considerations, mobile security has the great influence on mobile payment frequency in both nations. (Shin, S., et. al., 2014).

The number of payment systems for online purchase that have been proposed and are currently available, credit cards are at present by far the most popular within the Australian market. While most consumers appear to assume that credit cards are the only way to pay at online websites, alternative payment methods offer new opportunities to both sellers and consumers. The promotion of debit cards for online purchases and the growing set of other payment services, online merchants and consumers now have new options and new ways to pay and get paid. Among the various online payment methods that have been suggested and are now accessible, credit cards are currently the most widely used in the Australian market. Alternative payment methods give both consumers and sellers more options, even if the majority of customers seem to believe that credit cards are the best option to make purchases at online sellers. Online sellers and customers now have more alternatives for how to pay and receive money thanks to the expansion of various payment systems and the marketing of debit cards for online transactions. There is a need for broad adoption of affordable, safe, private, and reliable electronic payment methods used by Australian companies, organizations, and consumers, which will helps present chances to promote online payments and generate notable productivity increases that are advantageous to the Australian economy (Ally, M., 2010).

According to Bounie and François (2006), the transaction features determine the choice of payment methods, such as cash, cheques, and bank cards at the point of sale. Their study demonstrated that the size of the transaction greatly affects the choice of payment. As the value of a transaction increases, the probability of using cash decreases whereas the probability of using a check or a bank card increases. For each 10% increase in the transaction value, the probability of paying with cash falls by 7%, whereas the probability of paying with a check or bank card

increases by 10% and 9%, respectively. Moreover, the payment preference varies according to the type of products bought. The purchase of food and beverages is normally made with cash by consumers, but checks or bank cards are more frequently used to pay for other types of merchandise. In addition, customer behavior is also determined by the payment methods available at the point of sale. The use of cash increases significantly when the options for payment are limited; in such cases, cash payments have increased by 14%. According to the survey, women are more likely to use checks than cash or bank cards, which suggests that sociodemographic characteristics also affect payment choices. These findings highlight the need for companies and financial institutions to understand these factors when designing payment systems and policies since they suggest that transaction features and consumer demographics both affect payment behavior.

LOCAL STUDIES

An effective e-payment platform is characterized by providing secure financial transactions, which is a key indicator of perceived usefulness. The platform should also be easy to learn, control, and navigate to enhance perceived ease of use. E-payment systems contribute to increased sales, provide convenience of access, and make salary payments easier for the micro-entrepreneurs. It indicate that e-payment systems have reduced errors in salary payments, human error still plays a significant role in computing and entering employee wages into the system. However, e-payment platforms have shown to positively impact sales, profitability, and operational efficiency in SMEs in previous research (Pueblos, et al., 2023).

People create developments to make life easier for everyone, such as the e-payment system. This system was designed and implemented so that individuals do not need to carry cash, wait in line to pay bills, or wait for their change. This development is precisely what people need, given that digital technology is now a part of everyone's daily life. By linking their debit cards, mobile wallets, and other digital gateways to shopping accounts, consumers can now purchase and pay for products online. However, according to the criteria from the seven factors provided by the researchers, respondents prioritize security when selecting a payment option. Results indicate that PayMaya has been able to deliver excellent service across all criteria, particularly in terms of security. Overall, most respondents are satisfied with their chosen payment option, although some respondents have had negative experiences with the cashless system; however, this varies based on their purchasing preferences or behavior. (Delos Reyes et al., 2021)

Most transactions, particularly in payments, are now conducted online. Digital payments are rapidly gaining popularity in the Philippines as people move away from cash to reduce physical contact due to concerns about the 2020 Pandemic, as well as for the convenience they offer. This study aims to evaluate the effects of adopting e-payment as a method of payment on the consumption value of customers. The objective of this study is to inform customers about whether their consumption will be affected or influenced by the adoption of e-payment. The researchers utilized a descriptive-causal study approach to determine the effects of the independent variable, which is the adoption of e-payment, on the dependent variable, which is consumer consumption. The study concluded that the level of e-payment adoption in Butuan City, considering the indicators of the independent variable, is quite high. The researchers also found that all indicators of the dependent variable had a significant impact on consumers in Butuan City regarding consumption value. Therefore, the data suggests that there is a significant relationship between the adoption of e-payment and customer consumption in Butuan City, Philippines. (Moncada et al., 2022)

According to Ching (2017), this described the dynamics of these relationships and found that the adoption of EPS is highly influenced by four important perceptions: general, privacy, security,

and trust. According to the survey, the individuals with shorter workdays were likely to choose in-person transactions since they portrayed fewer positive opinions regarding the security of electronic payments. On the other hand, people who are employed have stronger opinions about EPS in terms of security and trust, which suggests that they are more likely to use such systems. Furthermore, EPS was deemed to be more trustworthy by female users than by male users, indicating that perceptions of trust vary by gender. These findings indicate why some user problems need to be resolved in order to raise the nation's adoption of EPS.

Belmonte et al. (2024) used an improved Technology Acceptance Model (TAM) to examine the variables affecting Millennials and Generation Z interest in embracing e-wallets in the Philippines. Based on the use of an online poll with 24 indicators and 500 responses, it was revealed that there were various significant characteristics which affected the adoption of e-wallets. One of them is the level of perceived trust because customers' intention to utilize an e-wallet service would largely be driven by the amount of faith that they possess concerning its dependability and integrity. Besides, other payment options are attractive and thus make user choices. In this case, the more alluring options make it less likely that a specific e-wallet will be chosen by a user.

Another crucial factor is the perceived security of digital wallets because the adoption of digital wallets among users is influenced significantly by concerns about the safety of financial transactions. Perceived value, which refers to the total evaluation of how advantageous an e-wallet is relative to its disadvantages, is another factor that determines user intention. Moreover, the propensity of the users to apply the technology would depend greatly on perceived utility-the measure of how much they feel the e-wallet would improve the effectiveness and efficiency of their transactions. According to our findings, in order to promote adoption among young Filipino customers, establishing user trust, implementing robust security measures, and communicating the benefits and usability of e-wallets are important.

School Expenses

FOREIGN STUDIES

Variation in school attributes, proximity, and fees across neighborhoods is used to identify factors that affect whether poor households send their children to government school, private school, or no school. Lowering private school fees or distance or raising measured quality raises private school enrollments, partly by transfers from government schools and partly from enrollments of children who otherwise would not have gone to school. The strong demand for private schools is consistent with evidence of greater mathematics and language achievement in private schools than in government schools. These strongly support an increased role for private delivery of schooling services to poor households in developing countries (Alderman,et al., 2001).

U.S. school spending from 1890 to 1990, demonstrates large and steady increases in spending on U.S. schools. This spending has been propelled not only by expansion of schooling in the population but also by increases in real per pupil resources. Changing expenditure can reflect changes in input costs, an expansion of school responsibilities and objectives, altered choices about level of outcomes, and varying efficiency of resource use. The century-long expansion of elementary and secondary school spending may, however, now be threatened, as student enrollment grows and policy makers and the public increasingly consider resource constraints (Hanushek, E. A., & Rivkin, S. G., 1996).

LOCAL STUDIES

Maintenance and Other Operating Expenses (MOOE) utilization relating to School-Based Management (SBM) performance of public secondary schools in Samar Island for school years 2016-2019. It highlight a high extent of Maintenance and Other Operating Expenses

utilization to ensure students' access to complete basic education; priority for school ceremonies like the Moving Up of the Junior High School, Closing Ceremonies, and Recognition Programs; to support the needs of the learners for their learning activities; to fund the rentals and minor repairs of tools and equipment that are important to classroom activities; and to fund the expenses related to graduation rites. It showed that the least priority in the expenses were for the Internet connection of the school, telephone bills, salaries for the janitors, and the security guards. It also found out that the School Based Management performance of the schools have improved in the past three years, from good to better (Jericho D. Ecija., 2021)

2.1.1. Synthesis

The reviewed literature comprehensively elaborates on payment method preferences and school expenses locally and internationally. In these studies, it can be seen that technology, consumer behavior, and institutions' policies form the major impacts on choice making in educational payments.

Consumer preferences about payment methods depend on factors of cost, convenience, security, and awareness about technology(Stavins, 2017; Shin et al., 2014). Australian and U.S. studies point to the increasing use of digital payments, such as credit/debit cards, mobile wallets, and online banking (Ally, 2010). Local studies also support the fact that Filipinos value security and trust in choosing e-payment platforms, especially for tuition and school-related expenses (Delos Reyes et al., 2021; Belmonte et al., 2024). In addition, research indicates that electronic payment systems increase financial productivity and minimize human errors in transactions (Pueblos et al., 2023).

Research on school fees indicates that parents' decisions are based on accessibility, affordability, and school policies. Cross-country studies indicate that decreasing school fees and increasing access to payment can motivate more parents to send their children to private schools (Alderman et al., 2001). In the United States, the funding trend for public schools has demonstrated a critical imperative to ensure prudent management of funds in order to maintain the quality of education amid the escalating operational cost (Hanushek & Rivkin, 1996). Locally, a study on public school budgets shows that money is used to cover mostly school rites and activities, learning sessions, and facilities' upkeep. Internet and staff's wages, however, rank low (Ecija, 2021).

Such findings continue to emphasize the need for flexible and secure payment options for school expenses. This leap toward digital payments can be seen as an opportunity to encourage San Jose Academy to develop its financial processes in the betterment of security, cost-effectiveness, and ease of paying for expenses on school bills. What's more is that learning from studies of school expense management would show that this is a significant goal in order to ensure financial sustainability in providing resource allocation to the needs of student learning.

By integrating these perspectives, this study will determine the specific payment preferences of Grade 11 and 12 parents at San Jose Academy, adding value to the optimization of school payment systems and financial strategies.

2.2. Methodology

2.2.1. Research Design

The researchers used qualitative approach in conducting the study. This study aims to explore the payment method preferences of Grade 11 and 12 parents at San Jose Academy in managing school-related expenses. Qualitative research is an approach that is straightforward, a descriptive research that is a process of gathering, analyzing, and making accurate interpretation about such data without the aid of statistical methods. A descriptive type of research involves the collection of data to

answer questions in the study. It is utilized to make a descriptive detail of the data gathered. Qualitative research involves the examination, analysis and interpretation of observations for the purpose of discovering underlying meanings and patterns of relationships. The researchers used phenomenological approach in interpreting the data. Phenomenological approach focuses on exploring the human experiences coming from respondents and understanding and interpreting the meaning to the experiences. The researchers believed that the method of gathering information was suitable for the study, to obtain accurate data in exploring San Jose Academy Grade 11 and 12 parent preference for payment Methods in school expenses.

2.2.2. Population Sampling

The population to be targeted in this study are parents and guardians of Grade 11 and 12 San Jose Academy students with authority in managing school expenses. They are the ones who make financial decisions about tuition fees, and other payment requirements, thus are the most appropriate participants in the study.

Since the study is qualitative phenomenological approach, the researchers will apply purposive sampling, which is non-random and chooses participants based on their direct experience of making school payments. This is to ensure that only participants with first-hand knowledge and similar insights are selected to allow for an in-depth probe of their payment choices, challenges, and decision-making processes.

The participants will be selected to ensure that different viewpoints are obtained through the inclusion of parents from both Grade 11 and 12, so that answers capture different financial experiences and tastes. Through the use of purposive sampling, this research hopes to gain a thorough insight into San Jose Academy Grade 11 and 12 parents' preferred payment methods, which will ultimately lead to betterment in the school's financial transaction system.

2.2.3. Research Instrument

To begin, researchers will locate and compile a list of parents of San Jose Academy students in a chosen portion of sections in grades 11 and 12, ensuring that data protection laws are appropriately followed, using school records and correspondence. Next, researchers will disseminate an invitation letter through emails —that clearly explains the study's purpose, which is to explore the preferred payment methods used by parents for managing school-related expenses like tuition, books, uniforms, and other fees, as well as the underlying reasons influencing their choices. Informed agreement will be requested from interested parents to take part in this qualitative survey, guaranteeing that they are aware of the voluntary nature of their participation and the confidentiality of their answers. The survey will be designed with a series of open-ended questions to encourage detailed responses, and will be made available both online and in hard copy to maximize accessibility and convenience. Every response will be recorded, safely saved, and anonymised to preserve participant anonymity. The gathered information will then be methodically arranged for thematic analysis. In addition to guaranteeing a representative sample of parents, this extensive data collection process offers solid qualitative data to fully investigate and comprehend the dynamics underlying their preferred payment methods for school-related expenses.

2.2.4. Data Gathering Procedure

The purpose of this survey is to investigate how parents of San Jose Academy students in Grades 11 and 12 choose to pay for school-related expenses. The school's payment mechanism will be improved with your input. Every response will be kept private and used only for research.

This survey consists of four sections. Demographic profile, Payment Methods Perception, and Difficulties in Using Payment Methods. The demographic profile gathers demographic information, such as age, sex, and grade level, to understand respondents' backgrounds. Payment Methods Perception evaluates the safety and convenience of different payment methods, ensuring they align with user needs. Difficulties in Using Payment Methods identify potential obstacles to efficient processing and encourage suggestions for improvements. Participation in this survey is valuable as it helps understand parents' and guardians' preferred payment methods.

3. RESULTS AND DISCUSSION

This chapter cointains a presentation, analysis, and summary of the information gathered by the investigators throughout the data gathering process. The results were categorized into smaller topics that were inspired by the goals and research question outlined in Chapter 1. The frequency chart subsequent to was included to show the results of the calculated responses of those who responded to the different interview questions.

3.1. Payment Method References

Table 1. Payment methods

Question	Common themes	Code frequency
Which payment method(s) do you currently use for school-related expenses?	a. Cash	a.23
	b. E-Wallet	b. 19
	c. Bank transfer	c. 4
	d. Other (specify)	d. 0

Table 1 illustrates the use of payment instruments for educational expenditure. Based on it, cash was frequently used by 23 individuals from the chosen respondents of the researchers. The table also states that 19 respondents chose E-wallet as their payment method. Bank transfer was used rarely by 4 individuals. Finally, no individual used "Other," which implies that the given options successfully identified the methods people paid with.

Table 2: Factors that influence parents' choice of payment

Question	Common themes	Code frequency
What factors influence your choice of payment?	a. Convenient	a. 10
	b. Accessible	b. 3
	c. Faster	c. 3
	d. Easy	d. 3
	e. Safety	e. 3
	f. Hassle free	f. 2
	g. Saves time	g. 2
	h. Practical	h. 2
	i. Direct	i. 1
	j. Receipt	j.1

Table 2 examines factors that affect people's payment selection. "Convenient" was the most commonly mentioned factor, chosen by 10 individuals. "Accessible," "Faster," and "Easy" were chosen by the 3 respondents, which indicates how important ease and speed are in payment options. Safety was also an

important factor for some individuals to ensure their security in terms of paying using their chosen payment methods. "Time-saving" were stated by 2 respondents, any "practical" and "direct" being only stated by 1 respondent. Finally, requiring a "receipt" was stated by one respondent which is actually essential for paying. Convenience and ease of use are what drive the payment method choice, according to the data.

3.2 Perception of Payment Method

Table 3: Payment methods' convenience

Question	Common themes	Code frequency
In what way different payment methods can be convenient to you?	a. Not having to go to school b. Direct c. It is secured d. It saves time e. Provides more option f. Can pay anytime g. Easy transaction h. Availability	a. 5 b. 5 c. 3 d. 3 e. 3 f. 2 g. 2 h. 1

Table 3 shows how convenient it is for parents to use their preferred payment methods. According to the data, "Not having to go to school" and "Direct" were the most frequently stated explanations by 5 individuals who were chosen by the researchers. Furthermore, the chart shows that 3 respondents favored "It is secured," "It saves time," and "Provides more options" because of how simple and effective it is for them to pay for their child's educational costs. Additionally, 2 people chose "Easy transaction" and "Can pay anytime." Finally, one person selected "Availability," emphasizing the value of having easily accessible payment methods. This implies that when it comes to handling their child's educational costs, parents prefer payment options that provide flexibility and convenience.

Table 4: Security in payment methods

Question	Common themes	Code frequency
Do you feel secure while paying using this payment method? Explain why and why not.	a. Yes, because it is a direct transaction. b. Yes, because of receipts. c. Yes, because of the security system and passwords. d. No, because the system can have technical problems.	a. 9 b. 8 c. 4 d. 3

Table 4 displays the respondents' level of security when utilizing the payment method of their choice. 'Yes, because it is a direct transaction,' which was selected by 9 people, was reported to be the most commonly selected response. Furthermore, 8 respondents said that receipts make them feel secure, whereas 4 respondents credited the system's security features

and passwords with making them feel secure. But according to 3 people, there is a chance that the system will experience technical issues. These findings imply that while some parents are still wary of possible systemic problems, the majority of parents regard the straightforwardness of the transaction and the availability of receipts as crucial components in feeling confident while paying their child's educational costs.

3.3 Challenges in Using Payment Methods

Table 5. Challenges in using payment methods

Question	Common themes	Code frequency
What challenges have you encountered when using your preferred payment method?	a. Doesn't have any problem b. Unstable internet connection c. Transaction error d. Not having enough money e. Don't have any change f. Time-consuming g. Difficulty in paying in person	a. 9 b. 7 c. 5 d. 3 e. 3 f. 3 g. 1

Table 5 illustrates that the majority of respondents "don't have any problem" with their payment methods 9, but problems still exist. The most prevalent problem is an "unstable internet connection" 7, followed by "transaction errors" 5. Some have a problem with "not having enough money" 3, "don't have any change" 3, and "time-consuming" processes 3. Only one of the respondents has a problem with "difficulty with in-person payments.". Although the majority of users experience their payment options as trustworthy, enhanced internet stability and fewer errors might make the payment process better.

Table 6. Improvements to enhance the school's payment process

Question	Common themes	Code frequency
What improvements or additional options would you suggest to enhance the school's payment process?	a. None b. Improve the security c. Let the student access	a. 15 b. 2 c. 2

Table 6 reveals that a majority of the respondents are of the view that there is no need to improve the payment process of the school 15, which means there is a general satisfaction with the existing system. A minority of respondents 2 proposed improvement of "security", which refers to the fear of transaction and data safety. Another 2 respondents suggested "allowing students to access" the payment system, possibly by providing students with greater control over their accounts or allowing them to make payments themselves. Although most are satisfied with the existing arrangement, strengthening security features and providing greater student access would make the system even more convenient and trustworthy.

4. CONCLUSION AND RECOMMENDATION

This chapter provides the findings summary, conclusion, and recommendations of the research "Exploring San Jose Academy Grade 11 and 12 Parents' Preference for Payment Methods in School Expenses." The study sought to learn about parents' preferred payment methods, issues they face, and potential ways to improve the school payment system. The findings are rich sources of information about the efficiency, convenience, and security of available payment channels. According to the findings, this chapter will present key takeaways and recommendations to improve the payment experience for parents and the school administration.

Several factors influence how parents choose to pay for school expenses. The primary consideration is convenience, as many prefer methods that are practical, hassle-free, and easy to access. A faster payment process that does not require a visit to the school is often favored. Security also plays a significant role. Parents opt for payment methods they trust, ensuring their transactions are safe and reliable. Having an official receipt provides an added layer of assurance, giving them confidence in their chosen method. Availability and functionality of payment options impact decision-making. Some parents prefer cash payments due to their direct nature, while others find digital wallets and online transactions more efficient. However, issues such as wallets not functioning properly may deter some from using electronic methods.

Influences from family and friends also contribute to decision-making. Recommendations and shared experiences often shape preferences, guiding parents towards trusted methods. Additionally, many parents consider the ease of monitoring transactions, opting for methods that do not require frequent checks. Ultimately, the choice of payment method depends on individual circumstances. Parents seek the easiest, most practical, and secure way to handle school expenses while balancing their schedules and financial needs.

Based on the experiences of the respondents, digital payment methods such as e-wallets, online banking, and credit cards offer significant advantages in terms of convenience, security, and accessibility. Many respondents answered that they prefer cashless transactions because they are safer and eliminate the need to carry physical cash. Additionally, these digital options provide more flexibility and serve as a reliable backup when traditional cash payments are not available.

One of the most appreciated benefits is the ability to conduct transactions anytime and anywhere, saving time and reducing effort. Respondents emphasized that e-wallets and online banking allow them to complete payments without physically going to school, banks, or payment centers. The direct and hassle-free nature of these transactions makes them a preferred choice.

However, some respondents pointed out that these digital methods are dependent on internet access. In cases of poor connectivity, they may face difficulties in completing transactions. Despite this limitation, many still find e-wallets, GCash, and online banking highly useful, as they enable payments from home and provide a seamless financial experience. Additionally, the ability to ask questions and receive assistance when needed further enhances their accessibility and reliability.

The interviewees shared their experiences regarding how individuals diversify their means of payment so that they can keep their money safe. Most prefer direct transactions since they are done on the spot therefore, they are secure and verify immediately. Cash payments are also a trusted means since they produce physical receipts as evidence and dispense with the waiting time associated with online transfers. It signifies that you get to physically view your transactions and confirm that they actually exist.

But, not everyone is on board with e-wallets and bank transfers. Bank payments are perceived to be safer and they allow easy access to funds, while some respondents expressed reservations about GCash, such as encountering system failures and payments sent by mistake. In spite of added security such as passwords, receipts, and email confirmations, there are some who still prefer traditional payment schemes.

Though GCash is popular and largely secure, many are still skeptical about its legitimacy. In the end, most respondents care more about payment schemes that are accurate, secure, and give them peace of mind.

As per the experience of the respondents, payment methods that were used in making payments to San Jose Academy were very difficult to utilize. The process of payment was also extremely challenging, including acute financial challenges in the form of loss of cash, lack of funds, and large-scale forgeries, along with painful technical challenges in the form of application crashes, loss of connectivity, slow internet speed, and so on, apart from difficult logistic challenges in the form of unavailability of exact change, incapability to handle very large bills, very lengthy waiting times, and poorly crowded payment areas. These problems had a major impact on their overall payment experience, causing them a lot of hassle.

The issues extended beyond the technical difficulties. There were certain other issues that were also identified. The respondents highlighted the impact of internet connections that were always unstable, the high rate of transaction errors that caused financial losses, and the frustration of long processes and delayed payments. All these combined to create a poor user experience.

These intricate problems suggest that they must be resolved. Logistical problems that impact user experience, along with financial instability and technical failures, generated numerous problems. With how often these issues happen and the severity of the problems, significant system changes are necessary.

Based on the experience of the respondents, San Jose Academy's system is well organized and managed in handling the payment of the expenses of the students. Most of the respondents don't have any additional options or recommendations that they want San Jose Academy to improve because the service that San Jose Academy is giving, in terms of paying the expenses of the students, has a good service and can communicate properly.

Despite having a well organized and managed system, the respondents still encounter many problems that they experience. San Jose Academy has a website wherein they can track your expenses and see how much is your remaining balance. According to the respondents, the website of San Jose Academy is confusing and difficult. In that way, the respondents recommended that San Jose Academy should make their website easy to understand. Many respondents suggested that San Jose Academy needs to improve the security and unavailability of E-wallets such as GCash, because most of the students still encounter problems in paying their expenses online. San Jose Academy should offer additional accounts in digital payment applications because there is an amount limitation in every account, that is why one of the additional options that they want is having no amount limit in sending money to an account to pay their expenses. Additionally, it is suggested that San Jose Academy should have a schedule day and time for different strands and sections whenever the deadline of the expenses in San Jose Academy is near, especially in examination, for a more efficient system in payment.

The implications of these findings suggest that San Jose Academy should utilize a substantial improvement on other payment methods such as E-wallet and Online banking to optimize the payment process and improve the overall parent

experience. Future research could explore more about the additional factors that are impacting the parent's payment method preferences.

For San Jose Academy

To improve the payment process for parents, it is recommended that the school implement a structured payment schedule based on grade level and section. This system would help prevent system errors and reduce payment congestion. For example, payments for Grade 11 - St. Jude could be scheduled for one week, while Grade 11 - St. Matthew could have their designated schedule the following week. This approach would streamline transactions, minimize technical issues, and provide a more organized and efficient payment process. Additionally, clear communication of these schedules should be ensured to keep parents informed and reduce confusion. Implementing this policy would enhance the overall payment experience and address the concerns raised by parents.

For parents

Parents are advised to select the most practical and safe payment option for their needs in order to prevent any financial issues. Being aware of the various payment methods—such as cash, bank transfers, or mobile wallets—can assist individuals in making wiser choices. To avoid late payments, parents should also plan ahead for school expenses in order to efficiently manage their resources. Additionally, they may guarantee a more seamless transaction procedure by keeping lines of communication open with the school about any issues or problems pertaining to payments. Last but not least, parents should ensure accountability and transparency in their financial activities by maintaining records of their payments as evidence in the event of inconsistencies.

For future researchers

To increase the findings' applicability, future researchers who are interested in parents' preferences for school expense payment methods could broaden the study by include a broader and more varied sample, such as parents from other grade levels or schools. By documenting both statistical patterns and individual experiences, a mixed-methods approach that blends qualitative and quantitative research can offer a more thorough insight. Future research may also examine elements that were outside the purview of this study, such as security issues, technical developments, and economic conditions. Monitoring changes in preferences over time, particularly with new payment systems, may be made easier with the use of a longitudinal research. Finally, evaluating the effectiveness, safety, and usability of payment options would provide insightful information that schools might use to enhance their payment procedures.

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Understanding the Impulse Buying Factors Influencing Unplanned Purchases Among Grade 11 Students

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Abstract: Impulse buying is a prevalent behavior among adolescents, often influenced by social, psychological, and marketing factors. This qualitative study aimed to identify the primary drivers of impulsive purchasing behavior among Grade 11 students at San Jose Academy. Using availability sampling, 15 participants from the ABM, HUMSS, and STEM strands were selected for semi-structured interviews. Thematic analysis of the responses revealed that social influences, particularly peer pressure and trends, were the most significant contributors to impulse buying. Psychological factors, such as emotions and mood, also played a crucial role, while marketing strategies, including sales promotions and brand influence, further encouraged unplanned purchases. The findings highlight the need for better self-control strategies and financial awareness among students to mitigate impulsive spending habits. Future research could explore intervention strategies to help adolescents develop more mindful purchasing behaviors.

Key Words: Impulse Buying; Unplanned Purchases; Grade 11 Students; Buying Factors

1. INTRODUCTION

1.1. Background of the Study

According to Gantulga (2023), impulse buying is a spontaneous, unplanned decision to purchase a product or service, made just before the purchase. This occurrence is common among consumers and is influenced by a variety of factors, including social, psychological, and marketing influences. Adolescents, particularly those in senior high school, are especially susceptible to impulse buying due to their developmental stage and exposure to various marketing strategies. Hence, they form their identities through explorations of different things, making them particularly vulnerable to social influences such as peer pressure, trends, and advertisements.

Marketers, on the other hand, take this opportunity to use promotions, discounts, flash sales, and strategic store layouts to trigger impulse purchases by making the products seem more appealing and creating a sense of urgency. With the rise of e-commerce, social media marketing, and frequent sales, mass consumerism has been fueled among Filipinos, making impulsive buying more prevalent in the Philippines. Encouraged by advertising and mass media, extra-utilitarian factors have contributed to building a culture where happiness and success are measurable by material achievement (Japson, Te, & Velecina, 2017). Therefore, by understanding these influences, this study aims to promote preventive measures that can be implemented to help Filipino consumers make more informed and mindful purchasing decisions rather than acting impulsively.

The psychological aspect of impulse buying among adolescents is also significant, as emotions, self-control, and the need for immediate gratification play a crucial role in their purchasing decisions. According to Ahn et al. (2020), customers' emotions mediate the relationship between impulsive buying tendency and behavior. Understanding these influences is crucial for educators, parents, and businesses to promote responsible spending habits among students. This study aims to explore the key factors that drive impulse buying behavior among Grade 11 students and its implications, further assessing the issue and providing insights that can help them navigate their purchasing decisions more effectively.

1.2. Statement of the Objectives

This study aims to answer the question: What are the primary factors that influence impulse buying behavior among Grade 11 students?

Specifically, it aims to answer the following questions:

1. How do social influences (e.g., peer pressure, trends, advertisements...) contribute to unplanned purchases?
2. What role do marketing strategies (e.g., discounts, flash sales, store layouts...) play in encouraging impulse buying?
3. What psychological factors (e.g., emotions, self-control...) contribute to impulse purchases of these individuals?
4. Among these factors, which is the most prevalent in influencing impulse buying behavior among Grade 11 students?

1.3. Significance of the Study

Upon completion, the findings of this study is expected to benefit the following:

STUDENTS: This study is significant for students as it highlights the importance of making informed purchasing decisions,

especially given their limited financial resources. At this stage, students are highly influenced by social media, peer pressure, and marketing tactics, making them more susceptible to unplanned purchases.

SHOPPERS: This research is significant for shoppers, as they are increasingly under the influence of mass consumerism particularly with the prevalence of online advertisements. Researchers in the field have incorporated advertising value attributes such as credibility and creativity into their investigations of the impact of advertising value on impulsive buying behavior, (Malafe et al., 2023). With the constant exposure to these ads through technology, shoppers are more likely to make spontaneous purchasing decisions. By raising awareness of the factors driving impulsive buying behaviors, this study can help individuals recognize their shopping habits and identify changes they can make to avoid acting impulsively.

TEACHERS: This research is valuable for teachers, as it not only provides them with insights into managing their shopping habits but also equips them with knowledge they can pass on to students. Teachers hold significant influence over students, who often view them as knowledgeable role models. Teachers with extensive depth and breadth of content knowledge are better able to foster student motivation, (Del Siegle et al., 2013). By sharing the findings of this research, teachers can help students become more mindful of their shopping behaviors and encourage them to make more informed purchasing decisions.

PARENTS: According to Xuqi Chen et al., (2021). Results show that parents and spouses are the most common shopping companions and the most influential on the shoppers' impulse purchase decisions compared to other types of companions (e.g., significant others, colleagues, children, friends, and other shoppers). This research is beneficial for parents, as it provides insights to help them avoid impulsive buying, especially since they must carefully manage their finances to support their families. Additionally, parents can use this knowledge to educate their children about the consequences of impulse buying and guide them in developing healthier shopping habits.

1.4. Scope and Delimitation

This study examines the key factors that influence impulse buying behavior among Grade 11 students. It examines how social influences, marketing strategies, and psychological factors contribute to impulsive purchasing decisions among adolescents. The research is limited to Grade 11 students, specifically within a defined educational setting, and does not address impulse buying behaviors of other age groups or in other contexts, such as online shopping or other consumer markets. The study aims to assess how these influences shape adolescents' buying habits and the implications for responsible spending. The scope also includes the

potential role of these factors in guiding students toward more informed purchasing decisions. The study was limited by the sample size, which was restricted to a specific number of participants.

The scope of this research is narrowed down to Grade 11 students; the research, therefore, specifically targets Grade 11 students, excluding students from other grade levels so that a certain age group and stage of development can be focused on.

The study examines various psychological, social, and marketing factors that influence impulsive purchasing, such as exposure to advertisements, trends, peer pressure, emotional triggers, and sales. While it aims to provide a broad perspective, certain other factors, such as parental influence or personal financial management abilities, were not primarily included.

2. METHODOLOGY and RRL

2.1. Review of Related Literature

This investigation seeks to offer insights into how impulsive purchasing decisions are formed and to provide strategies for promoting more thoughtful consumer habits.

Over the years, the world has been constantly evolving. This evolution encompasses technological advancements, societal changes, and shifts in consumer behavior, each influencing various aspects of our lives. In the context of consumer behavior among adolescents, further understanding the factors that drive impulsive buying behavior among Senior High School students in San Jose Academy, particularly in Grade 11, provides insight into the possible threats and setbacks that it may pose.

According to Asi & Anaya (2024), educators and parents should focus on promoting informed decision-making and critical thinking about purchasing influences. This highlights the great importance of this study, as it aims to identify which factor—social, psychological, or marketing tactics—is the biggest contributor to impulse buying behavior among Grade 11 students in San Jose Academy. The findings can serve as a foundation for developing effective solutions to address this issue.

SOCIAL

Research indicates that peer influence is a significant determinant of impulsive purchasing behavior among adolescents. Impulse buying, characterized by spontaneous and unplanned purchases, can significantly affect financial stability, especially among adolescents influenced by their peers (Asi & Anaya, 2024). According to Gulati (2017), peer pressure is a social phenomenon in which members of a society or social group exert influence on an individual's behavior. While not always negative, it can often lead to

socially undesirable behaviors, particularly those that individuals may initially resist or feel less inclined to engage in. Moreover, social influence plays a crucial role in shaping consumer behavior, especially in the digital age. With the rise of the internet, the accessibility of products and services has significantly expanded, making it easier for consumers to make impulsive purchases (Brown, Smith, & Johnson, 2022).

PSYCHOLOGICAL

Psychological factors are crucial because they play a central role in how consumers make product choices (Bagus Nurcahyo, 2016). The brain governs various aspects, including decision-making and emotions. Research indicates that emotions significantly shape our choices, whether they are positive or negative. Social media amplifies our emotional responses based on the opinions of other users regarding specific products. This can lead to impulsive decision-making, as seeing others with certain items creates a desire to have them as well.

When people feel positive, they tend to shop more carelessly, believing they deserve to buy whatever they want. Conversely, negative emotions can drive individuals to shop as a way to alleviate their feelings; for many, online shopping serves as a stress reliever. The virtual nature of online shopping obscures the reality of how much money is being spent, as consumers focus more on the products than the financial impact. A high degree of familiarity with online shopping platforms plays a significant role in influencing college students' impulsive buying behavior (Cing Itt Khai et al., 2024). As consumers often incorrectly believe that more settings mean greater power (Mauricio Pelmeira et al., 2019), they may also fall prey to similar misconceptions in their purchasing decisions. Therefore, developing self-control is extremely beneficial in managing the influence of emotions on buying behavior.

MARKETING

Social media platforms in online shopping, such as Shopee, Lazada, TikTok, and Shein, categorize products based on customers' preferences, making them more appealing for purchase. As a result, customers tend to buy products impulsively whenever they find items they like, without fully visualizing them in person. These products are advertised in a way that makes them difficult to ignore. Zenodo (2022) analyzed the importance of social media in marketing and highlighted how product reviews on shopping pages influence purchasing decisions. With readily available reviews, consumers can decide whether to buy a product immediately or not. According to Yturralde & Lazatin (2022), visual merchandising has become a common strategy in modern retail, serving as a valuable tool for both retailers and manufacturers to communicate their offerings effectively. This encourages consumers to purchase products, often

leading to impulsive buying behavior. Furthermore, Dharta, Prasetyo, & Dema (2021) emphasized that understanding the impact of impulse buying behavior requires examining how attitude mediation influences spontaneous purchasing decisions.

2.1.1. Synthesis

To summarize, impulse buying behavior among adolescents, particularly Grade 11 students at San Jose Academy, may be influenced by social, psychological, and marketing factors. Social influences, such as peer pressure and social media, amplify emotional responses, leading students to make impulsive purchases based on others' opinions (Bagus Nurcahyo, 2016). Psychological factors, including emotions and stress, also play a significant role, as positive emotions encourage careless spending while negative emotions drive shopping as a coping mechanism (Cing Itt Khai et al., 2024). The ease of online shopping further exacerbates impulsive buying by obscuring financial consequences and creating misconceptions about product value (Mauricio Pelmeira et al., 2019). Platforms such as Shopee, Lazada, TikTok, and Shein have certainly worked, even subconsciously, for shoppers to discover the goods they like. Research by Zenodo (2022) hits on the extent to which the visual presentation of products can influence consumers on what they actually decide to buy. Also, Yturralde and Lazatin (2022) emphasize that visual merchandising is a widely used strategy in modern retail, serving as a powerful communication tool for brands and retailers. Meanwhile, Dharta, Prasetyo, and Dema (2021) investigate impulsive buying concerning our attitudes, where such behavior influences choice patterns. These findings illustrate just how mode of presentation positions our buying behavior.

2.2. Methodology

2.2.1. Research Design

This study employed a qualitative, exploratory, and cross-sectional design with a phenomenological approach to understand the factors influencing impulsive purchasing. Semi-structured interviews were conducted to capture participants' lived experiences, and thematic analysis was used to identify common patterns in their responses.

2.2.2. Population Sampling

The study's population consisted of Grade 11 students from San Jose Academy across three academic strands: ABM (Accountancy, Business, and Management), HUMSS (Humanities and Social Sciences), and STEM (Science, Technology, Engineering, and Mathematics). A total of 15 participants were selected through availability sampling, ensuring that only those who were accessible and willing to participate were included. To enhance

representativeness, participants were randomly chosen based on availability while maintaining balance across the three strands. Prior to the interview, a filtering question was asked to confirm that participants had relevant impulse buying experiences. Those who met this criterion proceeded with the interview process.

2.2.3. Research Instrument

A semi-structured interview guide examined social, psychological, and marketing influences on impulse buying. Questions covered personal experiences, shopping frequency, product preferences, emotions, self-control, regret, and the impact of online sales and marketing strategies. Participants also identified the most significant influencing factor and shared advice for managing impulse buying. Interviews lasted 5–15 minutes, with responses audio-recorded (with consent), transcribed, and analyzed using thematic analysis.

2.2.4. Data Gathering Procedure

The study on impulsive buying among Grade 11 students had utilized availability sampling to select 15 participants from the ABM, HUMSS, and STEM strands based on their willingness and accessibility. Students were asked if they had ever bought items impulsively due to factors like ads, trends, peer pressure, emotions, or sales, with only those who answered yes proceeding to interviews. These interviews, lasting 5 to 15 minutes, were conducted after briefing the participants and obtaining their verbal consent. Interviews were audio-recorded, transcribed, and thematically analyzed to identify patterns and the most prevalent impulse-buying factors based on response frequency and depth.

3. RESULTS AND DISCUSSION

This section presents the analysis of interview data on impulse buying behavior. Findings are categorized into sub-themes based on the study's objectives, with a frequency table summarizing key influencing factors.

Table 1. Personal Experiences

Question	Common themes	Code frequency
Can you describe a recent time when you made an unplanned purchase? What made you decide to buy it?	**A.)** Desire Based	➔ **6**
	B.) Necessity Based	➔ **3**
	C.) Influence Based	➔ **3**
	D.) No Planning	➔ **2**
	E.) Discounts	➔ **1**

Results from Table 1 shows that 6 out of 15 participants were acting based on their desires, 3 out of 15 were due to necessity, 3 out of 15 were based on no influence, 2 out of 15 were based on particular planning, and lastly 1 out of 15 was due to discounts.

Table 2. Shopping Frequency

Questions	Common themes	Code frequency
How often do you shop for non-essential items?	**A.)** Frequent Shoppers	➔ **7**
	B.) Infrequent Shoppers	➔ **7**
	C.) Occasional Shoppers	➔ **1**

Table 2 shows the shopping frequency commonalities between different individuals when it comes to buying non-essential items. The most common response is "frequently" with 7 participants out of 15 being on the same page. On the other hand, 7 out 15 as well have been observed to be infrequent shoppers. Meanwhile, only 1 participant identified as an occasional shopper.

Table 3: Product Preferences

Question	Common Themes	Code frequency
What types of products do you find yourself buying on impulse?	**A.)** Fashion/ Clothing	➔ **6**
	B.) Cosmetics	➔ **4**
	C.) Arts & Collectibles	➔ **3**
	D.) Essentials	➔ **2**
	E.) Sports Related Products	➔ **1**

Table 3 results show that Fashion & Clothing is the most commonly chosen category, with 6 participants selecting it. Cosmetics came in second, chosen by 4 participants, followed by Arts & Collectibles with 3, Essentials with 2, and Sports Related Products with 1. This suggests that among the participants, fashion items are the most tempting for impulse purchases, followed by cosmetics and arts, while essentials and sports products are less likely to be bought impulsively.

Table 4: Emotions

Questions	Common Themes	Code frequency
What emotions do you typically feel when making impulse purchases?	**A.)** Satisfied/ Excited	➔ **9**
	B.) Regret	➔ **4**
	C.) No clear Response	➔ **2**

Table 4 results show that the most common emotions are satisfaction and excitement, felt by 9 participants. This is followed by regret, experienced by 4 participants. Additionally, there are 2 participants who did not have a clear response.

Table 5. Self-Control

Question	Common themes	Code frequency
How would you describe your level of self-control when it comes to spending money?	**A.)** Low Self-Control	➔ **6**
	B.) Moderate Self-Control	➔ **5**
	C.) High Self-Control	➔ **4**

Table 5 shows 6 out of 15 participants identified as individuals with low self-control. On the other hand 5 out of 15 with moderate self-control. Meanwhile, 4 out of 15 with high self-control. This suggests that among the participants, a significant number view themselves as having low to moderate self-control over their spending habits, while a smaller group perceives themselves as having high self-control.

Table 6. Regret

Question	Common themes	Code frequency
Do you ever experience regret after an impulse purchase? If so, what factors contribute to that feeling?	**A.)** Not considered/ No opinion	➔ **6**
	B.) Yes; Poor product quality & services	➔ **5**
	C.) Yes; Lack of thought before	➔ **3**

Table 6 shows that 6 participants did not have a considered opinion on the matter. Meanwhile, 5 participants reported experiencing regret due to poor product quality and services, and 3 participants cited a lack of thought before the purchase as a contributing factor.

Table 7. Impact of Sales

Question	Common themes	Code frequency
Do online sales encourage you to buy impulsively?	**A.)** Yes	➔ **13**
	B.) No	➔ **2**

Table 7 findings reveal that 13 participants agreed that online sales do encourage such behavior, while 2 disagreed. This suggests that most participants perceive online sales as a catalyst for impulsive buying.

Table 8. Marketing Impact

Question	Common themes	Code frequency
Are there specific promotions or marketing strategies that trigger your impulse buying?	**A.)** Brand & influence marketing	➔ 7
	B.) Sales & Discounts	➔ 4
	C.) Advertising influence	➔ 3
	D.) Not influenced by promotion	➔ 1

Table 8 results revealed that 7 participants are most influenced by brand and influence marketing, followed by 4 participants who are swayed by sales and discounts. 3 participants are influenced by advertising, while only 1 participant mentioned being not influenced by promotions.

Table 9. Significant Factors

Questions	Common themes	Code Frequency
Between these social, psychological, and marketing factors, which one do you think influences your unplanned purchases the most?	**A.)** Social Influence	➔ 9
	B.) Psychological Factors	➔ 6

Table 9 results show that social influence is the most significant factor, with 9 out of 15 participants selecting it. Psychological factors come next, with 6 out 15 participants, and marketing factors being the least influential among the three. This highlights that social interactions play the biggest role in driving impulse buying, followed by individual psychological triggers, while marketing strategies have a lesser impact.

Table 10. Advice

Question	Common themes	Code Frequency
What advice would you give to someone who struggles with impulse buying?	**A.)** Smart spending and shopping control	➔ 12
	B.) Budgeting and financial planning	➔ 3

Table 10 shows that 12 participants have advised for smart spending and shopping control, whilst 3 advised for budgeting and financial planning.

4. CONCLUSION AND RECOMMENDATION

4.1 Conclusion

In the first chapter of this research paper, it was stated that the goal was to understand the key drivers of unplanned purchases and determine which among social, psychological, and marketing factors has the greatest influence on this phenomenon. The researchers' data analysis revealed that social influences are the primary factor affecting impulse buying behavior among Grade 11 students at San Jose Academy, while psychological factors and marketing strategies, such as sales and brand promotions, also play significant roles.

In conclusion, while social dynamics such as peer influence and trends, which are the most predominant drivers, emotions and moods also serve as internal triggers for impulse purchases. Additionally, marketing strategies further amplify the likelihood of impulsive spending. Therefore, managing social influences, controlling psychological triggers, and making informed purchasing decisions are essential in preventing young consumers from developing habitual impulse buying behavior.

4.2 Recommendations

Given by the preceding data, findings, and analysis, the researchers propose the following recommendations:

For Students:

- Discipline with one's own spending habits should be present at all times
- Avoid unnecessary purchases without a specific goal in mind or purchasing through peers' influence.
- One should reward themselves from time to time if need be, while practicing mindfulness.

For Parents:

- One should give proper guidance to their children when spending money.
- Teach them proper budgeting and allow them to learn how to manage their own expenses wisely..
- Give them prior knowledge about different types of cards such as debit, credit, and other financial or identification cards, for them to learn how to manage finances wisely, for security awareness, and further understanding how financial transactions work.

For Future Researchers:

- It is suggested to cover areas around Parental Influence or Personal Financial Management Abilities to give light to other factors that may be contributing to impulse buying behavior as well.
- Target participants or respondents should be expanded (age & length) for more thorough understanding and more accumulated insights.
- It is also suggested that different settings other than academic establishments should be considered.

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Submitted by Bausin, Princess Faith., Abutin, Jillian Rob., Pleños, Diolanie Jr., Del Rosario, Wilfredo., and Morado, James in partial fulfillment of the requirements for Practical Research 1 for School Year 2024-2025

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Abstract: This study aimed to determine the influence of entrepreneurship subject on the entrepreneurial intentions of Grade 12 Accountancy, Business, and Management (ABM) students in San Jose Academy. This study examines how this subject shapes their understanding of entrepreneurial concepts, their confidence in entrepreneurial endeavors while answering a survey of the graduating Grade 12 ABM students in San Jose Academy using a survey qualitative research approach and a survey questionnaire as its instrument 20 San Jose Academy students a validated survey questionnaire. Data analysis focused on understanding student perceptions and experiences within the entrepreneurship subject. The findings reveal that students generally hold positive perceptions of entrepreneurship subject, anticipating it to provide practical knowledge and skills. Grade 12 ABM students find the subject challenging yet enjoyable, parcticularly appreciating hands-on activities. However, students also encounter challenges with complex concepts such as financial management and time-consuming tasks. Researchers conclude that the entrepreneurship subject positively impacted student critical thinking, problem-solving, and time management skills, contributing to their preparation for the corporate world. The study also demonstrated the teacher's critical role in delivering engaging and effective instruction, contributing to a positive learning environment.

Key Words: Entrepreneurship education; Entrepreneurial Intentions; Business Education, ABM Students

1. INTRODUCTION

1.1 Background of the Study

Over the past two decades, entrepreneurship has become a significant economic force globally. This growth has spurred a parallel expansion of entrepreneurship education, with an increase in the number of colleges and universities offering related courses from a handful in the 1970s to

1,600s in 2005. (Kuratko, 2005) nations vary widely in their levels of entrepreneurial activity, ranging from countries in which large employers no and the state dominate labor markets to countries in which small firms and self-employed craft workers play much the same role they did centuries ago. (Stephen et al., 2005)

As the Philippines faces challenges in creating sufficient employment opportunities for its growing population, the development of entrepreneurial skills and intentions among young people is crucial for economic growth and innovation (Hisrich & Shepherd, 2017). The educational sector, particularly in Senior High school, serves as a starting ground for students to understand their entrepreneurial intentions. Grade 12 students of Accountancy, Business and Management (ABM) track in the Philippines explore different concepts of entrepreneurship and business related topics found in subjects such as Entrepreneurship, Fundamentals of Accountancy and Business Management 2 (FABM2), Business Ethics, and Business Finance, providing researchers a relative context for this study. Accountancy, Business, and Management (ABM) strand is designed for students who are interested in business-related concepts to provide them with knowledge and skills in fields such as accounting, marketing, finance, marketing and business management. According to Takawira et.al (2017), entrepreneurial education has a positive correlation with entrepreneurial intentions. This study shows how entrepreneurship-related subjects can significantly influence students' perceptions of entrepreneurship as a career option. Educators have understood the importance of fostering an entrepreneurial mindset among students, adopting entrepreneurship education to prepare students in entering the complexity of economics.

Despite a general consensus that entrepreneurship education positively correlates with entrepreneurial intentions (Dees & Anderson, 2011). A significant knowledge gap persists regarding the specific influence of the entrepreneurship subject on Grade 12 ABM students. Existing literature often lacks a nuanced analysis of how curriculum design, teaching methods, and student demographics shape intentions within these specific student populations.

This study addresses this gap by investigating the influence of entrepreneurship education on the entrepreneurial intentions of Grade 12 ABM students at San Jose Academy. By analyzing students' understanding of entrepreneurial concepts and their perceived self-efficacy in entrepreneurial endeavors, this research aims to provide insights on school administrators to find effective ways in cultivating the next generation of entrepreneurs. The findings will contribute to a more comprehensive understanding of the factors that shape entrepreneurial intentions within the specific context of the Philippine ABM curriculum.

1.2 *Statement of Objectives*

Research Problem:

The study seeks to answer the question: How does the Grade 12 ABM entrepreneurship subject at San Jose Academy influence students entrepreneurial intentions?

Research Questions:

- What are the students' experiences and perceptions of the Grade 12 ABM entrepreneurship subject?

- What aspects of the entrepreneurship subject are the most impactful in shaping students' entrepreneurial intentions?

- How do Grade 12 ABM students at San Jose Academy perceive the entrepreneurship subject's content and teaching methods?

1.3 *Significance of the study*

The study focuses on understanding the influence of Entrepreneurship Subject in Entrepreneurial intentions of Grade 12 ABM Students at San Jose Academy. This study will be beneficial to the following:

Students. The findings of this study could help students to gain deeper knowledge about entrepreneurship, helping them to improve their entrepreneurial skills such as, critical thinking, leadership, and problem-solving skills. This study could also help students in choosing their future career, whether to continue entrepreneurship or other fields related to business and accounting.
Teachers/Admins. The result of this study could provide teachers and administrators insights on how they can develop and improve their teaching strategies to provide better learning outcomes for students.
School. Results of this study could provide essential insights for San Jose Academy to develop programs that could help students develop their entrepreneurial skills and to support them with their aspirations and career goals.
Future researchers. This study could provide data and information that could be used by future [;'/'=\.researchers to further expand the study.

1.4 *Scopes and Delimitations*

The scope of the study focuses on the Influence of the Grade 12 ABM entrepreneurship subject on the entrepreneurial intentions of Grade 12 ABM students at San Jose Academy. The study will be conducted in San Jose Academy, targeting Grade 12 students who are enrolled in Accounting, Business, and Management (ABM) strand. The study will utilize a qualitative research design, specifically interview and focus group discussion. Factors outside the scope of entrepreneurship subject, students who have prior entrepreneurial experience, family background, or external economic conditions, will not be directly examined. The study also does not examine the long-term impact of the course on students' entrepreneurial activities after graduation. Only the findings will be specific to the context of San Jose Academy and may not be generalizable to other school and students populations.

2. METHODOLOGY

This chapter discussed the research methodology used in the study. The area where the study is conducted, the study design and population and sample are also described. The instrument used to collect the data, including methods implemented to maintain validity and reliability of the instrument, were also presented.

2.1 *Research Design*

A survey is used to collect original data for describing a population too large to observe directly (Mouton 1996:232). In this study the information was collected through a structured online survey administered the respondents by the researchers.

A descriptive survey was selected because it provides an accurate portrayal or account of the

characteristics, for example behaviour, opinions, abilities, beliefs, and knowledge of a particular individual, situation or group. This design was chosen to meet the objectives of the study, to determine the knowledge and perceptions of Grade 12 ABM at San Jose Academy.

2.2 *Population sampling*

The researchers selected students from Grade 12 Accountancy, Business, and Management (ABM) as their respondents. The researchers utilized purposive sampling, a sampling technique where in the participants is selected based on their characteristics, experiences, and relevance to the study. The researchers conduct an interview with the fifteen (15) participants from two sections. The respondents were divided into two, eight (8) students from St. Peter Faber and seven (7) from St. Bernardine, selected based primarily on the their class participation levels. Students demonstrating consistently high levels of engagement in class discussions and activities were prioritized. In addition, the selected respondents were picked based on their interest in business and their aspiration to become entrepreneurs in the future.

2.3 *Research Instrument*

To get the appropriate data, the researchers will utilize survey instrument to the Grade 12 Accountancy, Business, and Management (ABM) about the influence of entrepreneurship education on the entrepreneurial intentions.

The researchers prepared an questionnaire. On the (1) first part of questionnaire consisted of demographic profile of the respondents, such as name, gender, age, of a respondent. The (2) second part focuses on experience and perceptions of Grade 12 ABM entrepreneurship subjects. The (3) third part is aspect of the entrepreneurship subjects are the most impactful in shaping students entrepreneurial intentions. The (4) fourth part is Grade 12 ABM students at San Jose Academy perceive the entrepreneurship subject's content and teaching methods.

2.4 *Data Gathering Procedure*

The research adviser reviewed, assessed, and verified the questionnaire created by the researcher. The researchers employed an survey google form to collect data. Upon receiving approval, They were instructed to answer the questions briefly and concisely. The researchers provided clear instructions to the respondents the importance of their answers to the study and provided onsent forms to ensure that participants are fully informed about the purpose and procedures of the study.

The researchers use purposive sampling technique, a non-probability sampling technique where in the researchers select participants based in their relevance to the study. After collecting all of their responses, the data was organized and classified. The results of the study will serve as evidence for this research. The researcher will explain the importance of their responses to the study, this will be the process of how the researchers collect the information needed to be answered.

3. RESULTS AND DISCUSSION

This chapter presented, analysed and interpreted the result from the conducted survey data gathered by the researchers. The analysis on the result of the evaluation was done to measure the influence of entrepreneurship subjects on entrepreneurial intentions

Table 4.1
Grade 12 ABM Students Perceptions before taking the Entrepreneurship Subject

Questions	Coding		Frequency
1.What were your expectations about the Entrepreneurship subject before you started taking it ?	a.	focus on starting a business	a. 3
	b.	Entrepreneurial challenges and skills	b. 5
	c.	Business Fundamentals and content	c. 8
	d.	comprehensive understanding	d. 4

Results from Table 4.1 show the perceptions of Grade 12 Accountancy, Business, and Management before taking it. Students anticipated the subject would focus on starting a business, covering business fundamentals, and exploring the challenges and successes inherent in entrepreneurial ventures. They also expected the subject to include business management skills and product creation and presentation of product.

Table 4.2
Students experiences in the entrepreneurship subject

Question	Coding		Frequency
2.Can you describe your experiences in the grade 12 ABM entrepreneurship subjects?	a.	Difficult	7
	b.	Fun	1
	c.	Expensive	4
	b.	Product Proposal	6
	d.	Easy	1

Table 4.2 shows the experiences of Grade 12 ABM in their Entrepreneurship subject, describing it as both challenging and enjoyable, highlighting the engaging activity of product making and proposal that allowed them to foster their skills. Some found the subject not only enjoyable, but also Educative and easy. While most students encounter difficulties along the way, the student's overall take away was that the subject provides them with educational knowledge that will foster their understanding about the process and concepts of Entrepreneurship.

Table 4.3
Challenges that the student's encounter with the entrepreneurship subject

Question	Coding		Frequency
3. What were the challenges you encountered while taking the subject?	a.	Time management	a. 3
	b.	Lot of terms need to memorize	b. 5
	c.	Financial struggles	c. 3
	d.	Business plan/product prototype	d. 9
	e.	Under	e. 3

		standing calculations and formulas	
	f.	Critical thinking skills	f. 1

Table 4.3 revealed the Grade 12 students several challenges while taking the Entrepreneurship subject, especially in business planning/ product prototyping that requires them to do extensive research and use their critical thinking skills, they also share their financial struggles in accomplishing this activity. Additionally, they note difficulties in understanding calculations and formulas and also memorizing a lot of terms due to its significance in their summative assessment, which caused them struggling with time management.

Table 4.4
School task that stood out to students and significant learning experiences

Questions	Coding		Frequency
4.Were there any specific activities, assignments, or projects that particularly stood out to you? If yes, how did this contribute to your learning?	a.	Business Plan and Product Proposal	a. 18
	b.	None	b. 2
	c.	Application in Real-life	c. 5

Table 4.5
Topics and lessons that are least engaging and challenging

Questions	Coding		Frequency
5. What lessons did you find less engaging or challenging?	a.	Business ethics	a. 1
	b.	None	b. 6
	c.	Defining Entrepreneurship	c. 5
	d.	Corporate and social responsibility	d . 3
	e.	Financial Analysis	e. 4
	f.	Product Making	f. 5

While most of the students did not find any challenging and least engaging lessons,some students revealed that financial analysis along with the product proposal/making, are the most challenging lessons and experiences in Entrepreneurship due to its detailed and complex concepts. In contrast, they perceived that the lesson about defining entrepreneurship and the development of it as the less engaging lesson. They feel that the historical and developmental aspects of Entrepreneurship fail to spark their interest and attention.

Table 4.6
How did the subject impact student's personal growth

Question	Code	Frequency
6.How did the subject impact your personal growth and development	a. Time management	a.2
	b.Not sure	b.2
	c.Self Assesment	c.5
	d.Critical Thinking Skills	d.2
	e.Developed Entrepreneur mindset	e.10
	f.Prepared me from corporate world	f.5

Table 4.6 reveals how the subject impacted student's personal growth and development. Many students stated that the subject significantly influenced their personal growth and development by enhancing their time management and critical thinking skills. They also emphasized lessons that require them to have regular self-assessment, fostering a deeper understanding of some of their areas that need improvements. Additionally, the subject also helped them develop an entrepreneurial mindset, preparing them for the corporate world. Lastly, while some acknowledge the positive impact, others were uncertain about its significance.

Table 4.7
The influence of Entrepreneurship subject on students' perspective about starting a business

Questions	Coding	Frequency
7. How did the subject influence your perspective on starting a business?	a. Interested	a. 9
	b. Not interested	b. 2
	c. Business is hard	c. 9
	d. To turn ideas into reality	d. 1
	e. To test the knowledges and skills I learned	e. 2
	f. Profit	f. 2

Table 4.7 result shows Grade 12 students various responses regarding the influence of the entrepreneurship subject on their perspectives about starting a business. While some expressed that they were interested in entrepreneurship and a desire to create innovative products for the market, others acknowledged the challenges and difficulties involved in starting a business, leading them to reconsider their desires and aspirations. Despite this, some students felt inspired to pursue entrepreneurship in the future, reflecting a mixed and balanced motivation as they sail across their thoughts on becoming entrepreneurs someday.

Table 4.8
Subjects that helped students in developing their business in starting up a business

Question	Coding	Frequency
8.Did the subject help you in developing interest in starting a business	a.Yes	a. 9
	b.It is fun	b. 2

	c.No	c. 9
	d.To turn ideas into reality	d .1
	e.To test the knowledges and skills learned	e .2
	f.Profitt	f. 2

Table revealed that Grade 12 students show enthusiasm for entrepreneurial intentions, wanting to make their ideas into reality, and test their gained knowledge and skills, and also to have, of course profit. Meanwhile, some students also expressed their disagreement with starting up a business, most of them are really not into starting up a business with no reason indicated on it.

Table 4.9

Question	Coding	Frequency
9. For those who answered Yes in Number 8: What specific topics or lessons in the Entrepreneurship subject do you think have the most significant impact on shaping your entrepreneurial intentions?	a.Taking risk	a.2
	b.Business Plan	b.3
	c.Decision Making	c.2
	d.Social entrepreneurship	d.1
	e.Ethics and finance	e.1
	f.Entrepreneurship concepts	f.6
	g.7ps	g.1

Table 4.9 reveals the lessons that significantly influenced their intentions in starting up a business. Those lessons are the importance of taking the risk and understanding various aspects of business, market dynamics, ethics and finance, as well as entrepreneurship concepts. Additionally, students also consider communication skills as one of the most important lessons they've learned in the subject.

Table 4.10

Question	Coding	Frequency
10.What did you learn in the entrepreneurship subject that you found most valuable or useful? (do you think this knowledge can be applied in the future?)	a.Business planning and strategy	a.3
	b.Product and Market focus	b.2
	c.Financial Management	c.3
	d.Broad Entrepreneurial Knowledge	d.1

Table 10 results, entrepreneurship subject to be helpful in learning how to create a solid business plan by conducting market research and understanding the key decisions involved. The subject also provided thema

strong foundation in financial management. Grade 12 ABM learned about developing unique products that can appeal to consumers and attract investors. Students gained a broad understanding and knowledge of various entrepreneurial concepts and how they can be applied to different business situations, including starting and business management

Table 4.11
Students' description of their teachers' passion for the subject

Question	Coding	Frequency
11.How would you describe your teacher's knowledge and passion for the subject?	a.Teacher's Expertise and knowledge	a.1
	b.Effective and Engaging Teaching Methods	b.5
	c.Positive learning impact	c.5

Table 11 results of Teacher teaching and passion for entrepreneurship subject. It highly impacts students' knowledge and learning experience. The teacher demonstrated deep knowledge and passion for the subject, making learning engaging and enjoyable. Their effective teaching style, clarity of explanation, and enthusiasm created a positive learning environment. The teacher's teaching method fostered active learning by incorporating real-world examples to connect their discussions which can be easier to students to enhance their understanding of the subject. Teacher's expertise created a positive learning experience that was both enjoyable and inspiring for the students.

Table 4.12

Question	Coding	Frequency
12. What are your opinions on the way the teacher explains the different concepts in entrepreneurshio subjects?	a. Clarity and effectiveness of teaching	a.7
	b.Engaging and Interactive Learning	b.1
	c.Teacher's Communication style	c.1
	d.Suggestion for improvement and satisfaction	d.2

Table 12 results of perceptions about how the teacher's teaching style to be effective, teacher explained concepts clearly and effectively, making the discussions easy to grasp. Which can help the Grade 12 ABM students to grasp the concepts. The teacher also employed real-life examples, which made the subject more matter relatable and helped students connect the concepts. The communication was eloquent and direct to the point making the discussions concise and comprehensible.

Table 4.13
Grade 12 ABM students recommendations for improvement in enhancement of learnings

Question	Coding	Frequency
13. How do you think entrepreneurship subjects could be improved to better support your learning?	a.Hands-on learning and activities	a.5
	b.Instructional approach and passion	b.2
	c.Time management and Practical	c.2

	skills	
	d.Course Management and Inclusivity	d.3

Table 13 results, students from Grade 12 ABM responses indicate a strong desire for a more hands-on and real-world focused approach to Entrepreneurship. The students want more opportunities to apply the concepts they are learning through simulations, practical exercises, and guest speakers. Students also desire to be more passionate, teach specific skills like time management, and improve subject management like fair groups assignments. Lastly, students suggest a Tagalog or Filipino version of the subject which highlights the importance of accessibility.

table 4.14

Question	Coding	Frequency
14. What do you think are the strengths and weaknesses in the content of entrepreneurship subjects?	a.Practical skills and Mindset	a.3
	b.Interest and Relevance of Entrepreneur	b.4
	c.Lack of Hands-on application	c.2
	d.Difficulty and engagement	d.4

Table 4.14 shows the students' requests for a balance between theoretical knowledge and practical application, the importance of fostering interest in entrepreneurship, and the need to address challenges related to difficulty, engagement, and the scope of the curriculum.

Table 4.15
Grade 12 ABM students recommendations for subjects's content and teaching methods

Question	Coding	Frenency
15. What are your recommendations for the subject's content and teaching methods?	a.Real-world application and experiential learning	a.5
	b.Engagement and active learning	b.3
	c.Content Delivery	c.3
	d.Preparation and prior know life	d.2

Table 4.15 results of recommendations of Grade 12 ABM students for the subjects content and teaching methods, results the students desire for a more practical and engaging learning experience. Students from Grade 12 ABM want to go beyond lectures and participate in activities that allow them to apply their knowledge in real-life scenarios.

4. CONCLUSION AND RECOMMENDATION

This chapter presented the conclusions based from the analysis of the data gathered, addressing the influence of the entrepreneurship education on Grade 12 Accountancy, Business, and Management (ABM) students on entrepreneurial intentions followed by the recommendations for future research.

4.1 *Conclusions*

5.1 Students perceptions and Experiences

The study has found evidence that entrepreneurship has an impact on students behavior and perceptions of its effects. They also found evidence that entrepreneurship subjects assume an impact on the entrepreneurial intention of young entrepreneurs. (Helena, et al 2016)

Students generally held a positive perception regarding the entrepreneurship subject, anticipating it to focus on practical aspects of starting and managing business. Students expected the subject to cover business fundamentals, explore challenges, and enhance their management skills. Students found the entrepreneurship subject to be both challenging and enjoyable. They valued hands-on activities like product making and business plan development, which fostered their understanding on entrepreneurial processes

Students identified various challenges, including the complexity of financial management, the extensive research required for business plans, and the time-consuming nature of some activities. Additionally, researchers found the memorization of technical terms and the need for financial resources for their product proposals.

5.2 Effect on Personal Growth and Development

Previous studies determine that the entrepreneurial values and the total benefits offered are instrumental to firm performance. (David, et. al 2013) Entrepreneurship research has emerges as a distinct field of study with a growing community of scholars dedicated to it (Per, et al 2017)

The entrepreneurship subject positively impacted student development, improved critical thinking skills, problem-solving abilities, and time management efficiency. They gained valuable insights into preparing for the corporate world.

The subject had a mixed impact on Grade 12 Accountancy, Business, and Management (ABM) students' perspectives about starting a business. While some expressed increased interest in entrepreneurship, others, recognizing the associated challenges, reconsidered their aspirations.

5.3 Teacher’s Performance and Teaching Practices

Teaching entrepreneurship is a challenge for most of the professors from non-business faculties, where the development of soft skills should be combined with a proactive approach of changing mindsets and attitudes. (Catalin & Romita, 2014)

The studies mostly aim to examine the attitudes, perceptions and views of students, teachers, or other educators regarding Entrepreneurship subject. There were a lot of study results highlighting the importance of entrepreneurship in teacher training. The biggest emphasis was laid upon methods, techniques, models or strategies used in entrepreneurship education. (Jaana, 2018)

Teachers in San Jose Academy demonstrated deep knowledge and passion for the subject, creating an engaging and enjoyable learning environment for the Grade 12 Accountancy, Business, and Management (ABM) Students.The Teacher also employed effective teaching practices, including clear explanations, and interactive learning activities. This teacher’s approach fostered active learning and promoted Grade 12 Accountancy, Business, and Management (ABM) students in understanding.

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The Impact of Tiktok Short-Form Video on Senior High Students' Purchasing Behavior in E-commerce

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Abstract: The study aimed to understand the impact of TikTok short-form videos on Senior High Students' purchasing behavior in e-commerce. Information from 30 participants was gathered using a qualitative research method and availability sampling used in the study, with data being collected through surveys. The findings reveal that Senior High Students frequently watch TikTok promotional videos, especially for makeup, clothing, and skincare products, but make purchases infrequently. While most students rarely buy through TikTok Shops, those who do tend to spend modestly each month. Factors like positive reviews, price, and product quality heavily influence their purchasing decisions. Many students believe TikTok videos have a stronger impact on their buying habits than traditional advertising. Price, ease of use, and trust are crucial features when shopping on TikTok, and influencer collaborations, alongside informative content, play a significant role in shaping students' perceptions of product quality. Furthermore, the study suggested that future research can provide a more comprehensive and nuanced understanding of the relationship between TikTok and the purchasing behavior of senior high students.

Key Words: Tiktok; Short-Form Video; Senior High Students; Purchasing Behavior; E-commerce

1. INTRODUCTION

1.1. Background of the study

In recent years, short-form videos have become a dominant form of user-generated digital media. Concerns have arisen regarding the binge-scrolling of short-form videos and its potential impacts on the well-being of young audiences. According to Jarboe (2022) Students are more likely to remember and connect with a brand's message when presented through a visually engaging video, rather than static text or images.

Social media advertising plays a key role in improving people's purchasing behavior. It is a strong predictor and performs a very important role in consumer purchasing behavior. Sankar (2019). Senior high school students are greatly influenced by TikTok trends and marketing, with brands targeting

this age group due to their active engagement on the platform. Local brands often adjust their advertising strategies to match regional cultural preferences, using short-form video content to appeal to students.

According to Hussain & Iqbal (2021), social media has a strong impact on the purchasing behaviour of students. They find it easy to explore social media for seeking information regarding any product or service. It helps consumers make a decision about purchasing sometimes; attractive content on social media drags consumers attention towards a product.

Social media has fundamentally transformed the advertising landscape, offering advertisers unprecedented opportunities to reach, engage, and convert target audiences. Its contribution to advertising is undeniable. It offers targeted reach, enhanced engagement, measurable results, and a direct line to consumers.

According to Kirindoh (2023) TikTok has been working on integrating e-commerce features directly into the platform, such as shoppable links and in-app shopping, allowing users to buy products without leaving the app. Which offers a new and seamless way of buying products online, making it more convenient and faster than traditional methods.

Social media has become an integral part of students' lives, influencing their daily activities, including their purchasing habits. Its pervasive influence extends to various aspects of their lives, including their purchasing behavior. It has a significant and multifaceted influence on students' purchasing behavior. It provides access to information, shapes preferences, and creates social pressure, all of which impact their buying decisions.

This study focuses on how TikTok, with its short-form video format, is changing the way of Purchasing Behavior to reach Generation Z (Gen Z). It aims to understand how Tiktok Short-Form Format impacts Senior High Students' Purchasing Behavior in E-commerce.

This topic holds significant importance due to Gen Z being a significant consumer group with a strong online presence, and TikTok is a massively popular social media platform, especially among them. Understanding how to leverage TikTok for marketing is crucial for businesses that want to connect with and influence this generation.

This study sets out to analyse how Generation Z’s buying behaviour is impacted by the favoured social media platform TikTok in relation to the information search process, as a transformation is indicated in how this next generation of consumers searches for information.

1.2. Statement of Objectives

The study aims to offer advice on helping senior high school students make effective purchasing decisions and understand

consumer behavior and awareness in TikTok shopping. It will help understand the effect of TikTok short-form videos on senior high students, their behavior and perceptions, and purchase intentions. Results will assist students in spreading awareness and deepening their consumer understanding through gained knowledge, and help future researchers by providing data for new research and enabling them to expand and offer new beneficial information.

The study sought to answer the question: What is the impact of Tiktok Short-Form Video on Senior High Students' Purchasing Behavior in E-commerce?

To address its overarching goals, the researchers investigated these specific questions:

1. What types of TikTok videos are most effective in driving purchases among senior high students?

2. Why do viral challenges and trends on TikTok lead to increased purchasing behavior among senior high students?

3. How does exposure to TikTok short-form videos featuring products influence senior high students' purchase intention and actual purchase behavior?

1.3. Significance of the study

The significance of this study lies in its potential to shed light on the growing influence of TikTok on the purchasing behavior of senior high school students,a demographic increasingly active in e-commerce. The results of this study will benefit the following:

For Educators. The study can help educators understand the impact of TikTok on students' decision-making processes, particularly in relation to online shopping. By understanding the impact of TikTok on purchasing behavior, educators can better prepare students for the rapidly changing world of e-commerce, equipping them with the skills and knowledge to navigate this landscape responsibly. This study will help educators understand the powerful influence of platforms like TikTok on young consumers. The study can provide educators with valuable insights into the factors that influence purchasing decisions among senior high school students.

For Business owners, They can create TikTok content that appeals to high school students and makes them want to buy products. By creating engaging content that appeals to this demographic, businesses can see a rise in online purchases from high school students.

For Researchers and Policymakers, Knowing how TikTok impacts students' shopping habits can help policy makers make better decisions to protect young people, educate them, and support a healthy online

marketplace. This study can help policymakers make informed decisions about how to regulate online platforms and protect young consumers.

1.4. Scope and Delimitations

The study will focus on senior high school students in San Jose Academy, Navotas City. The research will investigate the relationship between exposure to TikTok short-form videos related to products or brands and the students' subsequent purchasing behavior in e-commerce.

This study will not examine the impact of other forms of media (e.g., television, video games). It will not include data from rural areas or teenagers outside the specified age range.

2. METHODOLOGY and RRL

2.1. Review Related Literature

This chapter provides a literature review, synthesizing key findings from journals, articles, and other sources to inform the research.

According to Varghese & Agrawal (2021) who studied the "Impact of Social Media on Consumer Buying Behavior", discussing social media is the best way to entice the customers towards products and services. The marketing methods should be designed in such a way that could attract the various age and class of the customers. They also found that social media influencers make a positive impact on the buying decision process of the customers that are more attracted towards the content that shows discounts, promotions and influencers because it keeps that ability to change customers' mindset and their perception. Consumers, influenced by Social media, tend to spend four times more than their normal purchase and the attraction towards the products is so high that they buy it on the same day using Social media. Thus, social media is effective and cheap which can make a direct interaction with customers in an effective way to generate more leads and sales.

The TikTok application has made a significant contribution to digital marketing. TikTok has been seen as an attractive marketing feature that can ease of use, a simple design, good performance, and other benefits that might attract consumers to purchase online through Tik Tok digital marketing that can influence purchase decisions among students. The study discovered that most respondents are influenced by the digital marketing features in TikTok, which causes them to make a pur-chase decision in order to fulfil their needs and buying behaviour. Informants generally agreed that TikTok is more user-friendly, accessible, informative, flexible, and has good customer service when discussing the digital marketing features that can impact students' purchasing decisions. The students intend to purchase products through digital marketing features in TikTok platforms because they are more influenced

by peers, friends and environment and the other finding they are influenced by review and recommendation from video content (Martini, Suardhika & Dewi, 2022).

The Gen Z consumers' impulsive buying behaviour during live streaming by examining the influence of specific factors such as time pressure, price promotions, and interaction. The findings indicated that the feeling of urgency does have a significant impact as a mediator in terms of the relationship between time pressure and consumers' impulsive buying behaviour during live streaming. Moreover, the understanding of the emotional mediators can help marketers design targeted strategies that evoke feelings of urgency, excitement, and enjoyment to enhance impulsive buying behaviour among Gen Z consumers (Omar & Dewar, 2024).

Short videos have limited time and it is impossible to show all these elements perfectly. Many features of short video ads have a positive and significant impact on consumers' impulse purchase intention. In order to successfully translate this intention into purchase behavior, it is best to include a way to obtain such products in the short video, or add a purchase link below the video, because when the audience has a certain level of trust in the product and video, they will naturally assume that the store's products are of high quality, as the video shows. It is also important to note that access to such products must be simple, quick and reliable. Otherwise, the audience needs to jump to another page to search for such products, which is easy to be transferred by other information in the search process, killing consumers' purchase desire and causing the loss of customers (Huihao & Yating, 2023).

According to Dihn et al. (2024) they found that Vietnamese students' impulse buying behavior on TikTok Shop using an online questionnaire distributed between January and March 2024. Their findings offer valuable insights for businesses currently operating on or considering joining the platform. Furthermore, it facilitates broader comparative studies across different regions or shopping platforms.

According to Arellano, et al. (2022) investigated a direct impact of social media marketing strategies on consumers buying behavior specifically among Filipinos. They found that Social media is a social phenomenon as it is an event that changes the way people interact or behave. It evolved from a tool of communication into becoming a marketing channel that helps businesses promote and advertise their products. However, due to the rising consumption of people on social media, they become addicted to or reliant on it thus, unconsciously altering their buying habits. Especially for students, as their lives revolve around social media and gadgets, they are highly affected by it, especially in their purchasing behavior. Due to the pandemic, they have become impulsive buyers and spend most of their time looking at various products that are not necessity but given to them by advertisements.

Advertising nowadays is challenged with creating content that can capture Gen Zs. They are consumers with shrinking attention spans and complicated content preferences and are considered financial experts, which pushes the need for newer, unique methods of advertisements, given the distinct attitudes they have toward other generations. Since most of the consumers that are highly engaged in social media tend to be Gen Z, the generation is a critical demographic for advertisers to target, especially now that they are projected to soon be the largest consumer group and biggest spender in the following years (Moreno, et al., 2023).

According to New & Lun (2023) discovered that the consumers exhibit higher levels of trust and satisfaction in product videos with lower prices, leading to increased purchase likelihood. The quality of a product's short video can significantly impact a consumer's trust and satisfaction, influencing their likelihood to make a purchase. They also discovered that a product's usefulness is closely linked to a consumer's sense of pleasure and satisfaction when viewing a short video on the product information display.

According to Araujo, et al. (2022) they examined Tik Tok's appeal to Generation Z continues to be stronger as it provides a space that allows them to relate with others and express their emotions. They also discovered that Brands and businesses must maximize this opportunity to showcase their offerings through relevant, timely, and relatable short-form video advertisements on TikTok, as Generation Z is passionate and vocal about their interests and preferences. Moreover, they can say that businesses planning to utilize TikTok as their new platform for advertising must focus on the emotional involvement that they can offer to consumers.

The most common digital shopping applications used by online shoppers are Shopee, Lazada, and TikTok. He found that most consumers have resorted to online shopping since the pandemic because they have observed that many are doing such. Further, because of its convenience. Most people are busy, and shopping online has been a way to cope up with this. They know shopping online will save them time. Thus, they follow what they see as convenient. Consumers won't have a hard time finding certain products because the least online product endorsers have a bearing on their online shopping habits which is ranked 6th. Consumers are attracted to endorsers who share their personal experiences in using a certain product. Most especially if there is proof given. An example would most likely center on beauty products (Scolding, 2024).

2.1.1. Synthesis

Based on a review of the literature, this study synthesizes the growing influence of social media, particularly TikTok, on consumer buying behavior, especially among younger generations.

Social media platforms like TikTok offer unique opportunities for brands to engage with consumers, particularly through viral challenges and trends (Varghese & Agrawal, 2021). The rise of social media has led to increased consumption and impulsive buying behavior, especially among students who are heavily influenced by online platforms (Arellano, et al., 2022). High-quality short videos, especially those with lower prices, can significantly impact consumer trust and satisfaction, leading to increased purchase likelihood (New & Lun, 2023). Live streaming on platforms like TikTok creates a sense of urgency and time pressure, which can significantly impact impulsive buying behavior (Omar & Dewar, 2022). Students are influenced by reviews and recommendations from video content, making TikTok's short-form video format highly effective (Martini, Suardhika & Dewi, 2022).

This research explores how social media and online video platforms like TikTok influence Gen Z's buying habits. Studies show that social media ads and short videos, especially those with lower prices and genuine endorsements, can make Gen Z want to buy things. Researchers also found that TikTok is popular with Gen Z because it lets them connect with others and express themselves, making it a good place for businesses to advertise if they focus on emotional connection. Online shopping has become even more popular since the pandemic due to its convenience.

2.2. Methodology

This chapter outlines the research methodology employed in the study. It details the study's setting, design, target population, and sample selection. The data collection instrument is described, along with the methods implemented to ensure its validity and reliability.

2.2.1. Research Design

The researchers used a qualitative design. Data for this qualitative study on the impact of TikTok short-form videos on senior high students' e-commerce purchasing behavior was gathered using self-administered questionnaires directly distributed to a convenience sample of senior high students. The questionnaires employed open-ended questions to explore students' experiences with TikTok-influenced purchasing decisions, focusing on the types of products purchased, the influence of specific video content, and their overall perceptions of the relationship between TikTok and their online shopping habits. Analysis focused on identifying recurring themes and patterns within the collected responses to understand the qualitative aspects of this influence.

2.2.2. Population Sampling

This study explores how TikTok short-form videos influence the online shopping habits of senior high school students. Because it's difficult to reach every senior high student, the research employs

availability sampling, a type of non-probability sampling. This method involves gathering data from students who are easily accessible and willing to participate. The study specifically targets senior high students who use TikTok and engage in e-commerce. While this method might not perfectly represent all senior high students, it provides a practical way to gather initial insights into the relationship between TikTok videos and purchasing behavior within a convenient sample.

2.2.3. Research Instrument

A survey questionnaire was used as the primary research instrument to investigate the impact of TikTok short-form videos on senior high school students' purchasing behavior in e-commerce. A structured survey questionnaire served as an effective research instrument. This approach allowed for the systematic collection of data regarding students' TikTok usage patterns, their interactions with content, and subsequent purchasing behaviors.

2.2.4. Data Gathering Procedure

This research investigated the impact of TikTok short-form videos on the purchasing behavior of senior high school students at San Jose Academy. Data was collected through directly distributed survey questionnaires using an availability sampling method. The questionnaire gathered demographic information, including age, gender, grade level, average daily TikTok usage time, and frequency of online shopping. The survey also included questions designed to explore students' exposure to TikTok promotional videos, their purchasing habits on e-commerce platforms, factors influencing their purchasing decisions, and their perceptions of TikTok's influence compared to traditional advertising.

3. RESULTS AND DISCUSSION

This chapter presents the findings of the study, which explored the Senior High Students' Purchasing Behavior in E-commerce regarding the Impact of Tiktok Short-Form Video. The research questions guiding this study were:

a. What types of TikTok videos (e.g., reviews, hauls, influencer marketing, product demos) are most effective in driving purchases among senior high students?,

b. Why do viral challenges and trends on TikTok lead to increased purchasing behavior among senior high students?

c. How does exposure to TikTok short-form videos featuring products influence senior high students' purchase intention and actual purchase behavior?

Data was collected through survey questionnaires from 30 participants. The analysis revealed several key themes related to Tiktok Short-Form Video and Purchasing Behavior of Senior High Students. The

following sections will delve deeper into each theme, providing rich descriptions and illustrative quotes from the participants.

Table 1. Frequency of watching promotional videos on TikTok

Question	Common Theme	Code Frequencies
How often do you watch promotional videos on TikTok?	a. Everyday b. Quite often c. Once	a. 16 b. 6 c. 5

In question 1, which explores how often students watch promotional videos on TikTok, there were three (3) common themes: Everyday had the highest frequency as it had 16 mentions, Quite often had 6 mentions, and Once had 5 mentions.

Table 2. Types of Products in promotional videos

Question	Common Theme	Code Frequencies
What types of products do you usually see in TikTok promotional videos?	a. Makeup Cosmetics b. Clothing c. Skincare d. Accessories e. Food f. Toys g. Electronics h. Household Materials	a. 12 b. 11 c. 9 d. 3 e. 2 f. 2 g. 2 h. 1

Question 2, focusing on the types of products students usually see in TikTok promotional videos, there were eight (8) common themes: Makeup/Cosmetics had the highest frequency as it had 12 mentions, Clothing had 11 mentions, Skincare had 9 mentions, Accessories had 3 mentions, Food and Toys both had 2 mentions, and Electronics and Household Materials both had 1 mention.

Table 3. Frequency of using Tik Tok

Question	Common Theme	Code Frequencies
How often do you purchase or use a TikTok shop?	a. Rarely b. Once c. Everyday	a. 12 b. 7 c. 6

For Question 3, which explores how often students purchase or use a TikTok shop, there were three (3) common themes: Rarely had the highest frequency as it had 12

mentions, Once had 7 mentions, and Everyday had 6 mentions.

Table 4. Expense Tracking on Tiktok

Question	Common Theme	Code Frequencies
How much do you typically spend on items you've seen on TikTok in a month?	a. Ranging from 100 to 600 pesos b. 1k to 5k pesos	a. 17 b. 7

For Question 4 which explores how much students usually spend on items they've seen on TikTok in a month, there were two (2) common themes: Ranging from 100 to 600 pesos had the highest frequency as it had 17 mentions, and 1,000 to 5,000 pesos had 7 mentions.

Table 5. Factors to consider before buying a product on Tiktok

Question	Common Theme	Code Frequencies
What are the factors that you consider before buying a product in a TikTok shop?	a. Reviews b. Price c. Quality d. Discounts e. Brand Reputation f. Credibility	a. 19 b. 13 c. 9 d. 3 e. 1 f. 1

Question 5 delves into what factors that students' consider before buying a product. The common factor mentioned in reviews was price, with 19 mentions, followed by quality, which was mentioned 9 times. Other factors considered before buying a product included discounts which had 3 mentions, brand reputation had 1 mention, and credibility had 1 mention. Different people prioritize different factors based on their personal preferences. A purchase decision is influenced by various elements, not just one. For example, some may prioritize price, while others focus on brand reputation. Depending on the type of product, one factor may be more important than others. For instance, if it's a luxury item, brand reputation matters more, while for everyday items, price or discounts may be prioritized.

Table 6. Frequency of purchased product demonstrated in Tiktok videos

Question	Common Theme	Code Frequencies
How often do you purchase	a. Sometimes b. Very	a. 17 b. 6 c. 5

products you've seen advertised or demonstrated in TikTok videos?	c. Often Not often	

For question 6, explore how often do students' purchase products they've seen in TikTok. The highest frequency was for Sometimes, with 17 mentions. Very often was mentioned 6 times in relation to purchasing a product that was seen, while Not often was mentioned 5 times. This applies to people who occasionally buy products they see on TikTok but not regularly. This is for those who frequently make purchases based on TikTok ads or demonstrations. This fits people who rarely or almost never buy products from TikTok promotions.

Table 7.

Question	Common Theme	Code Frequencies
Do you believe TikTok promotional videos have a stronger impact than traditional advertising methods in e-commerce?	a. Yes b. No c. Some times d. Both	a. 21 b. 3 c. 1 d. 1

Question 7, explores If do the students' believe that TikTok promotional videos have a stronger impact than traditional highest frequency of responses was Yes (21), indicating that users believe in their ability to engage others through short, visually promotional videos. Additionally, there were 3 mentions of 'No,' 3 mentions of Sometimes, and 1 mention for both. The effectiveness of TikTok promotions depends on the product, target audience, and marketing strategy. Some businesses may see success, while others may not. A combination of TikTok promotions and traditional advertising might be the best approach, as different methods can complement each other.

Table 8. Purchased product promoted on Tiktok

Question	Common Theme	Code Frequencies
Do you have any specific examples of a TikTok promotional video that led you to make a purchase decision?	a. Yes, Make-ups b. None c. Yes, Skincare d. Yes, Accessories e. Yes, Clothing f. Yes, Toys	a. 6 b. 5 c. 3 d. 2 e. 1 f. 1

For question 8, examine if students have a specific example of TikTok advertising purchasing decisions that have a significant impact, especially in industries with the highest frequency of mentions. Yes was mentioned the most in Make-up (6 times), followed by None 5 mentions, Skincare (3) mentions, Accessories 1 mention, Clothing 2 mentions in Yes, and Toys 1 mention in Yes. People have different experiences with TikTok promotions. Some may have made a purchase, while others haven't. But other people not familiar in kinds of product that they purchase.

Table 9. Purchased product regretted on Tiktok

Question	Common Theme	Code Frequencies
Have you ever regretted a purchase you made because of a TikTok trend?	a. None b. Yes	a. 16 b. 13

For Question 9 which explores if the respondents have regretted a purchase they made because of a TikTok trend, there were two (2) common themes: None had the highest frequency as it had 16 mentions, and Yes had 13 mentions.

Table 10. Features of Tik Tok shop influenced buying interests

Question	Common Theme	Code Frequencies
What features of TikTok Shop influence your buying interest?	a. Pricing b. ease of use c. Trust d. Social Media interaction e. Vouchers f. Collaborators	a. 10 b. 9 c. 8 d. 4 e. 1 f. 1

For Question 10, focusing on the aspects of what features of TikTok Shop influence their buying interest, there were seven (6) common themes: Pricing had the highest frequency as it had 10 mentions, Ease of use had 9 mentions, Trust had 8 mentions, Social Media Interaction had 4 mentions, and Vouchers and Collaborators both had 1 mention.

Table 11. Types of Tik Tok advertisement

Question	Common Theme	Code Frequencies
To what extent do you agree	a. Quality Awar	a. 6 b. 5 c. 4

that informative content, accessibility and influencer collaborations on TikTok impact your consumer decisions?	eness of a product b. Famous Influencers c. Features d. Quality e. Promote smaller businesses	d. 3 e. 1

For Question 11 which explores to what extent does the students agree that informative content, accessibility and influencer collaborations on TikTok impact their consumer decisions, there were five (5) common themes: Quality Awareness of a product had the highest frequency as it had 6 mentions, Famous influencers had 5 mentions, Features had 4 mentions, Quality had 3 mentions, and Promote smaller businesses had 1 mention.

4. CONCLUSION AND RECOMMENDATION

After collecting and analyzing data from informants, the researchers determined the driving purchases on the informants that are most effective in types of Tik Tok videos, the reason why the viral challenges and trends on Tiktok lead to increased their purchasing intentions, actual purchasing behavior, and the influence of exposure of Tiktok short-form videos featuring products.

This study of student TikTok promotional video consumption and purchasing habits revealed that most students watch promotional videos daily, primarily featuring makeup/cosmetics, clothing, and skincare products. While students frequently view these videos, they rarely make purchases through TikTok shops, with many reporting either no purchases or only a single purchase. Among those who do buy items seen on TikTok, monthly spending is typically a few hundred pesos, though some spend more.

Results show that the purchasing behavior of Senior High Students' driven by the most effective types of Tik Tok whenever they purchase is positive reviews, pricing, and considering the quality of the product as they often watch promotional videos on Tiktok everyday. They usually purchased Cosmetics, Clothing and Skincare, etc.

The investigation determined the factor on why Senior High Students' increased their purchasing behavior of their viral challenges and trends on Tiktok is they do believe that promotional videos have a stronger impact than traditional advertising in e-commerce, which is one of the factors why they purchased rarely or sometimes.

The survey revealed that price and quality are the top two factors consumers consider before purchasing a product, with price being the most influential. Regarding TikTok's influence on purchasing decisions, respondents most frequently answered "sometimes" when asked how often they buy

products seen on the platform, although "very often" was also a notable response. A majority of respondents believe TikTok promotional videos have a stronger impact than traditional advertising. Finally, when asked for specific examples of TikTok's impact on purchasing, makeup was the most cited category, followed by skincare and clothing, while some respondents stated that TikTok had no impact on their purchases.

The exposure of Tiktok on Senior High Students' purchasing behavior and intentions is that they agree that the features of Tik Tok greatly influence their attitudes and practices. This revealed mixed results regarding purchase regret, with nearly equal numbers of respondents reporting no regret and regretting purchases made due to TikTok trends. When asked about influential TikTok Shop features, price was the most frequently cited, followed by ease of use and trust. Regarding the impact of informative content, accessibility, and influencer collaborations, quality awareness was the most influential factor, followed by the presence of famous influencers and product features.

The study's authors suggested the following as a foundation for recommendations to impact tiktok short-form videos on students' purchasing behavior.

The study could be expanded to include various e-commerce platforms, such as Shopee, Lazada, or Amazon. This would allow researchers to examine how TikTok's impact varies across different platforms and their features.

This study only focuses on Senior High Students. Future researchers should include other age groups such as college students or young adults that would provide a more comprehensive understanding of TikTok's influence on purchasing behavior across different generations.

Future studies could compare the purchasing behavior of students exposed to TikTok with a control group that does not use the platform. This would help isolate the specific impact of TikTok on purchasing decisions.

Future research could focus on specific product categories, such as fashion, electronics, or cosmetics

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UNDERSTANDING BUSINESS CHALLENGES OF FISH VENDORS IN NAVOTAS CITY

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Abstract: The fishing industry is a vital part of Navotas City's economy, with 70% of its population relying on fishing for their livelihood. Many residents rely on fish vending as the primary source of income, contributing to the city's bustling seafood trade. Fish vendors face numerous challenges that impact their business and livelihoods. This study aimed to understand the challenges faced by fish vendors in Navotas city and propose solutions to enhance their business conditions and sustain their role in the local economy. The researchers used qualitative research and a phenomenological approach through semi-structured questionnaires to interview fifteen (15) fish vendors in navotas city that consists of twelve (12) questions. The findings revealed various challenges faced by fish vendors, including low sales, bad weather, exhaustion, police arrest, debts, competitors, and high prices. Despite these challenges, fish vendors exhibited resilience and coping mechanisms, such as borrowing money, finding alternatives, patience, and acceptance. The study concludes that this is beneficial for fish vendors to clarify their challenges and to be prepared in the future, for consumers to inform if the challenges of fish vendors affect the price and cleanliness of the seafoods, and for future entrepreneurs to guide them in pursuing their career. The researchers recommend that the government should provide financial support and subsidies to fish vendors to help them expand their businesses and reduce market price fluctuations. Additionally, providing access to affordable fish sources can help establish their business as a trusted source for fresh and affordable seafood products.

Key Words: fish vendors, challenges, livelihood, coping mechanism, business,

1. INTRODUCTION

1.1 Background of the study

The fishing industry is a vital part of Navotas City's economy, with 70% of its population relying on fishing for their livelihood. Many residents rely on fish vending as the primary source of income, contributing to the city's bustling seafood trade. Fish vendors face numerous challenges that impact their business and livelihoods. This study aimed to understand the challenges faced by fish vendors in Navotas city and propose solutions to enhance their business conditions and sustain their role in the local economy. The researchers used qualitative research and a phenomenological approach through semi-structured questionnaires to interview fifteen (15) fish vendors in navotas city that consists of twelve (12) questions. The findings revealed various challenges faced by fish vendors, including low sales, bad weather, exhaustion, police arrest, debts, competitors, and high prices. Despite these challenges, fish vendors exhibited resilience and coping mechanisms, such as borrowing money, finding alternatives, patience, and acceptance. The study concludes that this is beneficial for fish vendors to clarify their challenges and to be prepared in the future, for consumers to inform if the challenges of fish vendors affect the price and cleanliness of the seafoods, and for future entrepreneurs to guide them in pursuing their career. The researchers recommend that the government should provide financial support and subsidies to fish vendors to help them expand their businesses and reduce market price fluctuations. Additionally, providing access to affordable fish sources can help establish their business as a trusted source for fresh and affordable seafood products.

1.1 Statement of objectives

This study aimed to understand the business challenges faced by fish vendors in Navotas City. The researchers aimed to identify and examine the challenges encountered by these vendors. With these objectives, the study would offer a good understanding of the obstacles that fish vendors face and to contribute to the development of practical solutions that can improve their business conditions and support their continued role in the local economy.

It aims to answer the question: What are the main challenges that fish vendors in Navotas City face?

1. What is the demographic profile of fish vendors who faced the challenges:

   1.1 Name (Optional)

   1.2 Age

   1.3 Gender

2. How did they overcome the challenges they faced?
3. How do these challenges impact their operations and profitability?

1.3 Significance of the study

The purpose of this study is to understand the business challenges of fish vendors in

Navotas City. The researchers anticipate that the study's final output will be beneficial to various fish vendors. This study may help numerous organizations in recognizing the difficulties faced by fish sellers in Navotas City.

The benefactors of this study are the following:

Fish Vendors: With the help of this study, the fish vendors in Navotas City aim to understand and clarify their challenges they are going through in selling fish, and to be prepared for the future challenges they may experience again.

Consumers: With the help of this study, this will benefit the consumers by understanding if the challenges experienced by fish vendors affect the quality, price, and cleanliness of the seafood.

Future entrepreneurs: This study is beneficial for future entrepreneurs to be aware of their future business challenges in pursuing their career.

Future researchers: This study helps future researchers to fill up the research gap of our study for better findings.

1.4 Scope and Limitations

This research is conducted at San Jose Academy to understand the business challenges of fish vendors in Navotas City.

This study will focus only on fish vendors who are experiencing business challenges in Navotas City. This research will look into the challenges that fish vendors encountered, on how they manage to overcome the challenges and how the challenges affect their profit. It also includes how often they encountered such challenges. This study would be done through in-depth interviews with the target population that are involved in working as fish vendors in Navotas City.

This research will not address other issues that are not related to the experiences of fish vendors in facing their business challenges. This research will not answer a question such as having a contribution to the economy on a larger scale.

2. METHODOLOGY

2.1 Review of Related Literature

This chapter presents a review of relevant studies and literature that provide insights into the business challenges faced by fish vendors. It serves as a guide for the researchers, outlining key ideas, concepts, and findings related to the study.

Navotas City, known as the "Fishing Capital of the Philippines," is home to many fish vendors who encounter various challenges, such as financial constraints, supply chain issues, market competition, and government regulations. By examining previous research, this review aims to highlight these difficulties and explore possible solutions to support and sustain their businesses

Bowen et al. (2009) highlight the critical role of Small and Micro Enterprises (SMEs) in promoting economic growth, particularly through job creation. In Kenya, SMEs contributed over 50% of new jobs in 2005, though many faced rapid failures due to challenges like competition, limited access to credit, cheap imports, and insecurity. The study emphasized that while financial constraints remain a significant barrier, improvements in credit access and business training are essential for SME success. Vendors often use strategies such as fair pricing, product diversification, and superior customer service to survive in a competitive market. These insights underline the importance of financial access and managerial skills for business sustainability.

Valencia et al. (2021) conducted research on eco-labels and their effectiveness in communicating sustainable fishing practices to consumers. The study suggests that eco-labels are a reliable source of information that signals the health and recovery of fish stocks. When accurately reflecting the status of fish populations, eco-labels can influence consumer choices, fostering more responsible seafood consumption. This is particularly relevant to fish vendors who may be navigating the growing demand for sustainably sourced seafood in an increasingly eco-conscious market.

El-Azzazy (2019) explores the challenges faced by women fish vendors in Fayoum, Egypt, including harassment, violence, limited access to credit, and cultural restrictions. Despite these barriers, the study also identifies opportunities for growth, such as the formation of savings groups to provide capital for expanding businesses. The study underscores the need for policy reforms to address gender-specific constraints and improve the economic conditions of women fish vendors, which could have positive effects on the wider community.

Maswita and Arifa (2024) examined the challenges faced by vendors at the Merdeka Fish Market in Tanjung Tiram, Batubara Regency. Issues such as poor infrastructure, fluctuating prices, limited technology access, and logistical problems in sourcing and transporting fresh fish were identified. Despite these challenges, the study highlights opportunities for improvement, including better market management, infrastructure development, and government support to ensure the long-term sustainability of fish vendors.

Velava et al. (2015) focused on sustainability challenges within business practices, particularly in resource allocation, ecological impact reduction, and partnerships among businesses. Their findings emphasize the role of policy structures and government assistance in overcoming these challenges, with companies adopting strategies such as waste reduction and energy efficiency to meet sustainability goals. This highlights the importance of government support in helping businesses, including fish vendors,

integrate sustainable practices while achieving financial success.

Bermas et al. (2023) investigated the challenges faced by fish vendors in Iriga City, Philippines, where key problems included inadequate infrastructure, poor sanitation, limited access to storage and capital, and fluctuating fish prices. Competition from larger suppliers and the lack of government support also affected profitability. The study suggests that improvements in market organization, better waste management practices, and increased access to credit and skills development could enhance the working conditions for fish vendors.

Bucal et al. (2020) reviewed the challenges faced by SMEs in the Philippines, focusing on limited access to financial resources, inadequate infrastructure, and weak market connections. Many small businesses, including fish vendors, struggle with obtaining credit and integrating modern technologies, limiting their ability to grow and compete. The study suggests that improving government policies, increasing access to funding, and offering capacity-building programs could help strengthen the competitiveness and viability of small enterprises.

Barte (2012) studied the importance of financial literacy for the success of small businesses, particularly focusing on fish vendors in Cebu City, Philippines. The study found that many vendors struggled with basic financial management skills, such as budgeting, saving, and planning for future growth. The lack of financial literacy led to poor decision-making and resource wastage, undermining the long-term sustainability of their businesses. The research emphasizes the need for financial education and training to improve vendors' financial practices and business outcomes.

Libot et al. (2024) explored the distribution and availability of freshwater fish in traditional markets in Butuan City, Philippines. The study reveals the significance of freshwater fish in local food security and income generation. It also identifies challenges such as overfishing, unsustainable fishing practices, and environmental changes affecting fish populations. The authors recommend improving market infrastructure, regulating fishing practices, and raising awareness about sustainable consumption to address issues faced by both vendors and consumers.

Bayson et al. (2022) studied the awareness of fish vendors in Baybay City, Leyte, Philippines, regarding the use of fish by-products for local fish silage production. Their findings show that fish waste, such as heads and bones, is often underutilized due to vendors' lack of knowledge and infrastructure. The study suggests that educating vendors about the potential uses of fish waste and improving waste management could contribute to reducing environmental impact and enhancing resource efficiency in the fish trade.

2.1.1 Synthesis

The reviewed literature explores various challenges and opportunities faced by fish vendors, both locally and internationally, highlighting issues ranging from financial constraints to sustainability concerns and environmental, emphasizing financial constraints, supply chain issues, competition, infrastructure deficiencies, and government regulations. Studies on Small and Micro Enterprises (SMEs) globally, such as those by Bowen et al. (2009) and Maswita and Arifa (2024), show that limited access to credit, weak business management skills, and inadequate market support hinder business sustainability. Similarly, El-Azzazy (2019) and Velava et al. (2015) emphasize the importance of government intervention, infrastructure development, and resource management in addressing business sustainability issues.

Bermas et al. (2023) and Bucal et al. (2020), confirm that fish vendors in the Philippines face similar difficulties, including poor infrastructure, lack of financial resources, and intense market competition. Additionally, Barte (2012) highlights the significance of financial literacy in ensuring business success, suggesting that many small vendors struggle with budgeting and investment decisions. Libot et al. (2024) and Bayson et al. (2022) further discuss issues related to fish supply sustainability, environmental concerns, and the potential for utilizing fish by-products to minimize waste and improve economic opportunities.

Overall, the literature suggests that fish vendors' success depends on a combination of financial support, improved market conditions, business training, infrastructure development, and policy reforms. Addressing these challenges through proper interventions and sustainable business practices can enhance the profitability and long-term viability of fish vending businesses, ensuring their continued contribution to the local economy and fisheries industry.

2.2. Methodology

2.2.1. Research Design

This qualitative research will use the phenomenological method that will understand the challenges of the fish vendors inNavotas City. The main purpose of this study is to have in-depth knowledge and insights on the challenges of the fish vendors; and knowing what strategies they use to overcome those challenges.

According to Neubauer, et al. (2019), phenomenology is a powerful research strategy that is well suited for exploring challenging problems.

Furthermore, phenomenological research methods will collect the opinions of fish vendors in Navotas City on what are the challenges they experience and their

observation on what strategies they make to cope with their challenges.

2.2.2. Population Sampling

The target respondents of this study are those people who work as fish vendors in Navotas City with a total population of fifteen (15). In order to determine who participated in this study, the researchers employed a method known as random sampling methodology. The researchers select a group of individuals from a wider population using this method of probability sampling. They make sure that every individual of the population has an equal chance to be selected.

2.2.3. Research Instrument

The research instrument for this study is an interview guide designed to explore the business challenges faced by fish vendors in Navotas City. Data will be collected through face-to-face, semi-structured interviews, where the interviewer will ask questions directly to vendors from various market areas, ensuring diverse representation. Participation is voluntary, and vendors' personal information will be kept confidential. The interview guide aims to gather in-depth insights while maintaining ethical standards and ensuring that vendors understand the purpose of the study and their right to withdraw at any time.

2.2.4. Data Gathering Procedure

In order to collect data from the respondents, the researcher will do a personal interview. The researchers will ask for the adviser's comments and suggestions. After the needed validation, the researchers will conduct a data gathering procedure through which the interviewer reads the questions to the respondent in a face-to-face setting and records the answers.

The method will allow researchers to specifically target fish vendors from different market areas, ensuring diversity in terms of market size and types of vendor. In this study, data collection will be conducted through face-to-face interviews where researchers will visit fish markets in Navotas City to engage directly with vendors.

Moreover, the researchers will guarantee that the personal information of each responded will remain anonymous and all personal data will be kept confidential. Vendors will be informed about the purpose of the study before the interview, ensuring they fully understand their role in the research. Additionally, participation will be completely voluntary and vendors will have the right to withdraw at any point without any consequences.

3. RESULTS AND DISCUSSION

This chapter presents, analyzes, and discusses the data collected by the researchers during the data-gathering process. The study focuses on understanding the business challenges faced by fish vendors in Navotas City. To obtain relevant and accurate information, the researchers utilized the interview method as the primary data collection technique.

Table 1. Age of respondents

Question	Common themes	Code frequency
Age	1. 41-49 years old 2. 56-71 years old 3. 32-39 years old 4. 24-29 years old	1. 6 2. 4 3. 3 4. 2

Table 1 shows the ages of the fish vendors in Navotas City ranging from 24 to 71 years old, reflecting a diverse group with varying levels of experience and perspectives. This diversity can influence their approaches to their business, including service, knowledge, and adaptability to market changes. The age distribution among fish vendors can also impact their income levels. For instance, younger vendors might be more open to adopting new marketing strategies, potentially leading to higher earnings. Meanwhile, older vendors may rely on traditional methods, which could influence their income differently.

Table 2. Residence of fish vendors

Question	Common themes	Code frequency
Address	1. Tangos north 2. Bacog 3. Tangos street 4. A. Rodal Everlasting 5. San Roque 6. Paltok 7.Daanghari	1. 3 2. 3 3. 3 4. 2 5. 2 6. 1 7. 1

Table 2 shows that In Navotas City, the distribution of fish vendors varies across different areas. Tangos North, Bacog, and Tangos Street exhibit the highest concentration of fish vendors. Conversely, Paltok and Daanghari have the fewest fish vendors. San Roque and A. Rodal Everlasting is situated between these extremes, with moderate numbers of fish vendors.

Table 3. Years and months they start selling

Question	Common themes	Code frequency
When did you start selling fish?	1. 7-10 years 2. 13-16 years 3. 35-40 years 4. started selling since young 5. 8 months	1. 5 2. 4 3. 3 4. 2 5. 1

Table 3 showed the ages at which individuals begin their careers as fish vendors in Navotas City vary significantly, reflecting diverse personal circumstances, family traditions, and economic opportunities. Understanding the starting ages of fish vendors provides insight into the socioeconomic dynamics of Navotas City and highlights the adaptability of its residents in sustaining their livelihoods through the fishing industry.

Table 4. Location where they sell

Question	Common themes	Code frequency
Where do you sell fish?	1. Tangos market 2. Talipapa, San Roque 3. Talipapa, Bacog 4. Navotas Fish Port 5. Univeros	1. 5 2. 4 3. 3 4. 2 5. 1

Table 4 shows the locations are integral to the seafood supply chain in Navotas City, connecting fishermen, vendors, and consumers. They facilitate the distribution of fresh seafood, support local economies, and contribute to the rich culinary traditions of the region. The data shows Univeros, Tangos Market, Talipapa San roque, Navotas Fish Port, and Talipapa Bacog with Tangos market having the most operated location for fish vendors and Univeros with the least.

Table 5: Kind of fish they sell

Question	Common themes	Code frequency
What kind of fish do they sell?	1. Bangus 2. Tilapia 3.Galunggong 4. Assorted 5. Tinapa 6. Bisugo 7. Daing	1. 8 2. 6 3. 5 4. 4 5. 3 6. 2 7. 1

Table 5 shows that these kinds of Fishes are popular in Navotas City with Bangus being the most sold and Daing being the least. Each of these fish has their own roles in the local diet and market, with some being more affordable and others considered premium, making them popular across different income levels of fish vendors and in various Filipino dishes.

Table 6. Assistant on business

Question	Common themes	Code frequency
Do you work alone, or do you have family/employees who help you?	1. Family support and involvement 2. Solo work and independence	1. 9 2. 6

Table 6 shows that fish vendors include their nephew, daughter, and wife in selling fish. Others replied that they were selling

fish alone. But most of the replies of fish vendors about who is their assistant in selling fish is their husband. Having an assistant in selling is important to vendors because it helps them to efficiently manage sales, provide better customer service, and ultimately increase revenue

Table 7. Their earnings every day and every month

Question	Common themes	Code frequency
How much do you earn per day or per month from selling fish?	1. 300-500 a day 2. 1000-1200 a day 3. 10000-50000 a month	1. 10 2. 7 3. 3

Table 7 shows the differences in income reflect the scale and success of the vendors' businesses in Navotas City. A vendor earning a higher daily income or monthly total is likely more established, selling in a higher-demand area like Navotas Fish Port, and dealing in larger quantities of fish. Those earning less could be newer vendors or those in quieter areas, selling fewer types of fish or working part-time. The variety in incomes shows that the fish trade in Navotas is diverse, with opportunities for both small-scale vendors and larger, more successful businesses.

Table 8. Challenges of fish vendor

Question	Common themes	Code frequency
What is the biggest challenge you faced as a fish vendor in Navotas City?	1. Low sales and struggles 2. Weather and external factors 3. Physical and emotional struggles 4. Financial challenges and debt 5. Legal and regulatory issues	1. 6 2. 3 3. 3 4. 2 5. 2

Table 8 shows that the Fish vendors in Navotas City face a variety of challenges that impact their daily operations and overall profitability. These include fluctuating sales, physical exhaustion from demanding work, and the unpredictable nature of weather, which can disrupt the availability of fish and customer flow. Legal issues, such as operating without the proper permits, can also create significant financial setbacks. Additionally, debt, competition from other vendors, and the rising costs of fish products create pressure, making it harder for vendors to maintain stable profits and stay afloat in a highly competitive market. The combination of these factors creates a difficult environment for fish vendors, with some struggling to survive, while others adapt and overcome these challenges with resilience and creativity.

Table 9. Business Strategies

Question	Common themes	Code frequency
How do you address the challenges you face as a fish vendor?	1. Coping mechanism 2. Resilience and perseverance 3. Adaption strategies 4. Hope and positivity	1. 8 2. 3 3. 3 4. 3

Table 9 data reveals the resourceful ways in which fish vendors in Navotas City cope with the challenges they encounter. To overcome financial difficulties, many vendors resort to borrowing money from friends, family, or informal lenders. Others find alternative solutions, such as diversifying their products or exploring new markets. Notably, the majority of responses from the fish vendors indicate a resilient determination to continue selling, despite the slow sales and income. This persistence is a testament to their ability to adapt and find ways to survive, even in the face of adversity.

Table 10. Effect of challenges in their income

Question	Common themes	Code frequency
How are these challenges affecting your income?	1. Financial struggles 2. Low sales and business decline 3. Livelihood struggles 4. Economic conditions 5. Weather impact	1. 9 2. 9 3. 3 4. 2 5. 2

Table 10 presents the impact of these challenges on their income. They said that they were going bankrupt, they lost enough money to buy needs, and the most replies of fish vendors were low income. The challenges faced by fish vendors lead them to reduced sales, lower profits, and unpredictable income, ultimately affecting their financial stability and livelihood.

Table 11. Effect of challenges in their business

Question	Common themes	Code frequency
How does this affect your daily operations or sales?	1. Financial challenges and loss of earnings 2. Weather impact on business 3. Low income and business 4. Emotional and psychological impact	1. 4 2. 3 3. 2 4. 2

Table 11 shows According to fish vendors, they have sales challenges, the weather affects them, their capital issues increase,

and others are just accepting it and being resilient. But those who have the most replies of fish vendors are affecting their income and profitability.

Table 12. Supports that they received from the government

Question	Common themes	Code frequency
Have you received support or assistance from the local governmen t?	1. Government assistance and social programs 2. No assistance received 3. Pandemic related assistance 4. Limited support	1. 7 2. 4 3. 3 4. 2

Table 12 shows the support of the local government for fish vendors. They mentioned here that they received 4p's, municipal help, senior citizen membership, pandemic aid and fisherfolk aid. But the most replies of fish vendors are that they did not receive any assistance or support from the local government.

Table 12.1. Result of government support

Question	Common themes	Code frequency
If yes, is this enough? How did you use it?	1. Sufficiency of resources 2. Support for daily needs 3. Investment 4. Insufficiency	1. 5 2. 3 3. 2 4. 1

Table 12.1 shows Fish vendors said that the support of the local government has helped their livelihoods and investments, they use it in their daily needs and others are added to their investment, but there are still some fish vendors who did not receive enough goods to support their problems in their everyday life. Supporting fish vendors is important for local governments because they contribute to the local economy, food security, and community development.

Table 13. Fish vendor awareness on government

Question	Common themes	Code frequency
What is your call to the local government regarding this?	1. Economic concerns 2. Government assistance 3. Support for small vendors 4.Social and family concerns	1. 7 2. 6 3. 2 4. 2

Table 13 summarizes Fish vendors often face a range of challenges that affect their livelihood and the broader industry. Their requests to the government typically reflect a need for systemic changes to improve their conditions. Whether it's a reduction of price,

support, Job creation, unmet needs, or Fair treatment, by addressing these concerns, the government can help create a more sustainable, equitable, and thriving fish market, benefiting not only the vendors but also the larger community they serve.

4. CONCLUSION AND RECOMMENDATION

This chapter provides a detailed summary of the key findings from the data analysis presented in the previous chapter. The primary goal of this study was to investigate the challenges faced by fish vendors in selling seafood in Navotas City and to identify the strategies they employ to overcome these challenges. Specifically, the study examines the challenges experienced by fish vendors, as well as their various coping mechanisms and strategies used to address these challenges.

The researchers discovered that fish vendors in Navotas City encounter various challenges that hinder their ability to sell fish successfully. These challenges include struggling with low sales and profits, which can make it difficult for them to sustain their businesses. Bad weather conditions, exhaustion, and fatigue also pose significant threats to their daily operations. Additionally, the risk of getting caught by police for selling without permission, debts, competition from other vendors, and high prices of fish products further exacerbate their difficulties. Despite these challenges, fish vendors in Navotas City demonstrate impressive resilience and coping mechanisms. They find ways to overcome their financial struggles by borrowing money from others, finding alternative solutions, and exercising patience and strength. Moreover, they accept that challenges are an inherent part of their work and find ways to adapt and overcome them.

The challenges faced by fish vendors in Navotas City significantly impact their daily operations and sales. Specifically, they struggle with sales challenges, such as attracting customers and competing with other vendors. They also have to contend with the impact of weather, which can affect the availability and quality of fish products. Capital issues, including limited access to credit and financial resources, further exacerbate their difficulties. As a result, many fish vendors face income and profitability challenges, making it hard for them to sustain their businesses. Moreover, the experiences of fish vendors in Navotas City are deeply rooted in the social and cultural contexts of their work. The places where they sell, the strategies they employ, and their personal characteristics, such as gender and age, all influence their daily experiences and interactions. However, despite these unique challenges and experiences, the current local government support for fish vendors in Navotas City is insufficient. They do not receive adequate assistance to address their specific needs, leaving them to struggle and find ways to survive on their own.

This section must summarize the key findings of the study and describe potential areas for further research.

Considering the information that has been determined about the research problem, the researcher would suggest that the government should support innovation and sustainability in the fish vending industry, especially during times of economic uncertainty and market fluctuations. In order to attain this, listed here are some specific ways.

The government should provide financial support and subsidies to fish vendors so they can contribute to the overall ecosystem. Supporting fish vendors through financial assistance can help them expand their businesses, and by providing subsidies, the government should help reduce market price fluctuations for these small businesses to encourage stability and growth in the fishing economy. The government could prioritize those fish vendors who don't have permits yet. By doing this, it ensures that fish vendors will have the opportunity to sell fish in the markets legally. By having reliable access to affordable fish sources, the fish vendors can provide high-quality seafood and affordable products for their consumers; this can establish their business as a trusted source for fresh and affordable seafood products in the market.

As for future researchers, it is recommended to thoroughly investigate the struggles or 1.challenges encountered by the fish vendor more extensively. Also, they may investigate the impact of government policies and support programs about fish vending in order to have a deeper knowledge about the policies and programs about fish vendors and fish selling.

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The Role of Extracurricular Activities in Shaping Leadership Skills: A Study of Grade 11 Students of San Jose Academy

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Abstract: Extracurricular activities play a crucial role in shaping leadership skills by providing students with opportunities to develop key qualities of being a leader, like teamwork, decision-making, and collaboration. It also fosters personal values and interests. This study examined the effect of extracurricular activities on shaping leadership skills. Students who participate in extracurricular activities generally benefit from many opportunities, including having better grades and having a higher standard. Participants often learned skills like teamwork, collaboration, interaction, and leadership. This study aims to provide the effects of those activities on students, emphasizing the leadership skills that help them as students. The qualitative analysis highlights the significant impact of extracurricular activities in shaping leadership skills. It revealed how students' participation in extracurricular activities is influenced by factors such as interest, skills, time, and opportunities for improving abilities, learning lessons from past experiences, handling and managing time, and developing skills as a student. The researchers interviewed 15 Students from San Jose Academy so that they could relate with the topics. These findings proved that extracurricular activities are shaping and developing leadership skills and enhancing the potentials of every individual. The study also revealed different challenges faced by the students that affect how they manage extracurricular and academics. Additionally, the findings also highlighted the difficulties of students balancing academic and extracurricular activities which affects their leadership perceptions and the way they lead. This proves that these challenges contributed to the way students develop and enhance their mindset and skills. Overall, extracurricular activities not only help students gain knowledge and skills, it also develop students' mindset which they may apply in real life situations.

Key Words. *extracurricular activities; leadership skills; leadership abilities; personal growth; personal values*

1.INTRODUCTION

1.1 Background of the Study

The role of extracurricular activities in shaping leadership skills is essential for the individual, especially when you are approaching the college level or even the high school level. This study aims to determine the benefits or importance of extracurricular activities in developing leadership skills. The significance of this study lies in its potential to illuminate the importance of extracurricular activities in shaping leadership skills and exploring knowledge and support systems within the school environment.

In Russia, extracurricular activities play an important role in socialization and offer a powerful resource for personal development and acquisition of various soft skills that may not always be developed during classroom activities (Fakhretdinova et al., 2021). In the 21st century higher engineering education faces big challenges to prepare competent graduates in order that they are competitive in the global market, climate change and culture of sustainability. Educational policies are made to improve the quality of education,

where the main priority is to develop hard skills rather than soft skills.

In the Philippines, there are so many challenging times that they have faced, especially being a leader. Individuals need to have the skills of being a leader to be a good and wise leader (Villanueva et al., 2021). In these challenging times, especially during a pandemic when quality education is very much jeopardized, schools need leaders who will exercise the paramount leadership competencies or framework so as to be proficient, effective, competent leaders in being structural, human resource, political, and symbolic leaders

The impact of extracurricular activities in shaping leadership skills, highlighting how participation influences academic performance, personal growth, and career prospects (Premnath et al., 2024). Through involvement in leadership positions, community service, sports, and the arts, students at San Jose Academy (SNJA) can develop the ability or skills like communication, cooperation, and time management. The goal of this study is to increase students' motivation, self-confidence, and academic achievement by encouraging them to participate in extracurricular activities. These programs also offer practical experiences and beneficial networking possibilities that improve employment. That may lead to a better future.

This study is not merely a respite from academic hardship, and it serves as a crucible for developing essential leadership skills. Through participation in clubs, seminars, sports, and other extracurricular undertakings, students at San Jose Academy (SNJA) can learn to track or navigate complex societal interactions, take initiative, and collaborate effectively, skills that are necessary in leadership roles.

1.2 Statement of the Objectives

This study aims to explore how involvement in extracurricular activities shape the leadership abilities of the students. The researcher will investigate the different roles of extracurricular activities in shaping the leadership skills of the students. Furthermore, the study will examine the challenges students face and explore how these extracurricular activities might be better organized to help students develop their leadership abilities while overcoming obstacles by comprehending these variables.

1.3 Significance of the Study

The study aimed to provide information and knowledge regarding the perception of Grade 11 students In San Jose Academy towards the role of extracurricular activities in shaping leadership skills. Furthermore, the results of the study could be highly significant and beneficial to our respondents, mostly Grade 11 students.

Students. Extracurricular activities such as sports, student organizations, debate clubs, and volunteer work provide opportunities to develop critical leadership skills, including communication, teamwork, decision-making, and problem-solving. Participation in these activities helps students build confidence, adaptability, and a sense of responsibility. Leadership skills acquired through extracurriculars are highly valued by making students more competitive.

Teachers. Enhanced Learning Understanding extracurricular involvement and leadership development allows educators to design and evolve more programs that may help students to be more active and the impact of extracurricular activities on students.

School Administrators. Conducting interviews with teachers to understand their suggestions and perceptions of the school activities that will be implemented in the future. Exploring the weaknesses and strengths that they will face, and gathering information and ideas on how to improve the process.

Future Researchers. The study can fill gaps in knowledge regarding our research, expand, and give additional information and importance to our study regarding the enhancement of extracurricular activities.

1.4 Scope and Delimitation

This study emphasizes how important it is for schools to support students' involvement in group-based extracurricular activities in order to develop their capacity for leadership. This study also helps the education community understand the value of offering students a diverse range of extracurricular activities and how it affects their development as leaders.

With a focus on a specific sample of Grade 11 learners at San Jose Academy, this study was constrained by particular inclusion and exclusion criteria as well as the choice to use a qualitative case study methodology. This choice was made in order to investigate a topic that has received little attention: how extracurricular activities help students develop their skills as leaders. Although leadership development, in general has been covered in the literature, little focus

has been placed on the precise ways that extracurricular activities affect secondary school students' capacity for leadership.

2. METHODOLOGY AND RRL

This section will include research design, which explains the approach to the research, population and sampling, which describes the respondents and data sources, research instrument, which will involve interviews, and lastly data gathering procedure for collecting the data.

2.1 Review of Related Literatur

Extracurricular activities help students to develop their communication and teamwork as well as their leadership and social skills. Participation in athletic activities encourages kids' personal development and accountability, which helps to mold their leadership traits like socialization, cooperation, and decision-making. Engaging in athletic activities fosters students' leadership skills and academic and career success. It has been proven that extracurricular activities can lead to many benefits in our lives and to our future; they can also be followed by other students if they see the hard work, dedication, and success.

According to Wang and Ismail (2024), extracurricular activities help students to develop their communication, teamwork as well as their leadership and social skills. ngagement in sports activities fosters student's personal growth and responsibility, which contributes to shaping their leadership qualities such as decision-making, cooperation, and socializing. Sports activities not only contribute to students' leadership skills but also improve their academic and career success. These activities benefit the students as it benefits the students wherein they learn different values such as teamwork, individuality, endurance and physical strength, culture and a sense of community. Furthermore, extracurricular activities serve as a way of giving students a view and experience to apply academic skills to the real world (Caparros, 2023). This activity will not only benefit students to gain knowledge and value about teamwork and cooperation.

Extracurricular activities improve not only their knowledge but also their leadership skills, academic and professional achievement. According to Alkathiri (2024), extracurricular activities provide a practical application of academic skills in the real world. These activities teach values like teamwork, individuality, endurance, and physical strength, shaping leadership skills, building confidence, and guiding students for future careers.

These abilities can be helpful for a student and for all incoming students to have a good and passionate future in life and for their future success. The researchers are aiming to develop their leadership abilities through extracurricular activities; in this way, individuals will have a simple path to realizing their long-held goals (Tursino& Fakhri 2021). They can improve their leadership abilities and the development of their students by inspiring them and ensuring their satisfaction. For the benefit of the students' health, careers, and ability to succeed, this can be beneficial.

In summary, extracurricular activities play a crucial role in our development; it seeks to foster and enhance your mindset and maturity as well as building a foundation in developing the students' leadership abilities. Also, extracurricular activities are a vehicle for channeling talents and interests that function to develop the potential, abilities, personality, cooperation, and independence of students optimally to support the achievement of educatio*n goals.*

2.2 Methodology

2.2.1 Research design

The researchers used a qualitative approach in conducting the study to gather information. This study aims to explore the role of extracurricular activities in shaping the leadership skills of Grade 11 students at San Jose Academy. Qualitative research is an approach that is straightforward. It is defined as descriptive research as a process of gathering, analyzing, and making accurate interpretations about such data without the aid of statistical methods. A descriptive type of research involves the collection of data to answer questions in the study. It is utilized to make a descriptive detail of the data gathered. Qualitative research involves the examination, analysis and interpretation of observations for the purpose of discovering underlying meanings and patterns of relationships.

The researchers will use Interviews under Case Study Research. The interview allows researchers to gain rich qualitative data that can't always be captured through other methods like surveys; the interview helps researchers deeply understand complex phenomena and develop new theories based on participants' personal narratives and interpretations. The researchers believed that the method of gathering information was suitable for the study to obtain accurate data in exploring the

role of extracurricular activities in shaping the leadership skills of Grade 11 students.

2.2.2 Population and Sampling

The population of this study consists of Grade 11 students at San Jose Academy, who may have experience in extracurricular activities such as clubs, sports, and other extracurricular activities. The researchers expected to obtain a population of fifteen (15) students, selected through a random selection method, this method aimed to gather information on the profile of all Grade 11 students at San Jose Academy. It is expected that a total of 15 students can participate in the study.

2.2.3 Research Instrument

The research instrument employed for this study is an Interview questionnaire designed to explore the role of extracurricular activities in shaping leadership skills. The interview consists of open-ended questions, allowing respondents to express their thoughts in their own words. This approach ensures a more in-depth understanding of students' perspectives.

The gathered data will be used to examine how extracurricular activities help students at San Jose Academy balance their academic and personal goals while maintaining strong academic performance.

The respondents for this study will be Grade 11 students at San Jose Academy. Their insights will provide valuable information on how participation in extracurricular activities help them shape their leadership skills.

2.2.4 Data Gathering Procedure

The researchers will conduct interviews by utilizing purposive sampling. Purposive Sampling involves selecting participants with a purpose. According to Bisht (2024) It is a type of non-probability approach wherein researchers select a sample based on their assessment that would fit in their study, it selects a sampling based on their certain criteria. Therefore, Using purposive sampling enables the researcher to gather and collect in-depth data from individuals experiences and knowledge about the study.

3. RESULTS AND DISCUSSION

This chapter presents the collected data from the respondents regarding the role of extracurricular activities in shaping leadership skills. In this chapter the researchers gathered students who are involved in extracurricular activities at San Jose Academy to answer the researcher's questions.

Table 1. The table represents how the Students manage their Extracurricular Activities.

QUESTION	COMMON CONTENT AND THEMES.	FREQUENCY
1.What are the factors you consider when selecting extracurricular activities? How can you select the right extracurricular activities that align with their leadership goals?	A. Interest B. Opportunity C. Skills D. Time. E. Benefits	A. 11 B. 1 C. 5 D. 3 E. 1
2. How can you effectively organize your time between extracurricular activities and academic performance?	A. Prioritize Tasks. B. Time Management.	A. 8 B. 7
3. How can you handle your time with other responsibilities regardless of a tight schedule?	A. Time Management. B. Prioritize Tasks. C. Focus D. Finish the tasks beforehand. E. Go with the flow.	A. 5 B. 9 C. 1 D. 2 E. 1
4. In what ways do students manage their academics and extracurricular activities?	A, Time management B. Setting specific goal C. Prioritizing task	A. 7 B. 3 C. 5

The first question has (5), common themes. which explore the factors the respondents are considering when selecting extracurricular activities and how the respondents select the right extracurricular activities that align with the respondents leadership goals. Interest got the highest frequency as it has 11 mentions, opportunity is the second by having 5 mentions. time came third by having 3 mentions. And lastly, benefits and opportunity both got a mention of 1.

The second question has (2), common themes. The table presents almost the similarities of the student's. The respondents effectively organize their time between extracurricular activities and academic performance with the strategies of prioritizing the tasks and time management. The researcher observed that the highest frequency chosen by respondents is to prioritize tasks which have 8 mentions. The respondents effectively organize their time between extracurricular activities and academic performance by prioritizing tasks. The lowest frequency that is present on the table is time management which has 7 mentions. Time management is the strategy that is effective.

The third question has (5), common themes. which explore how the respondents handle time with other responsibilities regardless of a tight schedule. Prioritize Tasks has the highest frequency as it has 9 mentions, time management is the second by having 5 mentions. Finishing the tasks beforehand came third by having 2 mentions. And lastly, focus and go with the flow both got a mention of 1.

The fourth question has (3), common themes. This explores the ways students manage their academics and extracurricular activities. Time management has the highest frequency as it has 7 mentions, prioritizing tasks is the second by having 5 mentions. And lastly, setting specific goals got a mention of 3.

Table 2. This table represents the effects of participating in extracurricular activities

QUESTIONS	COMMON CONTENT AND THEMES	FREQUENCY
1. In what ways do extracurricular activities help you as a student to become more active in class?	A. Learned a lot. B. Boost Motivation. C. Participating. D. Self-discipline. E. Improvement. F. Boost Confidence.	A. 2 B. 6 C. 7 D. 1 E. 3 F. 4
2. What are the challenges that you encounter when participating in extracurricular activities?	A. Having a hard time balancing. B Tight Schedule. C. Responsibilities D. Too much school works. E. Stress. F. Tiredness G. Behavior.	A. 8 B. 2 C. 1 D. 4 E. 3 F. 2 G. 2
3. How do students' personal values interact with their academic responsibilities and extracurricular participation?	A. Knowing how to balance their time. B. Being Committed. C. Responsible. D. Satisfaction. E. Motivation.. F. Shape ourselves. G. Sense of morality. H. Prioritizing. I. Interaction.	A. 2 B. 2 C. 3 D. 1 E. 1 F. 2 G. 5 H. 3 I. 1

The first question has (6), common themes. The table presents what ways extracurricular activities help the student to become more active in class. Participation got the highest frequency as it has 7 mentions, boosting motivation is the second by having 6 mentions. Boost confidence came third by having 4 mentions. Improvement came fourth by having 3 mentions, and learned a lot came fifth by having 2 mentions. Lastly, self-discipline got a mention of 1.

The second question has (7), common themes. Table represents the challenges that the respondents encounter when participating in extracurricular activities. Having a hard time balancing time got the highest frequency as it has 8 mentions, too much school work is the second by having 4 mentions. Stress came third by having 3 mentions. Tight schedule, tiredness and behavior came fourth by having 2 mentions. Lastly, responsibilities got a mention of 1.

The third question has (9), common themes. In this table indicate the students personal value interact with their academic responsibilities and extracurricular participation. Sense of morality has the highest frequency which is 5. While responsible and prioritizing had the same frequency of 3 as the second to the highest. On the other hand, knowing how to balance their time, being committed, shaping ourselves got 2 mentions as the third to the highest frequency. And for the last lowest frequencies got 1 mention by the respondents are satisfaction, motivation and interaction.

Table 3. This table represents the way extracurricular activities shape the leadership skills of students.

QUESTIONS	COMMON CONTENTS AND THEMES	FREQUENCY
1. How do extracurricular activities show the value of mentorship? and how does that change the way we lead?	A. Motivated to do better. B. Focusing on priorities. C. Strengthen teamwork and collaboration. D. Developing different skills. E. Practice being a leader. F. Know how to handle things. G. Good decision-making. H. Going beyond capabilities. I. Change our Perspectives. J. Requires humbleness and openness.	A. 1 B. 1 C. 1 D. 2 E. 4 F. 1 G. 1 H. 2 I. 1 J. 1
2. What's the impact of extracurricular activities that change your mindset and maturity?	A. Experiences. B. Lesson Learned. C. Strengthens teamwork and develops skills. D. Can't Please Everyone. E. Improve different skills. F. Time Management. G. Developed. H. Being Responsible. I. Open-minded.	A. 1 B. 3 C. 1 D. 1 E. 3 F. 3 G. 3 H. 2 I. 1
3. How do your perceptions of your leadership abilities change based on your involvement in extracurricular activities? and what factors influence those changes?	A. Valuing efforts B. Give more opportunities to do better. C. Being fair. D. developed essential skills. E. Overcoming challenges in academic and extracurricular. F. Increase confidence. G. Setting goals. H. More responsible. I. Communicating with people.	A. 1 B. 2 C. 2 D. 1 E. 2 F. 4 G. 2 H. 2 I. 2

In question number one (1), the table presents the value of extracurricular activities in mentorship and how this changes the way students lead. There were 10 common themes: practice being a leader got the highest frequency of 4, while developing different skills and going beyond capabilities got the second highest frequency of 2. And lastly, motivated to do better, focusing on priorities, strengthening teamwork and collaboration, knowing how to handle things, good decision-making, changes our perspective and openness and humbleness got the lowest frequency of 1.

Question number two (2), asks the impact of extracurricular activities that change their mindset and maturity. There were 9 common themes. Lessons learned, improved different skills, time management and development got the highest frequency of 3. On the other hand, being responsible came as the second

highest frequency of 2, And lastly, experiences, strengthens teamwork and develops skills, open minded got the lowest frequency and it has 1 mention.

For question number three (3), explores the changes of their perception towards leadership abilities based on their involvement in extracurricular activities and the factors that influence those changes: there were 9 common themes. Increased confidence got the highest frequency of 4; while given more opportunities, being fair, overcoming challenges in academic and extracurricular, setting goals, being more responsible, and communicating with people. It has 2 mentions indicated as the second highest frequency. And lastly, valuing efforts and developing essential skills had 1 mention as the lowest frequency.

4. CONCLUSION AND RECOMMENDATIONS

This study revealed the effectiveness of extracurricular activities in shaping leadership skills. Since engaging in extracurricular activities fosters leadership goals, it helps students become more active and capable of sharing their skills. The perspective of students towards the role of extracurricular activities in shaping leadership skills revealed that these extracurricular activities influence their perception and somehow enhance their leadership abilities. These findings mainly highlight the factors that are contributing in shaping leadership skills. It also highlights the need for balancing their academics and extracurricular, as well as managing their time. The research contributes to our understanding of the lived experiences of those students who are involved in extracurricular activities. Therefore, Extracurricular Activities helps students develop key skills, improve time management and gain confidence which are valuable in their future.

However, the findings of this study are positive. The researcher also found out that students are struggling to balance their academic and extracurricular activities, which affects their leadership abilities.

Aside from the information stated above, the researcher would like to recommend:

- Teachers to guide students in maintaining good communication with others and finding appropriate strategies to improve their attitudes, skills, and interest in learning.

- Future researchers are encouraged to conduct related studies on extracurricular activities, not just focusing on one particular problem, but also expanding students' knowledge towards building leadership skills to determine the impact of this study on the students.

- Schools should implement extracurricular activities not only for sports but for shaping the leadership abilities of students. They should also create multiple activities that not only focus on students' interests but also help them improve their knowledge in leadership.

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The Impact of K-12 in Career Exploration and Decision-Making Among Senior High School Students in San Jose Academy

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Abstract: The research investigates how the K-12 program affects the career exploration and decision making of the senior high school students in San Jose Academy. The study specifically focuses on how the K-12 system, with its specialized tracks—Science, Technology, Engineering, and Mathematics (STEM), Accountancy, Business, and Management (ABM), Humanities and Social Sciences (HUMSS), and Technical-Vocational-Livelihood (TVL)—has influenced the students' career choices and skill development. The study, employing the phenomenological research approach, gathers data from interviews and questionnaires of 15 Grade 11 and 12 students. Results show that most of the respondents perceive that the K-12 program has benefited them a great deal in exploring their careers through specialized subjects based on their interests and career objectives. Most students indicated that the K-12 tracks enabled them to have better knowledge of their future careers, and hence, they were more confident in their career choices. Moreover, the program was also found to improve students' communication and social skills, as well as problem-solving capacities, since the curriculum is specialized and focuses on practical application. Relying on these results, the study suggests augmenting and continuing the K-12 program, particularly concentrating on fair access to career counseling, vocational education, and exposure to actual work experiences. These reforms are needed in order for all students, whether in any place in the country, to be able to acquire the benefits the K-12 system offers. This study emphasizes the necessity of career advising and professional schooling in assisting pupils in charting their future profession and underscores the role of the K-12 program in facilitating their success both in college and in the workforce.

Key Words: career exploration; decision-making; higher education; k-12 education system; vocational education

1. INTRODUCTION

1.1 Background of the Study

The K-12 education system in the Philippines was implemented to provide students with a more comprehensive and well-rounded education, preparing them for both higher education and the workforce. With the introduction of two additional years in senior high school, students are given the opportunity to explore different career paths and acquire skills that will help them make informed decisions about their future. The system's design, which offers specialized academic tracks such as Science, Technology, Engineering, and Mathematics (STEM), Accountancy, Business, and sManagement (ABM), Humanities and Social Sciences (HUMSS), and Technical-Vocational-Livelihood (TVL), is meant to guide students towards their chosen fields of interest, allowing for deeper exploration and more focused learning.

The K-12 educational system was implemented in the Philippines to improve the quality of education and better prepare students for higher education. With the new curriculum, the Department of Education promises to offer higher-quality education through the strands

(Enderun Colleges, 2022, March 11). One of the goals of the K-12 program is to help students in Senior High School (SHS) explore different career paths and make informed decisions about their future. The study by Rabaya et al. (2020) highlights the importance of career guidance programs in senior high school, noting that students who are exposed to career exploration activities tend to make more informed decisions about their future careers. In the SHS stage, students choose a strand based on their interests and future careers. This system is meant to expose them to various fields of study and career opportunities early on. By doing this, it is believed that students will have more time to reflect on their interests, leading to better career choices.

According to PBEd (n.d.), the implementation of the K-12 curriculum in the country drew negative reactions from various societal groups. Since 2011, critics have been very vocal on their primary concerns. They insist the government isn't yet ready for this new system and that this is more of an additional burden to students and their parents. On the report of UNTV News and Rescue (2025), As Chairman of House and Culture on Basic Education and Culture said, "The purpose of the proposal is to allow qualified students to pass senior high school and go directly to college or university by passing an honor's exam or advanced placement examination or by enrolling in a technical-vocational program."

In conclusion, the K-12 educational system in the Philippines was implemented with the intention of enhancing the quality of education and better preparing students for higher education and future careers. This study was chosen to better understand the effectiveness of the K-12 program in guiding students toward career choices. By examining the impact of career guidance and the opportunities provided through the SHS strands, researchers aim to assess how well the program is meeting its goal of helping students explore and reflect on their interests.

1.2 Statement of the Objective

This research focuses on identifying the effects of the K-12 program to the Career Exploration and Decision-Making to the Senior High School Students of San Jose Academy. Precisely this research desired result is to first, examine what are the effects of the K-12 program to the student in terms of their career exploration. Second is to discover the impact of the K-12 program on students in their decision-making process. The third is to analyze the effects of the K-12 program on the skill development of students. Lastly is to construct a recommendation from the findings of the study.

1.3 Significance of the Study

This study will benefit the following:

Students. The students will have a better understanding of how removing the K-12 program affects their preparation and career exploration. The students could relate the real life situation in this study, which will remain as their guide and basis in choosing a career-path. The students would have a wide perspective, and knowledge in terms of understanding the importance of deciding rights in the future.

Parents/Guardians. The parents itself would have a clearer vision in understanding the impacts of having a K-12 curriculum towards their children's life views. On the other side, they would be able to know the effects of removing the K-12 curriculum on their children's education system. This serves that the K-12 program has a huge role in molding the students' personality, and life perspective.

Educators. Teachers and Instructors would gain knowledge about the importance of the K-12 program, and its systems. It includes the possible effects of removing this program— The teachers might face several difficulties towards their teaching methods, efforts to provide career guidance, and the general capacity to get students ready for college.

Future Researchers. The study will offer a useful starting point on how K-12 program affect the education, career, and preparation of senior high school students. More study on ways to enhance educational policy and guarantee that students to prepare for the workforce will be encouraged. This will serve as their guide, and basis throughout their research study.

1.4 Scope and Delimitations

The scope of our study is to know the impact of K-12 on career exploration and decision-making. The study is delimited only to senior high school or Grade 11 and Grade 12 students in San Jose Academy. The main

purpose of this study is to find out the impact of having a K-12 program and also to know the effect of removing this for students and letting them decide to jump into college right away. The study only focuses on the K-12 system and its relation to career exploration and decision-making.

2. METHODOLOGY and RRL

2.1 Review of Related Literature

This chapter shows literature and studies that are essential in the discussion about the topic. This chapter is divided into two major discussions: foreign literature and local literature. The K-12 education system has significantly impacted career exploration and decision-making in senior high school students. Internationally, studies have explored the positive effects of K-12 programs in helping students make informed career decisions. For instance, Almeida and Azevedo (2021) found that K-12 systems, especially those offering career pathways, allow students to gain early exposure to different professions, leading to better career choices. This early exposure helps students align their interests with possible future jobs. Similarly, Smith and Williams (2022) highlighted the role of career counseling programs in the K-12 curriculum, suggesting that structured guidance in high school can shape students' career paths by helping them understand their strengths and aspirations.

Ferrer and Martinez (2020) also examined how vocational education within K-12 helps students develop the skills necessary for specific careers, thus preparing them for the workforce after graduation. In the same vein, Brown (2023) explored how career guidance embedded within the K-12 framework helps students make informed choices regarding their future professions, particularly in more developed education system. This type of interest is called individual or personal interest. Individual interest-oriented actions are regarded as current realizations of a general personality trait or a time-lasting attitude toward an

> object area. Personal interest is expressed, among other ways, by a tendency to engage with a particular object repeatedly, joyfully, and without an external cause. In this context, interest has a prominent subjective significance and forms an essential part of the self-concept. (Bahr et al., 2024)

In the Philippines, the K-12 system has also impacted how students make career choices. Lopez and Santos (2021) studied how specialized tracks such as STEM, ABM, and HUMSS in the K-12 curriculum help Filipino students align their strengths with potential career paths. They observed that the introduction of these tracks allows students to narrow down their interests early and explore various career possibilities. Meanwhile, Gonzales and Reyes (2022) focused on students in Metro Manila, concluding that students who had access to career resources and counseling during senior high school were more confident in their career decisions. However, Dela Cruz (2020) noted that rural students face difficulties in accessing career guidance, which limits their ability to explore different professional fields. This disparity shows that while urban students benefit from more resources, rural students often face challenges in making well-informed career choices.

Caballero (2023) further explored how K-12's impact on career decision-making differs between regions, revealing that students in urban areas tend to have more career exploration opportunities compared to those in more remote regions. Lastly, Morales and Tan (2021) assessed how effective K-12's TVL (Technical-Vocational-Livelihood) track is in preparing students for work. Their study concluded that while the TVL track equips students with practical skills, there is still a gap in matching these skills with actual job market demands.

These studies show that while the K-12 system has offered more career exploration opportunities for students, challenges such as unequal access to resources still exist. Both foreign and local studies agree that early career guidance and the availability of career pathways within the education system can significantly influence students' decision-making. However, there is a need to ensure that all students, regardless of their geographical location, have equal access to career exploration resources to make well-informed career choices.

2.2 Methodology

This research is a work of phenomenology. This part contains the method of research design that is called Qualitative Research. The population and

sampling has a huge contribution in making the research study. It also holds a research instrument in which the investigators choose the Interview-Procedure in collecting the respondents answer. Lastly, the data gathering procedure that shall explain the design and methods of the research study.

2.2.1 Research Design

This study utilized a qualitative method, and the data will be collected only within the San Jose Academy area. The researchers used a qualitative approach to gather participants' experiences. The phenomenology method will be used to obtain answers from respondents, determining the lived experience of each student based on the K-12 program.

2.2.2 Population Sampling

The study is composed of fifteen (15) respondents out of 808 senior high students. The random sampling technique is used as a method for gathering data. Researchers chose this method to gather different experiences of senior high school students throughout their senior high life.

2.2.3 Research Instrument

This study used questionnaires to survey senior high school students in San Jose Academy regarding the impact of the k-12 educational system on their career exploration and decision-making process. The questionnaire was created in line with the study's objectives, consisting of 10 questions. Each question aimed to explore various aspects of career decision-making, the opportunities available to students within the k-12 framework, and how it affects their career exploration. This survey resulted in more precise and accurate results because it's based on students' own perspectives and preferences regarding their own decision-making and career explorations that they think will benefit their future. This study also employed interviews as a complementary research instrument. The use of interviews allowed for a more exploration of the students' experiences, thoughts, and perceptions related to the K-12 educational system and its impact on their career exploration and decision-making process.

2.2.4 Data Gathering Procedure

This research interviewed the senior high school students in San Jose Academy regarding the K-12 project. The researchers provided several questions in having a dialogue with the respondents, which they answered with the help of their own perspective, which contains pure honesty, and integrity acknowledgment. The researcher made sure to check the background of each interviewee to avoid misconceptions and problems in the research study. The results of the interview were to be the basis of the research analysis. After the agreement, the researcher will use the interview outcome as a strong fundamental in the study. The whole research purpose is to assess the impact of having a 2-year extended curriculum in the students' career exploration and decision making.

3. RESULTS AND DISCUSSION

The researchers collect fifteen (15) senior high school students in San Jose Academy to gather data for the study. The following figure containing the demographic profile of the respondents:

Figure 1. Presents the Strands of Respondents

	Strand Frequency
STEM	7
HUMSS	6
ABM	2

Respondents from ABM have a total of two (2) frequency, HUMSS have a total of six (6) frequency, and lastly the stem students have a total of seven (7) frequency.

Figure 2. Presents the Sex of the Respondents

Sex	Frequency
Male	5
Female	10

The study has five (5) male and ten (10) females senior high school respondents in San Jose Academy.\

Table 1. Presents the Effects of K-12 program in terms of their Career Exploration

Questions	Common Themes	Frequency
1. How do the courses offered in the K-12 program at San Jose Academy help students discover or narrow down their career interests?	a. To be able to discover their skills and potential b. To choose a career-path easily	4 11
2. How is having a K-12 program beneficial for students' career exploration?	a. It enhances the knowledge of a student b. It enhances the knowledge of a student	10 5
3.Do you think that K-12 helped you as a senior high school student in terms of exploring your future career?	a. Yes,because of the K-12 program they explore more about their future career	15

Question one asking how do the courses offered in the K-12 program at San Jose Academy help students discover or narrow down their career interests? Respondents have two common themes: the highest frequency is to choose a career path easily with eleven (11) mentions. and in the other hand "to be able to discover their skills and potential got the lowest frequency with four (4) mentions

Question 2 is asking how is having a K-12 program beneficial for students' career exploration? Respondents have two common themes: the highest frequency is "it enhances the knowledge of a student" with ten (10) mentions. and the other "gives a clearer vision towards academics has the lowest frequency with five (5) mentions.

Question 3 is asking if they think that K-12 helped you as a senior high school student in terms of exploring your future career? Respondents have two common themes: the highest frequency is "yes, some students are sure about what course they want to pursue in college because of K-12" with fifteen (15) mentions.

Table 2. The Effects of K-12 in Decision-Making

Questions	Common Themes	Frequency
4. How has the structure of the K-12 program influenced the way students at San Jose Academy make decisions about their academic and career futures?	a. K-12 helps the students to make wise decision b. K-12 helps the student to be in an aligned program through choosing strand	7 8

5. In what way does the school, San Jose Academy, help you to make decisions regarding your future career?	a. Assist the students academic dedication b. Develop the students' social skills in communicating c. Helps the students to boost their confidence in terms of academic	3 12 3

6. Can you say that the K-12 program has a lot of contribution for creating your decisions relating to your future career? Why? or Why not?	a. Yes, it helped students to think clearly about what course they wanted to take in college	15

For question 4 how has the structure of the K-12 program influenced the way students at San Jose Academy make decisions about their academic and career futures? respondents have two (2) common themes: the highest frequency is "k-12 helps the students to be aligned program through choosing strand" with eight mentions, and the other "k-12 helps students to make wise decisions" got the lowest frequency with six (6) mentions.

Question 5 is asking in what way does San Jose Academy help respondents to make decisions regarding your future career? Respondents have three (3) common themes: the highest frequency is "assist the students academic dedication" with twelve (12) mentions. in the other hand "helps students to boost their confidence in terms of academics" got the lowest frequency with three (3) mentions

Question 6 asking if respondents can say that the K-12 program has a lot of contribution for creating your decisions relating to your future career? Why? or Why not? respondents have two common themes: the highest frequency is "" with fifteen (15) mentions.

Table 3. Presents the Influence of K-12 in the Skill Development

Questions	Common Themes	Frequency
7. How is the K-12 curriculum helpful in enhancing your skill according to your strand?	a. It provides a wide opportunity b. It gives a various knowledge	2 13

8. Does the K-12 program influence your skill development according to the course you will pursue? In what way?	a. Yes, because of the specialized subjects in their chosen strand, they gained more knowledge about their interests	15
9. What specific skills do students believe they have gained from the K-12 curriculum, and how do these skills align with their career goals?	a. Socialization b.Academic Progression c.Wise Decision -Making d. Wide Critical Thinking	3 8 1 3

10. How do senior high school students at San Jose Academy feel the K-12 program has contributed to the development of both hard and soft skills?	a. Yes, it contributed to the development of both hard and soft skills in their education	15

Question 7 is asking how is the K-12 curriculum helpful in enhancing your skill according to your strand? respondents have two common themes: the highest frequency is "it gives a variety of knowledge" with thirteen (13) mentions , on the other hand "it provides a wide opportunity" got two (2) mentions.

Question 8 is asking does the K-12 program influence your skill development according to the course you will pursue? In what way? have two common themes: the highest frequency is "Yes, because of the specialized subjects in their chosen strand, they gained more knowledge about their interests" with fifteen (15) mentions.

Question 9 is asking what specific skills do students believe they have gained from the K-12 curriculum, and how do these skills align with their career goals? respondents have three (3) common themes: the highest frequency is "Academic Progression" with eight (8) mentions while "socialization" and "wide critical thinking" both have three (3) mentions.

For the last question, question for 10 is asking how senior high school students at San Jose Academy feel the K-12 program has contributed to the development of both hard and soft skills? got the highest frequency is "Yes, it contributed to the development of both hard and soft skills in their education" with fifteen (15) mentions

RECOMMENDATIONS

4.1 Conclusion

4.2 Recommendations

The researchers discovers that the K-12 has a various of positive impacts towards the students' decision-making and career-path exploration, therefore, the researchers suggests the following:

Students must be hands-on towards their academic-responsibilities in order for them to secure a better career, and should enhance their settlement skills to have a wide perspective in decision making.

Parents/Guardians should be capable of guiding their own child as they walk through life-decisions. It is important to have proper guidance as you encounter different difficulties in both academic and real life situations.

The Educators should include a real-life situation in teaching the students in terms of deciding on their own, so that they would have a strong factual basis in learning something.

For Future Researchers,

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Comparing the Effectiveness of Retrieval Practice and Feynman Technique in Learning Among Senior High School Students of San Jose Academy

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Abstract: This study focuses on comparing the effectiveness of the retrieval practice and Feynman technique in the learnings of Senior High School of the San Jose Academy. This research investigates the efficiency of retrieval practice and the Feynman Technique in increasing learning outcomes for senior high school students at San Jose Academy. The study is intended to find out which method is more efficient in enhancing the understanding, memory, and use of knowledge of the students. Fifteen (15) respondents were gathered from the data, of which most of them were between fifteen (15) and sixteen (16) years old. The results show that Retrieval Practice is better for exam preparation and memory retention, and the Feynman Technique works better in terms of improving understanding through self-explanation. Nonetheless, they are most effective based on individual learning styles, cognitive functions, and habits of study. The research also identifies most students' common problems, such as problems with short-term memory, attention span, and distraction. In spite of all these difficulties, both approaches were discovered to have a beneficial impact on students' confidence and grades. The study indicates that combining both strategies with flexibility according to individual learning styles may be the best option. Future research could investigate the impact of these methods in the long run and their effectiveness across different learning settings.

Key words: r*etrieval practice; feynman technique; comparing; effectiveness; learning styles*

1. INTRODUCTION

1.1 Background of the Study

This research studied the effectiveness of study techniques, retrieval practice and the Feynman technique. Many students are being left behind by an educational system that some people believe is in crisis. Improving educational outcomes will require efforts on many fronts, but a central premise of this monograph is that one part of a solution involves helping students to better regulate their learning through the use of effective learning techniques. This will give the students knowledge about the two techniques they can use. Walck-Shannon et al. (2021) said that study strategies are more effective than passive ones, that cramming is less effective than distributing studying over time, and that focused study is more effective than distracted study. Whether students choose to use these more effective practices during their independent study time is a separate question. As stated, students need a technique that will help them to focus as they strive to excel in their academics. Education is considered a fundamental right for every individual. However, finding the right study technique that will suit a student can be difficult, this study can help every student of San Jose Academy. This study will compare the effectiveness of retrieval practice and the Feynman technique. Learning your study technique will help you to improve your performance academically. The goal of this research is to give knowledge to every student, that gives their best for their academics as they strive to excel. This research will also help them gain a deeper understanding, which will aid them in finding the technique that will suit them as they navigate through the crucial years of their academic year.

1.2 Statement of Objectives

The purpose of this study is to determine how the retrieval practice and the Feynman technique affect senior high school students at San Jose

Academy. Specifically, this study seeks to determine which study technique is most effective for senior high school students at San Jose Academy. The second goal is to assess how retrieval practice and the Feynman technique improve their academic achievement. The next step is to see if there are any differences in how students learn depending on their study strategies. Finally, make recommendations based on the study's findings.

1.3 Significance of the Study

The researchers chose this topic in order to help students who have not yet discovered the best suit for their learning style. This study aims to know what the main factor of study techniques is and what effective strategy they should employ to support them leading to improved academic performance and better understanding. This study will be beneficial to the following:

Students. This research helps students understand and comprehend the challenges faced by students in finding the best learning style. The study disseminates the factors and strategies that students can.

Teachers. This study helps teachers enable them to effectively equip students with the skills to learn independently, retain information better, manage their workload, and ultimately achieve academic success by teaching students how to actively engage with the material and understand why students struggle with finding the best learning style.

Future Researchers. This research has filled the research gap in the existing studies. This allowed future researchers to have a deeper understanding. Also this study can serve as a foundation for future researchers to know more factors of learning the best style to improve and to develop more effective strategies and interventions to support the students.

1.4. Scope and Delimitation

This study will focus on the effectiveness of retrieval practice or the Feynman technique. The study will be limited by the sample size, which will be limited to fifteen (15) participants. The study will only use self-reported data from the participants, which may be subject to biases and inaccuracies. The study will not explore the impact of other factors that may affect the mental health of teenagers, such as family background. The study will not include participants who are not senior high school students in San Jose Academy.

2. METHODOLOGY AND RRL

2.1 Review of Related Literature

The purpose of this review is to critically examine and synthesize existing literature and studies on retrieval practice and the Feynman technique to form a basis for comparing their effectiveness as learning strategies. Through the review, therefore, each method would be identified in its ability to enhance learning, retention, and conceptual understanding by viewing individual strengths, applications, and outcomes, particularly within the scope of senior high school education. Reiterating the research problem and give a brief summary of the scholarly context, senior high school students often face challenges with the retention of complex information, deep understanding of concepts, and adaptation to modern learning modalities, such as remote or modular setups. Even though retrieval practice and the Feynman technique have been touted in literature as effective strategies to address these kinds of issues, there is still a dearth of research studies that compare the relative effectiveness of these two approaches, especially in particular educational contexts, such as in San Jose Academy. This study will attempt to establish which method is more effective in improving learning outcomes, retention, and conceptual understanding among senior high school students in this setting. By embracing a teaching approach that breaks down complex information into more manageable ideas, educators and school administrators can address
more effective in improving learning outcomes, retention, and conceptual understanding among senior high school students in this setting.

According to Reyes et al. (2021), the study of the Feynman Technique as a Theological Learning Strategy for Independent and Remote Learning demonstrated the effectiveness of the Feynman Technique as a heptagon-based learning strategy by using a true experimental research design, in which students in the experimental group who applied the Feynman Technique outperformed those in the control group by their post-test results and learning gain scores. The positive result brings out the technique's constructiveness, self-directed, and theological approach, which creates deep construction of

concepts, high autonomy, and self-regulation qualities. This brings learners a better and more efficient grasp of lessons, especially because it is suited towards modern learning delivery. The Feynman Technique, as a teaching method, emphasizes the value of independent learning in promoting authentic learning experiences. It may improve students' academic performance while enabling them to acquire necessary 21st-century skills.

By embracing a teaching approach that breaks down complex information into more manageable ideas, educators and school administrators can address some of the difficulties students experience when learning remotely or in modular environments.

According to (Sanjay & Sharma, 2024), The Feynman Technique encourages breaking down complex ideas into simple, digestible parts. By explaining a topic in easy-to-understand terms, you force yourself to clarify your understanding, which strengthens memory retention and comprehension, and also Feynman's method involves actively recalling information rather than passively reviewing it.

By teaching yourself or others what you've learned, you reinforce the neural pathways, improving your ability to recall the material later, particularly under pressure. One of the core elements of the Feynman Technique is teaching. Explaining concepts to others or even to yourself ensures that you can articulate and solidify your understanding. leading to greater retention and mastery of the material

According to Becton (2024). Retrieval practice improves the efficiency of learning; making and using flashcards, concept maps, or any of the other retrieval practice methods will facilitate better learning than highlighting or re-reading. Having students actively recall the information will benefit you hugely, even if they get frustrated at first. According to Wang et al. (2023), The effects of combining different educational strategies remain quite scarce, especially within the context of environmental science. There is considerable room for future research on integrating retrieval practice with other effective learning strategies. Their study sheds some initial light on the effect of using two different drawing methods synergistically with retrieval practice to promote students' understanding of the carbon cycle. The implication of this for climate change education is that retrieval practice should be adopted by high school students in their learning experience so that they may enjoy its long-term mnemonic benefits.

According to (Fadeke Adegbuyi, n.d) The Feynman technique enables you to confront your ignorance. You recognize that you're starting from scratch, or at the very least, filling in some gaps, when you write down a topic on a blank page. This encourages a curious mindset, which aids in pinpointing areas that require additional attention. You begin by keeping an open mind. You can fully understand fresh ideas when you set aside your preconceptions. Instead of proving yourself correct, you're attempting to comprehend. You must be specific. Most of us don't know anything about most things, considering the universe's total knowledge! You might start by clearly stating what you don't know in writing. There is too much information regarding "Evolutionary Science," "Microeconomics," and "Psychology" to be contained on a single page. Instead, focus on more manageable, well-defined ideas or topics that could be consistently covered in a midterm or final exam.

According to (SBRobinson, 2022) Many individuals experience difficulty recalling specific details of an article they have read when attempting to discuss it with others, despite initially feeling they understood the content. This challenge highlights the importance of retrieval practice, a cognitive process that involves actively recalling information to reinforce learning and comprehension. One effective strategy for retrieval practice is the Feynman Technique, named after the renowned physicist Richard Feynman, who was widely recognized for his ability to simplify complex scientific concepts. This method emphasizes explaining concepts in simple terms, identifying gaps in understanding, and refining knowledge through iterative learning. By employing this technique, learners can enhance retention and improve their ability to articulate ideas effectively.

According to Adeoye (2023). This study found the principles behind the Feynman Techniques and highlights their practical application in educational settings. It also presents case studies and testimonials from slow learners who have experienced significant improvements in their academic performance and self-confidence after implementing these techniques. The findings suggest that the Feynman Techniques have the potential to revolutionize the way slow learners approach learning and achieve success.

According to Alfareza (2021), the Feynman Method can create an enjoyable learning environment by helping students activate their background knowledge before reading and evaluate their comprehension after reading. The aims of this research are to determine students' reading comprehension before and after being taught using the

Feynman Method and to determine whether there is any significant effect of using the Feynman Method on the students of SMKN 2 Kediri in the Academic Year 2021/2022.

According to Krebs et al. (2023), Retrieval Practice Technique for Strengthening Vocabulary students Based on the information acquired, the results of the study in table 1 reveal a Hake's gain score of 0.84 with a verbal interpretation of "High Gain" for the mean percentage score of the Pretest and Post test. This indicates that students in the G7 and G10 special scientific curricula can improve their academic performance in ICT by utilizing Alpha Omega PowerPoint and Alpha Omega Robots (Vex VR Blocks) effectively. The study "Project MIND CRAFT (Material Innovation Development, Collaborative Retrieval Practice, and Face to Face Team-based Learning) to Reduce Learning Gaps among ICT Learners in the Post-Pandemic Era" examined the effectiveness of a new pedagogical approach, Project MIND CRAFT, in reducing learning gaps among ICT learners in the post-pandemic era. Based on the results of the study, Project MIND CRAFT was significantly effective in reducing learning gaps as measured by student achievement scores on ICT exams. The results of the study are consistent with previous research on the effectiveness of material innovation development, collaborative retrieval practice, and face-to-face team-based learning. Material innovation development can help make the ICT subject more interesting and relevant for students, whereas collaborative retrieval practice can help stu Huy dents better consolidate their learning. Face-to-face team-based learning can provide students with the opportunity to work with and learn from their peers.

According to Reyes et al. (2021) The Feynman Technique is a mental model and learning strategy used to simplify any complex information. This study endeavors to provide empirical evidence on the effectiveness of the Feynman Technique as a self-determined based learning strategy that fits the e-learning landscape. Utilizing true experimental research design, grades 4, 7, and 11 students from typical elementary and national high schools were randomly assigned to experimental and control groups and underwent pre and post tests. Using two-sample and paired T-tests, results show that students under the experimental group, which applied the Feynman Technique, showed higher post test scores and learning gains than those in the control group. Hence, this study proves that the Feynman Technique can be an effective tool to improve K-12 students in learning, especially now given the new learning delivery modalities.

According to (How to Study After the Long Break: 6 Study Hacks That Might Work for You, n.d.) The Feynman Technique was created by Richard Feynman, a physicist, who asserts that simplifying a new idea is the most effective method for learning it. Therefore, when learning a theory, make an effort to explain it to yourself or your friends in a way that makes sense to you. Take notes while reading the original contents. Try to communicate the ideas you've learnt to yourself using the guidance you've received. You can share these with your friends to add to the enjoyment. Write as simply as you can when explaining things. To find any holes or mistakes in your description, go over it again. Continue until you understand the theory

2.2. Methodology

This chapter contains the method of research design, population sampling, research instruments and the data gathering procedure that shall explain the design and methods of the research study instruments and the data gathering procedure that shall explain the design and the methods of the research study.

2.2.1 Research Design

The researchers employed a qualitative method to gather information in the form of non-numerical values to collect accurate analysis and data collection. It explores and provides deeper insights into real-world problems, qualitative research helps generate hypotheses to further investigate and understand quantitative data (Tenny et al., 2022). This research used survey type aligned to gather data in accordance to know the effectiveness of each study technique. This survey research helps the researchers to test hypotheses and answer the research questions of the study. This structure seeks to understand the experience of individuals with retrieval practice and the Feynman technique that provides insights into the barriers that may help them to express their academic excellence. The target population for this research is all of the senior high school students at San Jose Academy.

2.2.3 Population Sampling

A purposive sampling process is adopted for choosing participants in the present study. Purposive sampling is a form of non-probability sampling where participants are chosen purposefully on the basis of particular qualities that are essential for research objectives. There were fifteen (15) respondents involved in this study. This method is suitable because, in this way, the researchers were able to identify what

is the best study technique for the students in San Jose Academy

2.2.2 Research Instrument

The instrument used was a survey designed specifically for the senior high school students of San Jose Academy to evaluate the comparison of retrieval practice and the Feynman technique as study techniques. The assessment was based on the objectives of the learning benefits the students gained from either of the study techniques. There were ten (10) items pertinent to various types of associations to help the researcher gauge from the respondents if they felt like it helped them learn better, if they understood better, and other learning preferences between the two. The items were in the form of open-ended questions for qualitative data.

2.2 4 Data Gathering Procedure

The intended population of this research is the senior high school students of San Jose Academy. A questionnaire is given to each student that represents a different academic background and it will give important information for making this, the comparative effectiveness of retrieval practice and the Feynman technique in their study that will align with the researchers objectives. The selected sample will have the senior high school students of San Jose Academy. The researchers will purposively choose the participants regarding the criteria they have in choosing their respondent. Doing this, the study aims to gather important data that correctly align that will give information about the effectiveness of retrieval practice and the feynman technique on students.

3. RESULTS AND DISCUSSIONS

This Part of the study researchers will present the data that has been gathered from all the respondents.

The researchers have fifteen (15) respondents, in the data that have been gathered the number of female respondents is bigger compared to the number of male respondents.

Figure 1. Shows the Gender of the respondents

Sex	Frequency
Female	5
Male	10

This table presents the demographic profile of the respondents of this study who are mostly fifteen (15) to sixteen (16) years old (8) while the others fall on the edge of seventeen (17) to eighteen (18) years old (7).

Figure 2. Shows the Age of the respondents

Age	Frequency
15 - 16	8
17 - 18	7

Table 1. Experience of the students in study techniques

Question	Similarities	Frequency
1. Do you experience any struggle in your learning strategies? If yes, in what way.	A. Yes, in terms of financial and time management. B. Yes, by not being able to concentrate. C. Yes, comfortable in these techniques. D. Struggle with learning strategies due to short-term memory issues, attention span, a high volume of lessons, or distractions.	A. 1 B. 2 C. 2 D. 10
2. How do you feel your retention of information	A. It can also use both.	A. 2 B. 1 C. 4 D. 9

differs when you use Retrieval Practice compared to when you use the Feynman Technique?	B. Confidence within yourself. C. Prefers Retrieval Practice over Feynman Technique. D. Prefers Feynman Technique over Retrieval Practice.	
3. How do the Retrieval and the Feynman complement in terms of understanding complicated tasks that you faced as a student?	A. It levels in the high percentage of learning. B. They utilize Retrieval practice in a simple study technique to use. C. It's a complicated task, both can help. D. Easy to learn with these techniques.	A. 1 B. 8 C. 4 D. 2

Question 1 which explores if there's any struggle in the respondents study techniques, there were six (6) common themes: They struggles in learning strategies some because of short term memory, attention span, many lessons to learn and when someone is distracting this has the highest frequency as it has ten (10) mentions, Struggle with learning strategies due to short-term memory issues, attention span, a high volume of lessons, or distractions got two (2) mentions, Yes, comfortable in this, Yes, by not being able to concentrate two (2) mentions, Yes, in terms of financial and time management all got one (1) mention.

Question 2 which explores the different feelings of the respondent's retention of information when they use retrieval practice compared to the feynman technique, There were four (4) common themes: Prefers feynman technique than retrieval practice while one (1) chose retrieval practice over feynman technique this has the highest frequency as it has nine (9) mentions, They preferred the retrieval practice over feynman technique this has 4 mentions, it differs it also can use both this has two (2) mentions, Confidence within yourself has one mention

Question 3 which tackles how the retrieval and the feynman technique complement in terms of understanding complicated tasks that the respondents face as a student, There were four (4) common themes: They utilize retrieval practice in order to save time and remember info in a simple way when there is quizzes and exams they also found the retrieval practice a simple study technique to use has gotten the highest frequency as it has eight (8) mentions, It's complicated task, both can help has four (4) mentions, It makes reviewing more easy and make more easy to learn with these technique has gained two (2) mentions, receive feedback, consumes knowledge, and it levels in the high percentage of learning has gained one (1) mention.

Table 2. How students perceive difficulty and efficiency in learning process

Question	*Similarities*	*Frequency*
4. Have you noticed any changes in your confidence when recalling information after using either technique?	A. It made them confident. B. They can teach others with what they've learned. C. It enhances their memory.	A. 4 B.2 C.2
5. Do you recommend Retrieval Practice to your fellow students? Why or why not?	A. No, Time consuming. B. Not familiar with Retrieval Practice.	A. 5 B. 1 C. 4 D. 1

	C. It depends on the person. D. Effective even if it's not working on them.	
6. How do both Retrieval Practice and the Feynman Technique contribute to your overall academic performance?	A. Helps them in exams and quizzes. B. More convenient. C. Did not make a difference in their performance. D. Depends on the person.	A. 4 B. 2 C. 2 D.2

Question 4 which tackles if the respondents have noticed any changes in their confidence after utilizing either the retrieval practice or feynman technique, there were three (3) common themes: It made them confident to recite and report on school this has the highest frequency as it has gained four (4) mentions, They can teach other people with what they have learned this has gained two (2) mentions, It enhances their memorization this has gained two (2) mentions.

Question 5 which explores if the respondents recommends retrieval practice to their fellow students, There were five (5) common themes: Effective even if it's not working on them this has the highest frequency as it has three (5) mentions, It depends on the person if they're comfortable this has two (4) mentions, Retrieval Practice needs time and effort to do this has (1) mentions, Not familiar with retrieval practice so no has one (1) mention.

Question 6 which explores how do both retrieval practice and feynman technique contribute to your overall academic performance, There were four (4) common themes: It helps them in exam and quizzes has the highest frequency as it was able to get four (4) mentions, It is more convenient has gained two (2) mentions, Did not made a difference on their performance has gained two (2) mentions, It depends on the person has also gained two (2) mentions.

Table 3. How do the study techniques affect the students in retention and understanding

Question	Similarities	Frequency
7. Which study technique do you find more effective for learning new material, Retrieval Practice or the Feynman Technique? Why?	A. Both can help in academic performance. B. Have concentration using Feynman Technique. C. All you need in Retrieval Practice to do is take notes & will help in memory retention better.	A. 2 B. 7 C. 6

8. Between Retrieval Practice and the Feynman Technique, which do you feel has had a greater impact on your learning? Why?	A. Been using Feynman technique since grade 10. B. Can do self explanation in Feynman technique. C. It's simple and easier to utilize as it only has something to do in Retrieval Practice. D. Both had equally impact in academic performance.	A. 5 B. 2 C. 4 D. 4
9. What study technique do you think is easier to utilize Retrieval Practice or the Feynman Technique? Why	A. Not familiar with retrieval practice. B. Feynman Technique is easier to use. C. Retrieval Practice will help them in their memory retention. D. Both can be convenient, it depends on people.	A. 1 B. 5 C. 6 D. 3
10. Do you think these study techniques can help you? If yes, in what way	A. Not only in academics, but also in work. B. It will always depend on the person. C. Made them confident.	A. 2 B. 10 C. 3

Question 7 which explores which study technique do you find more effective for learning new material, retrieval practice or the feynman technique? there were three (3) common themes: Teaches myself more and have concentration using feynman technique has the highest frequency as it managed to gain seven (7) mentions, All you need in retrieval practice to do is take notes & will help in memory retention better has gained six (6) mentions, Both can help in my academic performance has gained two (2) mentions.

Question 8 which explores the question between retrieval practice and the feynman technique, which do you feel has had a greater impact on your learning, there were four (4) common themes: Been using Feynman technique since grade ten (10) and their grades got better has the highest frequency as it has five (5) mentions, It's simple and easier to utilize as it only has something to do in Retrieval Practice by repeating the information has four (4) mentions, Both had equally impact in academic performance has four (4) mentions while Can do self explanation in feynman technique has managed to gain two (2) mentions.

Question 9 which explores what study technique do you think is easier to utilize retrieval practice or the feynman technique? there were four (4) common themes: Retrieval technique as they think that writing and hearing the info over and over again will help them in their memory retention has the highest frequency as it has six (6) mentions, in feynman technique is easier to use, you wouldn't need anyone around you. Also is less effort this has managed to gain five (5) mentions, both can be convenient, it depends on people has managed to gain three (3) mentions while Not familiar with retrieval practice has gained one (1) mention.

Question 10 it tackles the question do you think these study techniques can help you?, there were three (3) common themes: It will always depend on the person as they all think that not all students can learn at the same rate and way this has the highest frequency as it garnered ten (10) mentions, all said yes because it made them confident, if you're grade conscious has gained three (3) mentions while Yes, Not only in academics, also in work has gained two (2) mentions.

4. CONCLUSION AND RECOMMENDATION

The main purpose of this study is to compare the effectiveness of retrieval practice and feynman technique in enhancing learning outcomes among senior high school students at San Jose Academy. It aims to determine which method is more effective in improving students' understanding, retention, and application of knowledge.

The researchers found out that both retrieval practice and feynman technique offer unique advantages in learning. retrieval practice is more effective for memory retention and exam preparation, while the feynman technique enhances comprehension through self-explanation. However, their effectiveness depends on the learner's preference, cognitive abilities, and study habits. Therefore, a flexible approach that incorporates both techniques based on individual needs may be the most effective strategy for students.

Future research could explore the long-term effects of these techniques on academic performance and their applicability in different learning environments.

The analysis of Question 1 about experiencing any struggles in their study techniques revealed five main categories with more students struggling with short term memory, attention span, many lessons to learn and when someone is distracting being the most commonly mentioned theme with 10 occurrences. The troubles of also being out of money and time have also appeared once.

The overall impact of this study is positive. Despite some challenges and individual differences in learning preferences, both retrieval practice and the feynman technique were found to be beneficial in different ways. The majority of students reported improvements in confidence, memory retention, and comprehension, indicating that these study techniques can enhance learning outcomes when applied effectively. While some students struggled with distractions or short-term memory issues, the study highlights the importance of choosing the right technique based on personal learning styles. Ultimately, the findings support the idea that incorporating effective study strategies can improve academic performance, making the study's impact largely beneficial and insightful for students, educators, and future researchers.

Based on the data gathered thus far on the research questions, the researchers would like to advise senior high school students to:

- help their children to manage their time for their school work.

- value healthcare for better future

- being mindful can help them feel less stressed and anxious.

- lessen the pressure on themselves.

These recommendations will help students in time management greatly and these will also greatly impact their academic performances in a positive way.

The researchers also recommend using both Feynman Technique and Retrieval practice for memorization and deep understanding.

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Investigating the Challenges and Strategies Faced by Middle Adulthood Tricycle Drivers by Maintaining a Work-Life Balance in Barangay San Jose, Navotas City

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Abstract: This qualitative study examines the challenges and strategies employed by middle adulthood tricycle drivers (aged 40-65) in Barangay San Jose, Navotas City, in order to maintain a work-life balance. These drivers face several difficulties, including unstable income, physical discomfort, traffic congestion, and lack of passengers. This study intends to focus on the productive strategies drivers use to maintain and balance their work life and personal life demands, which eventually will benefit the transportation field, the drivers, and humankind. By investigating how these drivers manage their time and overcome their daily challenges, the study provides meaningful comprehension of their daily life hurdles and the importance of work-life balance. Ultimately, through in-depth interviews and qualitative research, the investigation of experiences and perspectives of tricycle drivers highlights their strategies for maintaining a good-natured balance between work and personal life, strategies: spending day time for family and night time for working, extra job for extra income to provide for their personal needs . The results reveal that tricycle drivers utilize numerous strategies namely taking breaks, part-time jobs, counting upon government assistance, and relying on family support. Those strategies signify the drivers' flexibility and commitments to their families and work.

Keywords: *challenges; middle adulthood; strategies; tricycle driver; work-life balance*

1. Introduction

1.1 Background of the Study

Tricycles are a common means of public transportation in the Philippines and are usually built in a variety of styles in different cities. There are two types of tricycles. A pedicab can accommodate three passengers, including the driver. The motorized tricycle can accommodate five to six passengers. Moreover, the purpose of a tricycle is to transport people to prescribed places at a cheap price.

Tricycle drivers also known as self-employed workers suffer from traffic congestion and air pollution. Tricycles are a valuable source of income for numerous Filipinos, especially in the city regions like Navotas City. The limited availability they have in tricycles can survive and provide for their daily needs. middle-age tricycle drivers face challenges concerning work-life balance, the physical demands of driving a tricycle for long hours, along with the pressure to meet daily targets and navigate congested roads, negatively impact their physical and emotional health.

Further, the unpredictable financial situation and fluctuating income of middle adulthood tricycle drivers add to their stress and financial uncertainty. But, despite the title, these drivers are riddled with stressors associated to their jobs. Another hurdle is financial incapability, as they have daily earnings that they receive on an irregular basis and are in constant anxiety about being able to fulfill the needs of their family (Baral et al., 2024) also, concerning work-life balance, the physical demands of driving a tricycle for long hours and navigating congested words, negatively

impact their physical and emotional health. For instance, studies have shown that tricycle drivers often work long hours in difficult conditions, which can lead to health issues and stress (Rosal et al., 2024). Through spending time with them, researchers will find out how they overcome the challenges and what strategies they consistently apply in everyday life.

Middle adulthood tricycle drivers aged 40 to 65 years old, comprise an important segment of these workers. Maintaining a work-life balance is necessary for their welfare, job satisfaction, and efficiency. Tricycle Drivers in Navotas City experience innumerable challenges in maintaining work-life balance, and personal lives, determining their physical, emotional, and social well-being.

Tricycle drivers face various challenges in their health due to fluctuating temperatures, prolonged driving hours, and traffic congestion. They also contend with irregular income and inconsistent passenger demand. This study aims to evaluate the productive strategies these drivers use to balance work with personal life responsibilities.

It highlighted the development of effective strategies that ultimately benefit the transportation industry, the drivers, and society. Researchers chose this study to investigate how in middle adulthood tricycle drivers balance their work-life and personal life, and also to know the strategies they use to manage their time and overcome life's challenges. Whereas work-life balance is about how you spend your working time and outside of work. A good work-life balance can give you relief and productivity at work and also give you time for yourself and your family.

1.2 Statement of the Problem

The specific problems of this research sought to address the way of the middle adulthood tricycle driver in Barangay. San Jose and understand the main challenges in balancing their work responsibilities with personal/family life and also the Strategies and coping mechanisms to manage their work-life balance as they spend half a day working just to survive each day.

1.3 Significance of the Study

This study will benefit the Local government and tricycle drivers in Barangay. San Jose, Navotas City. Since the researchers are schooling at San Jose Academy and most of the students have a tricycle service. By knowing their challenges and strategies it may be helpful for:

Students. Having an understanding of the challenges and strategies of tricycle drivers can help students appreciate their daily struggles and encourage them to build better relationships with their service providers.

Commuters. This study can provide insights into how tricycle drivers navigate their work, which may lead to better communication and mutual understanding between drivers and passengers. This will help improve the relationship between the driver and passenger.

Residents of Barangay San Jose. By identifying the challenges faced by tricycle drivers, residents can better understand local transportation issues and advocate for community improvement.

Local Government. The findings of this study may help the local government to identify areas where they can provide support, such as better traffic management, policy improvements, or financial assistance for tricycle drivers. By that, tricycle drivers would have more confidence as a tricycle driver.

1.4 Scope and Delimitations

This analysis will concentrate only on Barangay San Jose to make certain the outcomes are relevant and specialized to that area. The target demographic will be middle-aged tricycle chauffeurs in the city, between 40 to 65 years old, who actively transport people around the location.

By investigating this set, researchers hope to realize the one-of-a-kind difficulties and tactics employed by middle-aged tricycle drivers to balance their career responsibilities with the rest of their lives. This study could provide helpful insight for transportation businesses and public policymakers.

2. Methodology and RRL

2.1 Review of Related Literature

The literature review highlights several critical aspects that impact the quality of life, work-life balance, and well-being of tricycle drivers and older adults. Munda and Gache (2024) note that the fast pace of modern life presents significant challenges in clearly separating personal and professional areas.

This leads to difficulties in maintaining a healthy balance between work responsibilities and personal commitments. This imbalance often results in reduced success in both areas and causes issues in either one's personal or professional life.

Life expectancy is rising, particularly in low- and middle-income countries, which underscores the importance of addressing work-life balance and health-related quality of life for older populations (Lee et al., 2020). Work-life balance encompasses the interaction between work-related and non-work-related time and space, and it plays a crucial role in shaping an individual's career and overall satisfaction (Popoola & Fagbola, 2020).

The concept of health-related quality of life for older people includes various dimensions, such as physical health, mental state, levels of independence, social interactions, personal beliefs, and environmental context (Enssle & Kabisch, 2020).

The global demographic shift towards an aging population highlights the need for studying the challenges and advancements for the development strategies that will improve the health-related quality of life for the aging demographic (Fulmer et al., 2021). Home is a vital source of stability, providing safety, a sense of belonging, and economic stability. Conversely, feelings of homelessness, whether due to losing one's home or unsuitable living conditions, negatively affect well-being (Almevall et al., 2021).

Studies have shown that key factors linked to well-being include avoiding loneliness, feeling included, good health, physical activity, and living in one's own home. Engagement, freedom, and acceptance also play essential roles in influencing well-being, especially in very old adults (Almevall et al., 2021).

The study of Fhrizz and Winnie (2022), found that the longer someone has been driving a tricycle, the more likely they are to encounter the challenges mentioned earlier. Based on the responses, drivers with over a decade of experience have become more adept at managing the various difficulties associated with the job while also complying with environmental regulations and local ordinances.

These segments highlighted a few important parts of the power of work-life balance and the well-being of tricycle drivers and older adults. Such as the importance of a home that provides stability and economic security, life expectancy focuses attention on addressing work-life balance and health-related quality of life for older adults also studying the challenges and improvements for developing strategies that will enhance the health-related quality of life for the aging demographic.

2.2 Methodology

2.2.1 Research Design

This study investigated the Challenges and Strategies Faced by Middle Adulthood Tricycle Drivers in Navotas City. This study will employ a descriptive qualitative research design, which will allow for an in-depth exploration of the lived experiences of middle-aged tricycle drivers in Brgy. San Jose, Navotas City as they navigate the complexities of balancing work and life. The focus will be on understanding the meaning they ascribe to their experiences, the challenges they face, and the strategies they employ to manage these challenges.

2.2.2 Population Sampling

This study will use a purposive sampling technique focusing on investigating middle-aged tricycle drivers in Navotas City. This sampling technique allows the researchers to collect information that will give clarification for this study. Purposive sampling will focus on 15 tricycle drivers to gather data that are qualified for the study, data will be gathered through interviews.

2.2.3 Research Instruments

In this study, the researchers gathered data through interviews and provided questionnaires that are suitable to the study challenges and strategies faced by middle aged tricycle drivers by maintaining a work-life balance to gather data that will be needed for this study. In the interview, the researchers used open-ended questions that required participants to answer in their own words.

2.2.4 Data Gathering Procedure

To begin the data gathering, researchers used interview questionnaires to collect data and carefully select suitable questions on the study's goals to gather an appropriate data collection. At that, the interview questionnaires are sent to their research adviser for further evaluation and confirmation. The researchers began collecting data as soon as the questionnaires were validated.

3. RESULT AND DISCUSSION

The researchers mounded fifteen (15) middle-aged tricycle drivers in Barangay San Jose Navotas City to fill the research gap in this study. The succeeding Figures show the demographic profile of the respondents:

Figure 1. Presents the Age of respondents

AGE	*FREQUENCY*
40 - 44	2
45 - 50	5
51 - 55	0
56 - 60	3
61 - 65	5

The major part of this study was the five (5) individuals aged 45 to 50 years old and five (5) 61 to 65 years old, signifying an interest in investigating this study. Additionally, three (3) respondents aged 56 to 60 years old, while two (2) for 40 to 44 years olds.

Figure 2. Years of driving

YEAR	*FREQUENCY*
3 - 5 Years	*1*
6 - 10 Years	*0*
11 - 15 Years	*2*
16 - 20 Years	*7*
More than 20 Years	*5*

Demographics stated the years of driving of the respondents, the utmost frequency is 11 to 15 years of driving which is 7 tricycle drivers in Barangay San Jose, on the other hand, five (5) respondents are more than 20 years of driving while one (1) of tricycle drivers 3 to 5 years driving a tricycle.

To present the data gathered, the researchers used a tabular format. To present the common challenges, strategies, and how tricycle drivers maintain their work responsibilities and family responsibilities. There were ten (10) interview questions provided by researchers in three (3) sections based on the study's SOP.

Table 1. The challenges faced by Middle adulthood tricycle drivers in Barangay San Jose, Navotas City.

QUESTIONS	***COMMON THEMES***	***FREQUENCIES***
1. What are the challenges you typically face in a day as a tricycle driver?	a. Traffic Congestions b. Minimal Charge c. Crack pavement d. Low ridership	a. 15 b. 6 c. 5 d. 4
2. What is the challenge you have encountered?	a. Financial Strain b. Hunger c. Sudden health issue	a. 15 b. 8 c. 2
3. In what ways do the challenges you encounter affect your sense of self-worth or your interactions with others?	*a. None, they do not take their problem seriously* *b. None, they will not let the problems affect them.*	a. 8 b. 7

For Question 1, examine what are the challenges typically faced by tricycle drivers. Respondents have four (4) common themes: "Traffic congestion" is the biggest challenge typically faced by tricycle drivers as mentioned fifteen (15), "Minimal charge" collects six (6) comments, meanwhile, "Crack

pavement" has five(5) mentions, and "Low ridership" gets the lowest frequency with four (4) mentions.

Question 2 is about the other challenges they encounter not just as tricycle drivers. Respondents have three (3) common themes: "Financial strain" gets the highest frequency with fifteen (15) remarks, "Hunger" has eight (8) mentions, and the lowest frequency gets two (2) which is the "Sudden health issue".

Question 3 is asking about in what ways the challenges affect their sense of self-worth or their interactions with others. Respondents have two (2) common themes: the first theme "None, they do not take their problem seriously" gets the highest frequency with eight (8) mentions and for the second theme is "None, they will not let the problems affect them." gets the seven (7) mentions.

Table 2. The Strategies of Tricycle Drivers in Barangay San Jose, Navotas City

QUESTIONS	***COMMON THEMES***	***FREQUENCIES***
4. What are the specific strategies you employ to overcome the challenges you face as a tricycle driver?	a. Seeking commuters b. Great Patience c. Side Job	a. 6 b. 5 c. 4
5. What coping mechanism do you use to deal with problems associated with your job?	a. Taking a short break then continue working b. Save small amount for incase of emergency (e.g. hungry) c. They just enjoying working	a. 11 b. 2 c. 2
6. How are you equipped during a heavy weather season?	a. They will use the cover for the tricycle and raincoat for them b. Still working c. Let the weather calm down	a. 10 b. 6 c. 2 d. 2

7. What are the strategies you usually use everyday as a tricycle driver?	a. Taking break and rest b. Searching commuters c. Great Patience d. Get along with others	a. 13 b. 8 c. 7 d. 3

For Question four (4) pertaining to specific strategies of tricycle driver utilized to overcome the challenges they faced as a tricycle driver, Respondents has a three (3) common themes: got the highest frequency is “Seeking commuters” with six (6) mentions, in another hand, “Great patience” with five (5), and got the lowest frequency is “Side Job” with four (4) mentions.

Question five (5), tackling coping mechanisms they used to deal with problems related to their job. Respondents has a three (3) common themes: “Taking a short break then continue working” has the highest frequency with eleven (11) mentions and the two (2) common themes with 2 mentions, “Save small amount for incase of emergency (e.g. hungry)” and “They just enjoying working”.

Question six (6), strategies when having a heavy weather season. Respondents have three (3) common themes: “They will use the cover for the tricycle and raincoat for them” , the highest frequency with six (6) mentions, for "Still working” has six (6) mentions, and for lowest frequency “Let the weather calm down” with two (2) mentions.

Last question, Question seven (7) is about the strategies they usually use as tricycle drivers. Respondent has four (4) common themes: First, “Taking break and continue” the utmost frequency with 13 mentions, second, “*Searching commuters”* with the 8 mentions, third, “Great patience” has 7 mentions and lastly, got the lowest frequency with 3 mentions is “Get along with others”.

Table 3. Presents how tricycle drivers maintain work responsibilities and family responsibilities.

QUESTIONS	***COMMON THEMES***	***FREQUENCIES***
8. How do you balance the demands of your job with your personal responsibilities, such as family care, household chores, and personal well-being?	a. Prioritize the household chores before going to work b. Day time for family and night time for working c. Take a day off for family time. d. Do not have family	a. 8 b. 4 c. 2 d. 1
9. What support system do you rely on to help you manage the demands of your work and personal life?	a. Daily Driving for Income b. Find additional income opportunities after pedaling c. Asking for Relatives for Help d. Part of Senior citizens financial assistance	a. 13 b. 2 c. 2 d. 2

10. How do you prioritize your personal needs and well-being amidst the demands of your job?	a. The cost of living is the priority b. Prioritize the children's education c. Budgeting	a. 13 b. 1 c. 1

For the last three (3) questions, the 8th question is about how tricycle drivers balance the demands of their job and the demands of their personal responsibilities. Respondents have the four (4) common themes: "Prioritize the household chores before going to work" which is got the highest frequency of eight (8) mentions, "Day time for family and night time for working" got four (4) mentions, while, "Take a day off for family time" with two (2) mentions, lastly, got the lowest frequency "Do not have family" with 1 mention.

Question nine (9) , asking the support system of tricycle drivers to rely on to help them manage the demands of work and personal life. Respondents have the four (4) common themes: "Daily driving for income" got the utmost frequency with 13 mentions while "Find additional income opportunities after pedaling", "Asking for Relatives for Help", and "Part of Senior citizens financial assistance" got the 2 mentions.

For the last question, Question ten (10) about how they prioritize their personal needs and well-being in the midst of job demands. Respondents have three (3) common themes: The highest frequency with 13 mentions is "The cost of living is the priority" while "Prioritize the children's education" and "Budgeting" got 1 mention.

4. CONCLUSION AND RECOMMENDATIONS

4.1 CONCLUSION

This study offers valuable insights into tricycle drivers' challenges and strategies and how tricycle drivers balance their work life and personal lives. Respondents share the common struggles they encounter, like regular income was not enough for their daily needs, few passengers, traffic congestion, and technical problems. By acknowledging their challenges and strategies, we can better understand and appreciate the effort and dedication of tricycle drivers and determine the possible solutions to improve tricycle drivers' lives.

4.2 RECOMMENDATIONS

The researchers found that tricycle drivers are facing numerous challenges in their everyday life. Therefore the researchers recommend the following:

Students must be considerate and aware of others especially for our workers such as tricycle drivers by being fair and treating them with kindness and respecting their field of work.

The **government** should provide financial assistance to cover their personal needs and family expenses and the government shall offer alternative employment opportunities to enable tricycle drivers to further their professional growth and sustain a balanced work-life dynamic.

Commuters must engage with and e
encourage tricycle drivers to exert effort, persist, and continue despite challenges. Additionally, commuters should provide adequate and equitable compensation to prevent revenue deficiencies for tricycle drivers.

Future researchers may conduct a new additional study related to tricycle drivers to enhance our understanding of the reasons for their experiences.

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The Carrot and The Whip: Exploring the Influence of Operant Conditioning as Teaching Strategy on Grade 11 Students' Academic Performance in San Jose Academy

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Abstract: This study examines the influence of operant conditioning teaching strategies on grade 11 students of San Jose Academy. Operant conditioning is a learning approach based on positive and negative reinforcements, and it has been commonly used in some classrooms without the proper understanding of its application. Addressing the research gap on existing research, this study aims to determine the influence of operant conditioning teaching strategy on their academic performance by collecting students' perspectives on the said phenomena. The results indicate that positive punishment is a regularly employed technique. With a Qualitative research design being implemented, the collection of data is from 15 academic achievers students' of San Jose Academy and their perspective on operant conditioning, the data collection was collected online using Google Docs and through a voice message. The findings of the study revealed that students who receive rewards, praise, acknowledgements, etc., are most likely students who are productive in class, however, students who receive positive punishment are most likely to behave. Students who receive punishment through embarrassment are most likely students who don't want to attend the class. In conclusion, this research study builds upon existing knowledge on the application of Operant Conditioning among Grade 11 Students. The findings suggest that operant conditioning as a teaching strategy should be applied in every classroom with a proper application and understanding of its influence on students' academic performance. These results provided insight into how operant conditioning needs critical implementation for educators to reduce the negative outcomes of operant conditioning teaching strategy on students' academic performance.

Key Words: *Academic Performance; Operant Conditioning; Punishment; Rewards; Reinforcement*

1. INTRODUCTION

1.1. Background of the Study

The purpose of this study is to investigate how operant conditioning teaching methods influence grade 11 students' academic performance.

Operant conditioning, which is sometimes referred to as instrumental conditioning, is a learning method that enforces positive and negative reinforcements, which influence the behavior of the experiment subject. Burrhus Frederic Skinner created a box called the Skinner box and experimented with pigeons and rats with electric shock as a punishment and food as a reward. In the said punishment and rewards given by the box, the experimental subjects learned to press the lever whenever the green light turns on. Skinner's success in experimenting on pigeons and rats shows how punishment was introduced to reduce behavior while rewards were introduced to increase behavior. However, Skinner's idea of operant conditioning did not only take place in experimental settings but has been widely used in every setting, such as home, schools, etc.

The main objective of the topic, "The Effects of Operant Conditioning Teaching Strategy on Grade 11 Students' Academic Performance," is to examine and evaluate how the application of operant conditioning principles, as a teaching strategy, influences the academic performance of grade 11 students.

1.2. Statement of the Objectives

This study seeks to understand the influence of the operant conditioning teaching strategy on students' academic performance. The study aims to identify how rewards affect students' motivation to perform inside the classroom and how punishment affects students' actions. This study also intends to discover the students' different views and perspectives about the application of the operant conditioning teaching strategy. In order to form recommendations based on the findings of the study.

1.3. Significance of the Study

This study explores the influence of reward and punishment as a teaching strategy on grade 11 students, and the result of this study will benefit the following:

Students. This study will help grade 11 students at San Jose Academy to improve their academic performance by refining educators' teaching strategies. Students will increase their confidence when educators regularly give honest feedback and encouragement to a student.

Teachers. This study will benefit educators in terms of developing strategies that would minimize disruptions in class. Teachers' job satisfaction will improve with the application of operant conditioning. In addition, the study can inform educators on what technique they should use in a classroom, based on their students' characteristics.

School administrators. This study will provide insights on the school administrators on how rewards and punishment influence students academic performance that would help school administrators identify what teaching methods work best on students. By the help of this study, the school administrators will be able to supply actionable data that would help teachers and students on what are the best strategies for a better performance.

Future Researchers. This study provides valuable insights and evidence for future researchers who will investigate operant conditioning's influence on the academic performance of students. This research study offers a practical recommendation for effective discipline in the classroom. Researchers seek to provide insights that can provide support in a variety of educational contexts.

1.4. Scope and Delimitations

This research study focuses on investigating the effects of operant conditioning as a teaching strategy on the academic performance of Grade 11 students in San Jose Academy. The scope of this study is focused on the students of San Jose Academy, specifically those in Grade 11, and will only focus on the impact of operant conditioning on their academic performance.

To maintain the manageability of the study, specific delimitations will be established. Firstly, the study will be conducted in San Jose Academic, which other schools are not included in. Secondly, the findings will be specific to grade 11 students only and cannot be generalized to students in other grade levels. Lastly, the study will solely focus on operant conditioning as a teaching strategy, and other teaching methods are excluded.

2. METHODOLOGY AND RRLS

2.1 Review of Related Literature

Operant conditioning, as observed by B.F. Skinner has been widely used in classroom settings that shape students through rewards and punishment. Research on the application of operant conditioning in educational contexts reveals various effects on students' academic performance, particularly both negative and positive effects on students, depending on how the teachers implement rewards and punishment. According to Mantog and Castro (2024), the result of the study they had conducted shows that operant conditioning positively mitigates disruptive behavior among grade 6 students. This provides insight into how operant conditioning has a vital role in shaping students' morals and behavior. This aligns with the findings of Tolero et al. (2021), whose study shows that teachers' use of rewards, such as giving praise and

compliments, can give recognition to students, making them motivated to study well.

However, while positive reinforcements attract positive effects on students' academic performance negative reinforcement attracts both positive and negative effects on students' academic performance, particularly in the study of Fauziddin et al. (2023), and Wider et al., in which they tackle the negative effects of negative reinforcement on students. Punishment does not only serve students discipline, but it can also lead to students' lack of self-confidence and even fear of self-expression. Punishment such as exercise as a punishment for poor academic performance is demonstrated to be ineffective and ethically questionable punishment according to the discussion in the study of Wider et al., (2024) their study provides effects of forced exercise as a punishment for students bad academic performance could lead to students decreased motivation, physical injury, and even psychological distress. (Yulian et al., 2019), as cited in Wider et al. (2024).

In the study of Castillejos (2022), the result of the study shows that teachers view rewards as an effective method in mitigating all of their students' behavior. In addition to that, they strongly agree to the use of a rewards system, as it helps in motivating students. However, this study is only based on teachers' perspectives on operant conditioning teaching strategies with an absence of students' perspectives. To make the information balanced, students' perspectives on operant conditioning should be presented in this study.

Some researchers dislike the idea of a rewards and punishment type of discipline because of its negative effects on some students' mental health, but despite the negative effect of the use of operant conditioning. In Chen's (2023) study, they found that using this strategy can foster good behavior in students and remove bad behaviors. The use of operant conditioning in disciplining youth is popular among parents and teachers, as this is not only effective but also quick in effect. Sidin's (2021) study found out that if implemented wisely and righteously, the negative effects of operant conditioning can be prevented. With the right and effective use of operant conditioning, students' behavior and morals can be modified. That is why it is important for teachers to consider what are the effective rewards and punishments for their students to avoid the repetition of unwanted actions of students. The study of Eliseo (2024) shows how teachers should navigate effective discipline for their students to avoid negative effects on students' well-being and development. Discipline influences the learning process by creating a stress-free environment, whereas students behave accordingly to allocate time in activities, and in order to identify what discipline is effective for their students, teachers should observe and maintain a set of daily routines because this will help in shaping learners character and boost their motivation. In addition to the study of Saputri and Widyasari (2021), the researchers suggest that teachers should first focus on the different characteristics of students for a higher possibility of mitigating students' behavior. After that, give students the best and right rewards and punishments and explain why each student has a different type of rewards and punishment to enlighten students and to avoid envy among students. The study of Senados (2023) emphasizes that teachers play a vital role in molding students' futures. That is why it is important for teachers to correct students' behavior as soon as possible.

The study of Hermansya et al. (2023) reveals that the implementation of rewards and punishment improves students' academic performance, as it shows improvement in students' attention to learning, students' confidence in their ability to do learning tasks, and students satisfaction with the learning process that has been carried out.

2.2. Methodology

This section is composed of the research design, population sampling, research instrument, and data-gathering procedure. That will help researchers explain the design and methods of the research study.

2.2.1. Research Design

The study explores a qualitative research design wherein the researchers' explore a deeper understanding and seek to provide answers on the objectives being studied. According to Tenny and Brannan et al. (2022), qualitative research is a type of research that focuses on exploring and obtaining insight from real-world problems. The researchers studied the influence of operant conditioning as a teaching strategy. This study focused on gathering participants' experiences, perceptions, and behavior.

The approach used in this study is phenomenological; it provides a comprehensive understanding of Grade 11 students' perceptions and experiences related to this study. This approach helps the researchers identify the influence of operant conditioning as a teaching strategy on students' academic performance.

2.2.2 Population Sampling

The study implemented purposive sampling to select a sample of Grade 11 students who experienced rewards and punishment inside their classrooms. The sample consisted of fifteen (15) senior high schools from grade 11 at San Jose Academy. The participants were chosen based on their academic achievements, those who were receiving high grades, and good performance on tests. Furthermore, after selecting students from other sections, the students from the researchers' class were also selected for interviews, specifically those who were included on the honor list. By intentionally choosing participants through experienced conditioning, the study seeks to provide meaningful insights concerning the influence of rewards and punishment.

2.2.3 Research Instrument

The researchers formulated open-ended questions and asked for validation from their research adviser. The questions for the interview were prepared by the researchers to collect the information needed in this study. The researchers conducted an online interview using Messenger, and respondents sent their answers via voice messaging. The participants had the opportunity to respond to questions that were asked by the researchers and were encouraged to share their experiences, insights, or thoughts about the phenomena. Researchers will explore the participants' views on rewards and punishments and how it affects the school performance of Grade 11 students at San Jose Academy.

While participants answer the questions given by the researchers, the researchers will perform voice recording that would enable researchers to gather detailed information from participants. Before starting the recording, the researchers will give a soft copy of the consent form, which contains permission for voice recording. The researchers will ensure that the recorded voice will be maintained privately. The answers of participants will be the researchers' basis for analyzing the data.

2.2.4 Data Gathering Procedure

This study used a qualitative research design. The researchers employed interview questionnaires to collect data. In order to collect data, the researchers used a random sampling technique. The chosen participants of this study were fifteen (15) from San Jose Academy. The interview questionnaire consists of ten (10) open-ended questions, formulated by the researchers, and they start to request validation from their research adviser. Once the questionnaires were validated, the researchers gathered their data until they completed the information needed in this study.

3. RESULTS AND DISCUSSION

A total of fifteen (15) participants provided valuable insights into this research study. The demographic profile of the participants is summarized in the following figures:

Figure 1. Presents the sex of the Participants

Sex	Frequency
Female	11
Male	4

The demographics show a significant gender imbalance and reveal a predominantly female presentation, with 11 women making up the majority of the survey interview. Makes participants limited, accounting for only 4 out of 15 participants.

Figure 2. Present the Age of the Respondents.

Age	Frequency
16	11
17	4

The majority of respondents are 16 and a minority are 17 years of age and participated in the study on operant conditioning. The results demonstrate a strong belief in rewards and punishment works among students from Grade 11 at San Jose Academy. This study highlighted the effectiveness of operant conditioning in shaping the behaviors of selected participants.

Figure 3. Presents the Strand of the Participants.

Strands	Frequency
STEM	9
HUMSS	3
ABM	2
UNKNOWN	1

Feedback from 15 students among three academic strands (STEM, HUMMS, and ABM)

presented the following results of operant conditioning as a teaching method: STEM (9 students), HUMMS (3 students), ABM (2 students), and 1 student strand was unidentified.

To organize the collected data, the researchers employed a tabular format. This approach enabled them to present the common themes and responses from the participants. The ten (10) interview questions were categorized into three sections based on the SOP, which guided the ten questions.

Table 1. The effects of rewards on students' motivation

Questions	Theme	Frequencies
1. Does receiving a reward create a feeling of pride and achievement ?	a. Recognition b. Self-esteem c. Rewards given with effort	a. 4 b. 3 c. 1
2. How does receiving praise influence the way you approach your school work?	a. Productivity b. Motivated c. Boost confidence	a. 7 b. 6 c. 4
3. What type of rewards influence your willingness to participate in classroom activities?	a. Certificate of recognition b. Recitation chips c. improving a skills	a. 6 b. 6 c. 1
4. Do you believe rewards create unhealthy competition? Why or Why not?	a. Yes, rewards should only be encouraging b. No, it creates motivation c. it depends d. Yes, it builds favouritism	a. 5 b. 3 c. 2 d. 1

Question 1: The researchers discovered that rewards make students' hard work noticeable (mentioned 4 times). Receiving rewards boosts self-esteem based on the (3) participants. On the other hand, (1) argues that rewards are achieved only when earned by efforts.

Question 2: When Grade 11 students receive praise, the majority of the respondents say they become more attentive in class as it got (7) mentions, praises make them more motivated with (6) mentions, and boost their confidence that has been mentioned (4) times.

Question 3: The participants had different answers when it comes to the influence of rewards. Certificates of recognition are the majority type of reward that influence students for their willingness to participate in classroom activities. Also, recitation chips show that it can also influence their willingness.

Question 4: Students do believe that punishment should not make everyone feel they have to compete, but encouraged. Others say it can motivate students to participate more.

Table 2. The effects of punishment on students' actions.

Questions	*Theme*	*Frequency*
1. Have you experienced being punished in front of your classmates? If yes, how does it affect your school performance?	a. No b. Will take it as a lesson c. Lessens confidence d. Affects mood e. Don't want to experience f. It doesn't affect at all	a. 6 b. 5 c. 4 d. 4 e. 2 f. 1

2. Have you experienced being punished in front of your classmates? If yes, how does it affect your school performance?	a. Being scolded b. Feeling insulted c. Privately corrected d. Getting compared	a. 8 b. 4 c. 3 d. 1
3. Do you believe that punishment creates a fearful and stressful learning environment? Why or Why not?	a. Yes, fear of messing up again b. No, punishment is a room for improvement c. Depends on how the students view discipline	a. 6 b. 3 c. 1

Question 1: The researchers have explored that the majority of the students have not experienced punishment, as it got 6 mentions. (5) participants have been punished but will take it as their lesson. (4) Students lessen their confidence after being punished the same as the students that affect their mood after being punished. (1) The student says it does not affect that at all.

Question 2: The majority of students would change if the teacher scolded them, as it got 8 mentions. Privately corrected and constructive criticism would be enough for the (3) participants to change their poor behavior, and (1) influenced to change after getting compared.

Question 3: The researchers found that the majority of students caused them to be afraid to make mistakes, even if they were as small as (6) mentions. (3) participants say it creates a fearful environment, but punishment for them is a step to be better. The least of students argues that it only creates a fearful and stressful environment depending on how the students may view punishments.

Table 3. The perspective of a student about application of Operant Conditioning.

Questions	*Theme*	*Frequencies*
1. Do you agree that rewards and punishment should be implemented in every class? Why or Why not?	*a. Yes, because there's benefit for students.* *b. Implement in a proper way* *c. No, because it can cause tense classroom environment* *d. If needed only*	*a. 7* *b. 6* *c. 1* *d. 1*
2. Do you believe that with rewards and punishment inside the classroom, the students would behave accordingly? Why or Why not?	*a.It depends* *b.Yes, rewards and punishment is huge factor for students to behave* *c. No, because not everyone cares about rewards*	*a. 8* *b. 3* *c. 2*
3. Do you believe that punishment strains teacher-student relationships? Why or Why not?	*a.Yes, when punishment is too much.* *b. It depends on how students perceive the teacher's approach to discipline.*	*a. 12* *b. 2*

Question 1: The researchers analyze the perception of students in implementing rewards and punishment in every class. Seven (7) students agreed that it should be implemented for the benefits of the students. Six (6) participants agreed upon how punishment should be implemented, but in a proper way. Only one (1) student disagreed that rewards and punishment should not be implemented because it can cause a tense classroom environment.

Question 2: The majority of the responses to this question are (8) that believe that the rewards and punishment should be implemented in every classroom. (5) Students believe that having rewards and punishment inside the classroom would and would not be the cause of students behaving; they argue that it only depends on the students if they would behave or not.

Question 3: Examines the effect of punishment in teacher-student relationships. In this study, the researchers have developed, with the help

of (12) students who believe that teacher-student relationships would affect when the punishment is too much because students would talk bad behind teachers' backs. On the other hand, (2) students believe that it depends on how the students perceive the teacher's approach to discipline.

4. CONCLUSION AND RECOMMENDATION

In conclusion, this research has explored the significant impact of rewards and punishment as teaching strategies in the educational development of the students. Based on this study conducted by researchers, the findings confirmed that most of the learners are motivated and encouraged to keep up their academic engagement when receiving validation on their good work. On the other hand, negative reinforcement can lead the students in a fearful environment, but other students see punishment as a way for self-improvement. The researchers have enough information that it is effective and might have potential use in the classroom. However, to protect students' emotional health and maintain an active learning environment in the classroom, it is important for teachers to balance rewards and punishments.

After exploring the influence of rewards and punishment on Grade 11 students' behavior and motivation, the researchers suggest that the future researchers should explore the perspective of teachers who implement these strategies inside the classroom, given the suggestion and in one of the researchers' interview questions; it is important for students to also understand what teachers think about how rewards and punishment affect their relationship with the students. As the participants said, harsh punishment could lead to feelings of resentment, damaging the relationship between students and teachers. The current researchers on this study are delighted to know how teachers perceive the effectiveness of these methods.

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Exploring the Benefits of Community Service Programs on Social Skills Development of Senior High School Students at San Jose Academy

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Abstract: The purpose of this phenomenological study is to conduct a comprehensive research into the benefits that community service programs provide for senior high school students at San Jose Academy, especially the development of social skills. This research seeks not only to highlight the various benefits that the volunteers have gained through these activities but also to deeply explore the personal experiences of the participants. To ensure a systematic gathering of the collected data, the researchers conducted an interview with fifteen (15) participants, specifically senior high school students at San Jose Academy. The researchers employed a qualitative method, carrying out in-depth one-on-one interviews with fifteen (15) participants, guaranteeing a broad range of perspectives. Throughout these interviews, participants were asked a series of ten (10) well-structured open-ended questions aimed to draw out detailed insights into their experiences. The objective of this research is to raise action and encourage individuals, particularly the youth, to actively participate in community service programs. These programs not only benefit the community but also contribute significantly to personal development, particularly in enhancing social skills. This study emphasizes the necessity for a collective response that promotes a deeper understanding, improved treatment, and better conditions for dedicated volunteers. The experiences reported by volunteers serve as evidence of their commitment and resolve, highlighting the importance of supporting and engaging with these individuals. The findings derived from this study reveal a spectrum of benefits, as well as challenges and disadvantages, such as time management and health issues that are associated with active participation in community service activities. Importantly, the results underscore the profound impact that volunteer experiences can have on the personal growth and development of individuals, enriching their social competencies and fostering a greater sense of community connection.

Key Words: *benefits; challenges; community service; social skills; volunteers;*

1. INTRODUCTION

1.1 Background of the Study

The benefits of community service programs for enhancing social skills are significant. These activities are closely linked to an individual's growth, which is essential for their overall well-being and personal development. The study on the benefits of community service programs on social skills provides valuable insights into their benefits, as well as the broader

personal growth that these experiences can foster.

Community service involves voluntary efforts carried out by individuals or groups without any financial compensation, with the objective of improving the well-being of the community. According to Heldt (2021), these programs provide an opportunity for students to engage with their communities to gain practical experience that would benefit their personal development. These programs benefit different segments of the population, including elderly individuals, persons with disabilities (PWDs), and animals requiring assistance. Common activities include cleaning public parks, organizing feeding programs, tutoring disadvantaged students, and participating in charity events. Such programs not only offer essential support to those in need but also foster a sense of community and social responsibility among volunteers.

According to Distress Centre (2024), tackling unfamiliar tasks or demonstrating resilience during emotional challenges provides experiences of overcoming obstacles through service that can enhance one's self-assurance and determination, and their own communication skills. Moreover, engaging in community service allows individuals to develop valuable skills and experiences that promote personal development and enhance professional opportunities.

Community service programs play a crucial role in the educational journey, as they promote the comprehensive development of students, particularly in the area of social skills. The Senior High School stage represents a crucial time for refining social skills such as interpersonal awareness, teamwork, and effective communication. Given the growing dependence on technology, which has reduced in-person interactions, the importance of community engagement has become increasingly evident. Through their involvement in volunteer activities, students can shape meaningful connections with a diverse range of community members. By actively participating in these initiatives, students are afforded the opportunity to engage with significant social issues, fostering a sense of responsibility and empathy. Furthermore, these programs provide a valuable platform for students to develop essential life skills that will be relevant to their future pursuits. These community service programs are pivotal in providing students with vital life skills that also go beyond academic settings. Through active involvement in these programs, students cultivate abilities such as leadership, conflict resolution, and time management, which prepare them for future challenges in their personal and professional lives. As they manage event organization, collaborate with classmates, and address the needs of the community, students undergo a transformative experience that not only enhances their educational journey but also establishes a foundation for the meaningful acquisition of key social skills, encourages engagement, and provides students with essential life capabilities. This research study seeks to explore how community service programs benefit the development of social skills among senior high school students at San Jose Academy. First, the study will examine the benefits that community service programs provide in fostering social skills. The second focus will be to identify the challenges that the students face while improving their social skills and to investigate strategies for overcoming these obstacles. Finally, the research will assess how students can apply the social skills they have acquired to their daily lives and interactions at school.

1.2 Statement of the Problem

1.3 Significance of the Study

It aims to determine the benefit of community service programs on the social skills of senior high school students at San Jose Academy. Senior high school students will help them to discover the benefit of community service programs to improve their social skills, which they can apply in real life situations.

Students. Students will be able to understand how community service programs benefit their physical, mental, and emotional well-being and also to know their own potential. It also provides insights on how they can improve their capabilities in school or at work.

Parents/Guardians. Parents and guardians will gain knowledge regarding how community service programs help develop their children's social skills. They can also have an open mind on what is the future of their child by participating in community service programs, which can help them to discover new things.

Teachers. Teachers will be able to know further about the benefits of having community service programs on the communication skills of their students. With this, teachers can help students by improving themselves more to help them develop their social skills especially in the classroom.

Future Researchers. This research is helpful as a guide for their future research study that will also help them acquire knowledge about the experiences and the benefits of community service programs on social skills development.

1.4 Scope and Delimitations

This study will focus on the benefits and effectiveness of community service programs in Senior High School students' social skills development. The study will use interviews and self-reported data limited to 15 participants. Data will be collected through surveys, interviews, and participant observations during their community service activities. It views how participation in such programs enhances communication, teamwork, empathy, and leadership skills among Senior High School students. Overreporting and underreporting of perceived benefits of participation are common with survey and interview instruments. The short duration of academic completion constrains the study and does not give an adequate picture of the long-term effects of community service initiatives on the development of social skills.

2. METHODOLOGY and RRL

2.1 Review of Related Literature

Engaging in volunteer activities offers students a concrete opportunity to contribute positively to their communities and help organizations in fulfilling their objectives, at the same time enhancing their credentials for professional opportunities (Claybourn, 2022). Many organizations are facing limitations in staffing and financial resources, depending on volunteers to push and achieve their goals. For many adolescents, participating in volunteer service programs provides a valuable experience to interact with cultures or communities they might not otherwise have the opportunity to explore.

According to Segal and Robinson (2024), community service involves voluntary work that benefits one's community. It gives 2-way benefits for each individual. It provides essential assistance to those in need while fostering fulfillment and connection among volunteers. Through engagement in such service, individuals contribute to a greater cause, creating a positive impact. Furthermore, it encourages shared investment in the community's well-being and establishes supportive common values and experiences, enhancing the community's capacity to address challenges effectively.

The development of social skills in children is crucial for their well-being and success. These skills enable effective interactions with peers and adults, promoting cooperation, sharing, friendships, teamwork, and respect. Qualities such as helpfulness and empathy are vital for forming meaningful relationships and managing social situations. This emotional intelligence enriches their experiences, particularly in academic settings where communication is essential. (Hagen, et al., 2020)

Community service develops essential skills such as leadership, communication, and teamwork, which are crucial in today's competitive job market. Participating in these programs allows participants to face real-world challenges, thereby enhancing their critical thinking, problem-solving, and interpersonal skills. Community service introduces individuals to diverse populations and significant social issues, fostering cultural competence and an appreciation for varied perspectives. These experiences cultivate empathy and provide valuable insights into the distinct circumstances encountered by different communities. (Afzal & Hussain, 2020).

According to Kamarulzaman et al. (2022), students who participate in volunteer activities, especially those who dedicate substantial hours, demonstrate enhancements in self-esteem and protective motivations, which is closely associated with their goals for personal growth and development. This evolving mindset indicates a commitment to community contribution while enriching their life experiences. As students invest more time and effort in volunteering, they acquire valuable skills and insights that facilitate their overall development.

Participating in community programs greatly increases awareness of the value of volunteering. This involvement not only supports local development but also fosters a deeper understanding of social responsibilities and connections within the community. Volunteers can see the real impact of their efforts, which promotes a culture of helping others. Additionally, being actively engaged allows them to experience the positive changes that come from working together, prompting a more thoughtful consideration of their roles in the community (Salazar, 2020).

Based on Asio et al. (2023), students are inspired to engage in community service initiatives for a variety of reasons. Among these is the desire to make a meaningful contribution to society by tackling challenges such as poverty, education, and environmental issues. Additionally, participation in such programs fosters personal and professional growth by enhancing essential skills, including teamwork, communication, and problem-solving.

Students engaged in volunteer service demonstrate strong motivation, largely independent of external rewards. Their participation reflects fulfillment, purpose, and social responsibility, rather than a desire

for material benefits or recognition. This motivation underscores their appreciation for community engagement, viewing volunteerism as vital for personal growth and societal contribution (Child Hope Philippines, 2024).

According to Lucman (2020), integrating community service significantly enhances students' personal and professional skills. Community programs that align with students' academic disciplines, thereby enriching the educational experience and deepening their understanding of practical experiences.

Active participation in community extension services by student volunteers enhances their understanding and expertise in relevant fields. This involvement allows students to apply knowledge to real-world situations, bridging the gap between academics and personal. Such experiences facilitate the development of essential skills, including knowledge and communication skills while also contributing to personal growth. (Mishra et al., 2022)

Community service programs play a vital role in the comprehensive development of students. Participation in these initiatives enhances social skills and promotes overall personal growth. Through involvement in various community service activities, students gain valuable knowledge and insights that reach beyond traditional academic environments.

These programs allow students to interact with a diverse range of individuals, expanding their viewpoints and nurturing growth and resilience. Such engagement fosters essential soft skills, including teamwork, communication, and problem-solving capabilities, which are significant to achieving success in both personal and professional aspects of life.

Furthermore, community service fosters a sense of responsibility and awareness, allowing students to recognize their ability to bring positive changes within their communities. The experiences derived from these endeavors significantly contribute to their overall development, which is important to foster.

2.2 Methodology

2.2.1 Research Design

The researchers will use a qualitative method, specifically through a phenomenological approach. A phenomenological study concentrates on capturing the unique experiences of individuals relating to specific situations or life events.

This study focuses on examining the advantages of community service programs on the social skills development of senior high school students at San Jose Academy. The study seeks to enhance social skills and underscore the importance of these programs on personal growth.

2.2.2 Population Sampling

The participants of this study will comprise senior high school students from San Jose Academy who possess or have previously engaged in community service programs, either within the educational institution or in external environments. The researchers intend to recruit a total of 15 senior high school participants utilizing a snowball sampling technique. This method is specifically structured to gather data related to their experiences in community service. The objective of the study is to investigate the impact of community service programs on the development of social skills among senior high school students.

2.2.3 Research Instrument

To gather data for this study, the researchers created survey questionnaires aimed to explore the influence of community service programs on the social skills development of senior high school students. The questionnaire was carefully designed to effectively capture the students' experiences, perceptions, and the specific social skills they have gained through their involvement in community service. Interviews will serve as the primary method for data collection. This approach will enable participants to provide valuable, in-depth insights while maintaining a consistent structure, as every respondent will respond to the same set of questions. The interviews will focus on topics that highlight improvements in social skills, personal growth, and other benefits associated with community service programs.

2.2.4 Data Gathering Procedure

This study utilizes a thorough approach to data collection through interviews and interview-surveys with 15 volunteer senior high school students from San Jose Academy. The interview component includes open-ended questions aimed at examining how community service influences the development of social skills. This qualitative technique allows participants to share their insights regarding enhancements in social skills acquired through their engagement in community service activities. The findings will be analyzed

thematically to discern patterns related to the overall benefits of community service programs.

3. RESULTS AND DISCUSSION

This section presents the analysis of data collected from interviews and surveys conducted with senior high school students. A set of questions regarding their community service experiences and viewpoints was presented to them. To enhance understanding of the responses, the collected data was analyzed. The following figures show the demographic profile of the respondents.

Figure 1. Presents the sex of the respondents

SEX	FREQUENCY
Female	11
Male	4

The demographic profile shows that 4 females participated in the interview and the survey. While the majority of the respondents are men demonstrating a major contribution to the study.

Figure 2. The Grade levels of the respondents

GRADE LEVELS	FREQUENCY
Grade 11	10
Grade 12	5

The majority of the senior high school volunteer respondents are from grade eleven (11), while five (5) of the experienced respondents are from grade twelve (12).

The researchers utilized a tabular coding format to display the collected data. This format is designed to illustrate the common themes and the frequency of codes. The analysis included ten interview questions, which the researchers organized into three sections in accordance with the Statement of the Problem (SOPs).

Table 1. Benefits of community service programs on the social skills of senior high school students.

Question	Common Themes	Code Frequencies
1. In your opinion, do you believe that community service programs benefit the social skills of senior high school students?	a. Yes, it improves social skills through interacting with different people in different places b. Yes, it allows people to explore and contribute to different sectors of community service such as feeding and outreach programs	a. 13 b. 2
2. What do you think is the role of volunteering in shaping the youth's social skills?	a. Teamwork, leadership, and social skills b. Developed, confidence and pride to their capabilities c. Moral support d. Gaining experience	a. 11 b. 2 c. 1 d. 1
3. How does being a volunteer in community service programs help you to enhance your social skills?	a.Interaction with people b. Gaining confidence c.Improve speaking abilities	a. 9 b. 4 c. 2
4. What aspect of community service programs is the most effective for you to develop social skills?	a. Direct communication b.Different perspective of individuals. c. Teamwork, and problem-solving.	a. 8 b. 5 c. 2

For Question 1, respondents were asked if in their opinion, do they believe that community service programs benefit the social skills of senior high school

students? The majority of the responses were that it could improve social skills through interacting with different people in different places, with thirteen (13) mentions. The following response answers "Yes, as it allows people to explore and contribute to different sectors of community service such as feeding and outreach programs," with two (2) mentions.

For Question 2, the question is "What do they think is the role of volunteering in shaping youth social skills". Teamwork, leadership, and social skills have the highest frequency code with eleven (11) responses. Developed confidence and pride in their capabilities two (2). Moral support to the youth got one (1). Helps gain experience that they might need in the future got one (1).

For Question 3 the researchers interviewed the respondents on how they were helped by the community service on improving their social skills. Nine (9) students said that they interact with different kinds of people. Four (4) students, on the other hand, said that they gained more confidence during their participation in community service. Lastly, two (2) students said that they improved their speaking ability when talking to other people.

Question 4. What aspect of community service is the most effective for them to develop their social skills? Eight (8) students said that direct interaction in the community and with the co-volunteers. Five (5) students said that the most effective way is having a different perspective of conversations with other individuals. The remaining two (2) people said that teamwork and problem-solving is the best way for them.

Table 2. Challenges that the students encounter while enhancing their social skills during community service programs.

Question	Common Themes	Code Frequencies
5. What are the drawbacks of volunteering in community service programs?	a. Time management b. Exhaustion c. Communicating with different people d. There is no drawbacks e. Being prone to sickness f. The community does not appreciating the work of the volunteer	a. 5 b. 3 c. 2 d. 2 e. 2 f. 1
6. Do you feel more confident in social situations after engaging in community service? Why or Why not?	a. Yes, after communicating with other people b. Yes,especially when helping the community c. Yes, as I express myself to the public	a. 8 b. 4 c. 3
7. How do you manage your time as a student and a volunteer at the same time?	a. Finishing every schoolwork so I can make time to volunteer. b. Setting a schedule and recognizing my priorities	a. 10 b. 5

For Question 5, the researcher asked the respondents, "What are the drawbacks of volunteering in community service programs?. Five (5) students said that time management is the major drawback of community service. While three (3) students said that it is exhausting to do community service that results in tiring. Two (2) students said that it is hard for them to communicate with other people. Also, two (2) students said there are no drawbacks on community service. Two (2) students said that doing community service programs makes them very prone to sickness. The remaining one (1) student said that the commitment that they put on the work not being appreciated by the community is the disadvantage of community service.

For Question 6, the researchers asked the respondents if, after their community service experience, they gained confidence, why or why not. Eight (8) of the respondents said that they gained their confidence through communicating with other people. Four (4) students answered that they gained confidence every time they saw the community appreciating their work as a volunteer. Three (3) of the 15 students said that they got their confidence while they were expressing themselves to the people.

For Question 7, respondents were asked how they manage their time as both a student and a volunteer. The most common response with ten (10) mentions was managing it by finishing all schoolwork first to make time for volunteering. While the other response, with five (5) mentions, was managing my time as a student and a volunteer by setting a schedule and recognizing my priorities.

Table 3. Applying the social skills they learned in community service programs to their everyday lives and school interactions.

Questions	Common Themes	Code Frequencies
8. Has participating in community service programs changed the way you interact with your classmates, teachers, or family members? If yes, how?	a. Yes, community service made me more confident and less anxious. b. Yes, it fosters positive communication c. Yes, I became more open to conversations through gaining confidence. d. Yes, it made me more comfortable	a.5 b.3 c. 4 d. 3
9. How do you apply the skills that you've learned in the community service programs that you've joined, in your everyday life?	a. Communicating effectively and working in teams b. Listening to others and help them whenever possible c. Using the skills I've learned in my daily interactions	a.10 b.2 c. 3
10. How do you see the future of participating in community service programs helpful in the development of the social skills of students especially in the school setting?	a.Participating will enhance the social skills of people b. Community service programs will continue to help students gain confidence, develop social skills and improve their ability to interact with others	a. 5 b.10

For Question 8, the researcher asked the respondents if participating in community service programs changed the way they interact with their classmates, teachers, or family members? If yes, how? five (5) students said that community service programs made them more confident and less anxious. Three (3) students said that it fosters positive communication. Four (4) students said that they became more open to conversations through gaining confidence. Lastly, three (3) students said that it made them more comfortable.

For Question 9, the researcher asked the respondents how do they apply the skills that they've learned in the community service that they've joined, in their everyday life? The most common response with ten (10) mentions is communicating effectively and working in teams. Listening to others and help them whenever possible got two (2) mentions. Lastly, using the skills I've learned in my daily interactions got three (3) mentions.

For question 10, the respondents were asked how do they see the future of participating in community service programs helpful in the development of the social skills of students, especially in the school setting? Participating will enhance the social skills of people who got five (5) mentions. Lastly, with the most common responses is community service programs will continue to help students gain confidence, develop social skills and improve their ability to interact with others with ten (10) mentions.

4. CONCLUSION AND RECOMMENDATION

4.1 Conclusion

This comprehensive research study investigates the impact of community service on the development of social skills among senior high school students at San Jose Academy. Community service programs offer a unique perspective on the lives and challenges faced by individuals who rely on them. Volunteers engaged in community service, particularly during the time of disasters and charity events, encounter situations that may not be immediately visible to the naked eye. The study highlights both the advantages and the experiences and obstacles faced by these student-volunteers. It provides an in-depth analysis of their time management strategies, personal improvements they have observed, and the application of their community service learnings in daily life. While there are notable benefits, challenges such as time management and health concerns are also associated with community service programs. Nevertheless, the evidence suggests that community service programs, along with the involvement of volunteers, significantly contribute to the broader community.

The research reveals the challenges encountered by students and the valuable lessons they have learned from their involvement in community service. Participants from San Jose Academy who engaged in these programs reported both positive and negative experiences. The primary aim of this study is to raise awareness and encourage individuals, particularly the youth, to actively participate in community service programs, highlighting their benefits not only for the community but also for personal development, especially in social skills. Volunteers significantly contribute to their communities, which warrants recognition and respect for their efforts. This research serves as a call to action, advocating for a deeper comprehension, enhanced treatment, and better conditions for these valued volunteers. The experiences gathered from the volunteers illustrate their commitment and dedication, underscoring the need for community support.

4.2 Recommendations

Student. The researchers recommend students to actively participate in community service programs to enhance their social skills development.
Engaging in these activities allows students to improve their communication, teamwork, empathy, and, leadership skills, which are essential for personal growth.

Teachers. The researchers suggest that teachers should actively integrate community service programs into their curriculum to enhance students' social skills development. By incorporating structured reflections, group discussions, and hands-on activities, teachers can help students maximize their learning from these activities.

Parents/Guardian. The researchers recommend the parents to actively support and encourage their children's participation in community service programs. By doing so, they can help enhance their child's social skills, including communication, teamwork, and empathy.

Future Researchers. The presented study may help future researchers to conduct a further study that include more respondents to better understand the benefits of community service programs on social skills. This will help enhance our knowledge of how participating in programs can improve social abilities.

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Reclamation of Coastal Areas in Navotas City: An Appraisal About the Socioeconomic Impact

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Abstract: Coastal land reclamation is the process of turning the water or ocean into a new land. This involves draining water from a region and replacing it with solid ground using sand, rock, or dredged soil. Usually, it is done to make space for infrastructure expansion. In Navotas City, a major fishing center in the Philippines, this study examines the social and environmental effects of a coastal land reclamation project. Due to its focus on analyzing concepts and experiences, this study employed a qualitative-descriptive research technique. The study found that the reclamation of coastal land negatively impacted the community, economy, and ecology. According to the report, fishermen made up the majority of those affected in Navotas since the reclamation had an impact on their means of subsistence. Furthermore, the reclamation impacted the ecosystem, resulting in contaminated water that smelled and was opaque due to floating dead fish. According to the findings, the project contributed to local populations' economic hardships while causing serious environmental damage, such as declining water quality and increased floods. Many respondents stated that they had lost their jobs, been displaced, and were unable to enter many restricted places. The report emphasizes how the reclamation has impacted local fishermen's livelihoods and the necessity of government action, including providing sufficient assistance to those impacted and doing long-term environmental impact monitoring. The purpose of this research is to offer practical suggestions for reducing the reclamation project's adverse consequences and promoting a more sustainable urban development strategy and a more sustainable urban development strategy.

Key Words: *coastal communities; coastal land reclamation; economy; livelihood; society*

1. INTRODUCTION

1.1 Background of the study

Navotas, the fishing capital of the Philippines, has undergone significant land reclamation. While these projects potentially boost economic growth through increased land availability, they raise concerns about their consequences. The reclamation project is currently underway at the bay walk of Tanza 1 Navotas City.

Coastal land reclamation is the process of creating new land from the sea by filling in or building up areas of shallow water or seabed along coastlines. It is often used in places with scarcity of land and high population density to expand areas to provide more spaces for development, such as housing, infrastructure, and industrial housing; it has contributed to the improvement of the accessibility of a city.

It can also protect coastlines by creating barriers against erosion, storms, and rising sea levels. A reclamation project involves adding materials like sand, dredged soil, or rocks to reclaim land from the sea. But, based on existing research, the reclamation project has negative impacts, especially on the environment and livelihood opportunities of the people living near it.

According to Esteban et al. (2023), on an online survey of 425 middle class respondents, they discovered that disasters and climate change are often known and seen as environmental conflicts that worsen because of inadequate actions and defenses. The middle class perspectives view land reclamation and informal coastal decisions as harmful to the environment.

This research aims to identify the impact of coastal land reclamation on the society and environment of Navotas City, including the study of how the community and economic situation were affected. This study will answer whether the reclamation has a good effect or not.

1.2 Statement of the Objective

The purpose of this research is to determine how the Reclamation project has affected the economy and community of Navotas. Specifically, the initial goal of this study is to determine how the Reclamation Project impacts the Navotas City community. Next, what impact does the reclamation project have on Navotas City's economy. Lastly, how does the Navotas City Coastal Reclamation Project affect the environment

1.3 Significance of the Study

The study, “Coastal land reclamation in Navotas City: An Appraisal About the Socioeconomic Impact” is significant not only for its academic contributions but also for the benefits it offers to various beneficiaries:

Students. Students will have a better understanding of the reclamation efforts at the end of this study. Their perspectives on reclamation initiatives in their city and nation will be expanded by this study, which will also help them become more aware of the various problems that the community is now dealing with. Finally, this research will teach pupils to value the environment.

Fishermen. This research will be beneficial to the Fishermen around Navotas City because it specifically tackles the issues faced by these groups of people whose livelihoods are affected by the Reclamation Project. Moreover, the findings could assist fishermen in adjusting to the changes caused by the reclamation project by offering a thorough analysis of the study that may promote community empowerment and encourage informed participation.

Coastal Communities. Communities around the coast will benefit from this study. This is because, at the completion of the study, the researchers will provide conclusions and suggestions that might aid them in adapting to the changes brought about by the Reclamation Project. Additionally, as residents of coastal areas, coastal communities may learn how to properly care for the coastal surroundings. Finally, this research might support informed engagement and community empowerment.

Government Officials. This study will be useful for barangay officials, mayors, members of the congress, and other authorities in Navotas City. The results may address areas where mitigation measures are necessary to reduce the adverse effects of the reclamation project on the community. This could contribute to creating more effective policies to protect vulnerable populations and ecosystems.

Future Researchers. This study can serve as a guide for future researchers, offering a strong foundation for coastal reclamation. Furthermore, it has the potential to inspire new research questions and methodologies.

1.4 Scope and Delimitations

The influence of the coastal land reclamation project on Navotas's economy and society is the main topic of this study. This research includes determining if the reclamation effort has a positive or negative effect on the city of Navotas. This study will determine which members of the community have benefited and suffered from the reclamation effort.

Yet, as Malabon City discovered, the effects of the reclamation project on Navotas' bordering cities are not included in this analysis since doing so would greatly expand its scope. The city of Navotas's economics and society are the main subjects of this research.

2. METHODOLOGY AND RRL

2.1 Review of Related Literature

According to Esteban (2023), Metro Manila cities are facing challenges of fast urbanization. The possibility of hazards is increasing, and the effect of climate change. On the other hand, Tang j (2021) confirmed this statement, he stated that over the past 30 years, rapid coastal urbanization, global population growth, and economic activity have led to increased land consumption, with land reclamation from the sea being a common solution. Fast urbanization is one of the factors that makes it difficult for coastal communities because they are having a hard time adapting to the changes caused by reclamation projects. Limbo (2023) also agrees with the results of this study.

On the other hand, Turismo and Drew (2021) prove that reclamation projects have a negative impact on the environment. They stated that in Indonesia, coastal reclamation is a growing practice that aims to take advantage of natural resources and to benefit the economy of the community. They also stated that land reclamation has negative environmental impacts, including coastal ecosystem degradation, marine pollution, and increased vulnerability to natural disasters. One significant risk is coastal flooding, as reclaimed areas are often low-lying and exposed to storm surges, which may worsen due to climate change and rising sea levels.

While Ukhurebor (2022) states that both human and natural activities influence the growing issue of land degradation, he states that land degradation is caused by biological, physical, and chemical processes, leading to long-term land devaluation and reduced productivity. This study shows that some of the environmental problems are caused by both humans and reclamation projects.

While the study of Chia Huey and Kai Chen (2021) emphasizes the impact of reclamation projects on the environment and local fishermen, their study results show the impacts of land reclamation activities, specifically in Penang at Tanjung Tokong, and their effects on the environment and local fishermen. The research focused on how these reclamation projects affect the soil structure, marine life, and the livelihoods of fishermen. It seems that while reclamation projects may bring development, they also cause significant challenges, especially regarding pollution and habitat disruption. From the study, it was found that 80% of fishermen reported an impact on their income due to the reclamation, indicating the economic consequences of environmental degradation. It also emphasizes the importance of proper planning and mitigation strategies to prevent major environmental damage during reclamation, such as using rock protection for soil stabilization and coastal protection.

While Perera (2023) states the importance of managing financial and economic risks in coastal land reclamation (CLR) projects. She identifies and validates 13 key financial and economic risk factors, including poor sand and soil quality, payment delays, and safety concerns. Most of these risks are shared between clients and contractors. To manage these risks, strategies such as conducting environmental impact studies, following quality control procedures, and increasing social awareness are recommended.

2.2 Methodology

2.2.1 Research Design

The socioeconomic status of Navotas City is the primary focus of this study. In order to provide some insight into our economic problems and conflicts, this research attempts to address the significant issue, "What is the socioeconomic impact of the reclamation project in Navotas City?" As a result, the questionnaire will be the primary data collection tool in the qualitative-descriptive research approach. Because it concentrates on examining ideas and experiences, a Qualitative research method is selected.

2.2.2 Population Sampling

In order to collect data from 15 respondents inside the Navotas community, the researchers will employ the stratified sampling approach. This method may helps get precise responses from the Navotas City population about the current reclamation project that most likely impacts their standard of living.

2.2.3 Research Instrument

An online survey questionnaire and an in-person

interview will be the main methods used by researchers to collect data. The ability of the other respondents is taken into consideration by the researchers when selecting an in-person interview as one of the data collection tools. The fact that not everyone has an internet connection is taken into consideration here. However, those who are able to use the Internet are offered the opportunity to complete the online survey form. A portion of the surveys request for personal information, while the remainder focus on the experiences and observations of the respondents.

2.2.4 Data Gathering Procedure

In order to gather data, the researchers created an interview questionnaire. To have a useful set of data for the study, the researchers first carefully formulated questions relevant to the study's objectives. After that, it is passed to their research adviser for rechecking and validating the interview questionnaires. Once the questionnaires are validated, the researchers are set to start gathering the data.

For the in-person interview, the researchers will select respondents from the Navotas barangays. The researchers will depend on the availability and willingness of the selected respondents; only if they agree to the interview will the interview begin. Before the interview begins, the researchers will introduce themselves one by one and announce the purpose of the interview. The respondents have the right to provide their demographic profile, after which the researchers will give a simple token as a thank you for the time and effort of the selected respondents. For the online survey questionnaire, the respondents will search for potential respondents who are part of the Navotas community; the online survey questionnaire will be distributed through social media platforms such as Facebook, Messenger, and Instagram. The online survey questionnaire will be answered through Google Documents or Gdocs.

3. RESULTS AND DISCUSSION

The researchers employed a tabular structure to display the common themes and/or codes identified in the participants' answers, together with the code frequencies—the frequency with which these themes were mentioned—in order to clearly and efficiently convey the information they had collected. Since there are ten (10) questions, these were divided into 4 (3) major sections.

Table 1. The impacts of Coastal land reclamation in the Community

Question	Common Themes	Code Frequencies
1. Have you ever received sufficient support from the local government or NGOs to address the challenges the reclamation project poses?	a. Yes, but it's not enough	a. 1
	b. No, i only received a financial support because i am part of the "Fisherfolk scholarship"	b. 4
	c. No	c. 10
2. What are your thoughts and feelings about the reclamation project in Navotas City?	a. They implemented the reclamation project without considering our livelihoods , they are taking away our source of income.	a. 12
	b. The reclamation caused the environment to become worse, especially the sea.	b. 7

3. What are the biggest challenges you face (or have faced) as a result of land reclamation in Navotas City ?	a. I lost my livelihood b. They took away our home from us c. Most of the days, i don't earn enough money to support my Family d. None	a. 5 b. 3 c. 4 d. 3
4. Has the reclamation project led to displacement or relocation of residents in Navotas City?	a. Yes, I am among the affected since I was forced to move out of my house. b. No , but I know people who were forced to leave their homes c. No	a. 8 b. 3 c. 4
5. . Describe any changes you have observed in the social relationships within your community since the start of reclamation.	a. people became biased towards agreeing and disagreeing in the reclamation. b. None	a. 5 b. 9

Table 1 presents information about the effects of the coastal land reclamation project in the community of Navotas City.

For the first question, it was found out whether they received any support from the government or NGOs for the impact reclamation has had on their livelihoods. There were (3) common themes: answer "No" has the highest frequency as it has 10 mentions, while answer (b) got 4 mentions, and answer (a) got the least mention of 1.

—Stated by the respondents; they've got no support from the government or any NGOs for the challenges the reclamation poses, but they've had financial support from the fisherfolk scholarship Fisherfolk scholarship is a program to support the fishermen of Navotas known as the "Ulirang Pamilyang Mangingisda." Technically, Fisherfolk was only one of the factors that helped the Fishermen in order to survive their lack of a source of income, but it is not implemented to support the challenges posed by the Reclamation.

For Question 2, it evaluates the feelings and thoughts of the community of Navotas City about the coastal land reclamation. There are (2) common themes; answer (a) got the highest frequency as it has (12) mentions that the implementation of coastal land reclamation does not consider their livelihoods. Answer (b), on the other hand, got the least mentions (7). They've mentioned that the reclamation caused the environment to get worse.

Question 3 identified the biggest challenges faced by the community caused by the reclamation; there were (4) common themes: (a) got the highest frequency as it has (5) mentions that they have lost their livelihood, answer © got the (4) mentions that most of the days, they didn't earn enough money to support their families, and lastly answer (b) and (d) got the least mentions of none and loss of residence.

For question 4, it identified whether the reclamation had led to the displacement or relocation of residents in Navotas City. There were (3) common themes; answer (a) got the highest frequency as it has (8) mentions that they're one of the residents who got affected because they were forced to leave their homes, while answer (c) got (4) mentions of none, and answer (b) got the least mentions of (3) that they know someone who is affected by displacement.

Finally, for question 5, it identified changes observed by the community in the social relationships within their community; there were only (2) common themes: answer (b) got the highest frequency as it has (9) mentions of none, and answer (a) got the least frequency of (5) mentions that they observed that some of the people in the community are biased on agreeing or disagreeing in the reclamation project.

Table 2. Effects of Coastal Land Reclamation in the Economy of Navotas City.

Question	Common Themes	Code Frequencies
6. When the reclamation project started, did it affect your employment or livelihood opportunities	a. Yes, i lost my livelihood	a. 6
	b Yes, my fish sales is affected	b. 3
	c. Yes, I don't make much money most of the time because my fish haul amount was impacted.	c. 7
	d. No, I was given the chance to work at the reclamation's construction site.	d. 3
7. Do you believe land reclamation has improved or worsened the overall economic situation for residents of Navotas City?	a. No, since the ecosystem is being destroyed it leads to a lesser seafood harvest that affects the economy.	a. 9
	b. Maybe	b.7
8. Before the occurrence of the reclamation project, how would you compare the old pricing of seafood to the present?	a. The price of seafood in the market is more expensive now than it was before.	a. 15

Table 2 presents the effects of Coastal land reclamation in the economy of Navotas City

For question 6, it identified if the reclamation affected their livelihood opportunities or employment; there were (4) common themes: answer (c) got the highest frequency as it has 7 mentions that most of the time they don't make enough money to support their families, while answer (a) got (6) mentions that they have lost their livelihoods, and both answer (b) and (d) got the same 3 mentions that their sales have been affected and some got an opportunity to work at the reclamation's construction site.

Question 7, it explores the belief of the community if the reclamation has improved or worsened the overall economic situation of Navotas City; there were only (2) common themes: answer (a) got the highest frequency of (9) mentions that they believed that the reclamation project worsened the economy as it destroys the ecosystem that leads to a lesser harvest of seafood, and answer (b) got the least frequency of (7) mentions of "maybe."

Finally, for question 8 is all about the difference of the price of seafood in the market then and now, there were only (1) common theme; the respondents stated that since the Reclamation started, the prices of Seafoods in the market has significantly increased

Table 3. Effects of Coastal land reclamation in the Environment of Navotas City.

Question	Common Themes	Code Frequencies

9. Since the start of the reclamation project, have you noticed any changes in water quality?	a. Yes, It got more opaque, dirtier, and smelled worse. There were also a lot of dead fish floating around.	a. 15
10. Have you experienced any changes in the frequency or severity of flooding or other weather related events since the reclamation project started?	a. Yes, a small amount of rain may result in flooding also, Due to the daily passage of huge trucks on their route to the reclamation site, the road is in poor condition.	a. 15

Table 3 presents the effects of Coastal land reclamation in the Environment of Navotas City

For question 9, it explores the observations of the community in terms of the changes in the water quality, there was only one common theme; it has a (15) mentions that when the Reclamation started, the water quality got poorer.

Lastly, for question 10, it explores the experiences of the community in terms of the changes in the frequency or severity of flooding or other weather related events, there were only one common themes; it has a (15) mention that the Reclamation projects had affected the frequency and severity of flooding and the roads were in poor condition.

4. CONCLUSION AND RECOMMENDATIONS

The study discovered that Navotas' coastal land reclamation has a detrimental effect on the environment in addition to the local economy and people. According to the study's findings, the reclamation project has caused the majority of the community—particularly the fishermen and vendors—to lose their means of livelihood. Our respondents claim that their livelihoods were not taken into account when the reclamation project was carried out. The quality and quantity of fish caught have been impacted since the reclamation began in Navotas; most days at work, they don't make enough money to sustain their families because there isn't anything left to catch at sea because nearly all of the fish are dying, most likely as a result of the oil spill and habitat loss.

The researchers also discovered that Navotas City's ecology had been impacted by the reclamation project; the water's quality had declined, becoming more murky, unclean, and foul-smelling due to the presence of fish floating in the sea. Additionally, due to the daily passing of large trucks transporting heavy machinery for the reclamation site, the roads are severely damaged.

Lito, a 45-year-old fisherman, said, "Paliit nang paliit ang dagat dahil tinatambakan nila kaya paliit na din nang paliit ang kabuhayan namin, pag tinabunan nila lahat yan wala nang mangingisda." It is heartbreaking to hear this statement from a fisherman who has to deal with the loss of his livelihood. However, because of this the researchers came up with recommendations for the growing problem in Navotas City. Since the reclamation project is already underway and has had a full impact on the people of Navotas, the researchers believed that the government of Navotas must provide enough assistance to individuals impacted by the project. Second, since the reclamation project has an impact on the environment, the government should keep monitoring it in order to prevent the environment from getting worse. Finally, because the reclamation has had a total impact on the livelihoods of the residents, the researcher recommends that the Navotas government provide alternative livelihood options for the impacted residents and ensure that the jobs they offer are suitable for the families of those impacted.

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The Influence of Pet Ownership on Human Health and Behavior: A Phenomenological Study in Barangay San Jose, Navotas City

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Abstract: Belonging to pet ownership involves the maintenance and care of domesticated animals to obtain camaraderie and emotional assistance to fulfill personal needs. Pet ownership maintains great importance in Filipino homes since it affects how citizens feel healthy and behave. The research investigates the influence of pet ownership on physical aspects together with emotional and mental health for residents of Barangay San Jose, Navotas City. Researchers employed the phenomenological design to collect extensive interview data from fifteen (15) purposively sampled pet owners. People who own pets become more physically active because they walk and play with their pets thus enhancing their physical health. Study participants noted that their cardiovascular system improved with decreased stress levels and better sleep quality. Pet owners found emotional support through their pets since these animals provided them with companionship, helped minimize feelings of loneliness, and became a source of meaning. Pes ownership strengthened bonds between people as well as increased their involvement in community social activities. The advantages of pet ownership have to be weighed against money-related hardships along with difficulties in calculator use and health complications which may lead to allergic reactions and unhygienic conditions. The research results indicate that owners of pets should enroll in educational programs about responsible pet ownership. Local administrations should develop policies with two components: first, to support pet owners by offering veterinary access, and second, to run community education initiatives. Flawless pet-friendly initiatives should be actively promoted through schools and community organizations to facilitate proper pet ownership practices. Future researchers should investigate long-term pet ownership effects among various demographic segments to establish beneficial practices that address possible negative aspects. The study emphasizes that responsible pet ownership has a vital role in developing positive health outcomes and behavioral and social results between people and their communities.

Key Words: *behavior; household; human health; influence; pet ownership*

1. INTRODUCTION

1.1 Background of the Study

Pets are primarily referred to as domestic animals that provide pleasure or companionship to people. According to the International Trade Administration, a recent survey conducted by Kantar Philippines last January 2024 unveils that the Philippines takes its place as the highest level in pet ownership

among the countries in Southeast Asia, with 94% of Filipino households owning pets. 83% percent of Filipinos see their pets as their own "child," while 64% percent stated that they took a pet just because of "companionship," and more than 55% claim that they were obligated to look after the animals. However, others find pet ownership both a necessity and luxury, which entails budgeting for the pet's dietary needs and good quality foods (de Lazo, 2024).

NIQ (2016) stated that globally, 33% of households own a dog as a pet, which is the reason it is called, "man's best friend". In line with this data, it is also recorded that cats are the second most popular choice as animal companions of humans, with 23% of ownership globally. This concludes that people have their own preferences when selecting the right pet for their households. In accordance with the study by the Human Animal Bond Research Institute and Mars Petcare (2019), 80% of pet owners reveal that their pet is an instrument for them to feel less lonely.

Pet ownership is evidently beneficial in human health and mental behavior. A study reveals that due to pet ownership, homeless people in Los Angeles have hardly any symptoms of depression and loneliness than those people who do not (Rhoades et al., 2020). However, it is also visible that pet ownership is a product of negativity to human life. During the lockdown, in the midst of the COVID-19 pandemic, 263 Australians identified that owning a pet is a burden during the pandemic due to the pets' social and behavioral needs (Philipou et al., 2021). It is discovered that pet ownership is a disadvantage for homeless people to provide housing for them (Rhoades et al., 2015). These conclude that there is a huge debate about the various influences of pet ownership on human life, whereas this issue may cause confusion for other people in whether pet ownership is beneficial or not. This study will determine the different influences of pet ownership on people's health and behavior in the local community of San Jose, Navotas City, to provide proper information and enlighten other people about the effects of pet ownership.

In this light, the researchers decided to conduct this study to capture the unknown experiences of Navoteño pet owners. Their strategies and perception as pet owners, age, gender, physical and mental state, and the kind of pet they have will also be explored in this study to determine how pet ownership affects their health and behavior properly. This also aims to raise awareness regarding the context of pet ownership, especially in a small urbanized area such as Barangay San Jose, Navotas City. Lastly, this study aims to contribute to the local literature regarding the influence of pet ownership on human health and behavior in the context of Filipinos set up to provide a concise and useful collection of information that will help future researchers that will conduct a study with this similar topic.

1.2 Statement of the Objective

This study focuses on identifying pet ownership's influence on the health and behavior of pet owners in Barangay San Jose, Navotas City. Specifically, this study aims to first, identify what are the influences of pet ownership on the pet owners of Barangay San, Navotas City, in terms of their physical health. The second is to determine how pet ownership affects the behavior of the pet owners. Next is to investigate if there are different influences on pet owners' experiences depending on the type or classification of pet they own. Lastly, to create recommendations from the findings of the study.

1.3 Significance of the Study

The study, "The Influence of Pet Ownership on Human Health and Behavior: A Phenomenological Study in Barangay San Jose, Navotas City," is significant not only for its academic contributions but also for the benefits it offers to various beneficiaries:

Pet Owners. Pet owners will benefit from this study by having a better understanding of the effects that pet ownership has on their mental well-being, physical health, and social behavior. It also provides insights into how pets can enhance their daily life, such as encouraging physical activity, reducing stress and loneliness, and fostering social connections.

Non-Pet Owners. The research findings benefit everyone in the community because they demonstrate the wide-ranging effects of pet ownership. Non-pet owners gain a better comprehension of pet benefits to mental health, social connections, and public wellness through this research, which leads to increased respect for responsible pet guardianship. The research findings can help develop policies to resolve shared community worries about noise levels and sanitation and safety issues by establishing balanced living conditions for all members. The research findings promote mutual awareness between pet owners and non-pet owners to develop an inclusive environment based on compassion.

Community. Pet ownership benefits the community by enhancing social cohesion among

residents, improving public health outcomes by reducing isolation and loneliness, and encouraging more outside activity, which improves people's mental health and physical well-being. Additionally, pets increase our safety and offer therapeutic advantages, eventually improving everyone's quality of life in the community.

Local Administration. The research findings will benefit Barangay San Jose, Navotas City local administration through knowledge about pet ownership impacts on public health and community welfare and local policies. The study results will enable better health programs, strengthen animal welfare policies, and foster responsible pet ownership practices. The study will direct the development of pet-friendly areas, support community involvement, and strengthen disaster preparedness strategies for pet owners. The barangay can establish beneficial policies by using these insights, which support residents and their pets to create a healthier, compassionate community.

Future Researchers. Future Researchers can benefit from this research by providing an essential understanding of the impact of pet ownership on physical well-being, mental health, and social behavior, offering methodological insights capturing the experiences of the owners, expanding the literature on animal-human interactions in under-researched areas, deepening the role of cultural factors, promote interdisciplinary applications across different fields, informing public health policies and community programs, helping to identify knowledge for further investigation.

1.4 Scope and Delimitations

The general intent of this study is to know the influence of pet ownership on the human health and behavior of Navoteños. The study is delimited only to fifteen (15) respondents from Barangay San Jose, Navotas City, aiming to know the effects of pet ownership on their health and behavior and the lifestyle changes influenced by pet ownership. This study focuses on the daily habits of pet owners on how they keep their pets in good condition as much as how the pets' affect their overall condition.

2. METHODOLOGY AND RRL

2.1 Review of Related Literature

Pet ownership started thousands of years ago and has evolved over time. The relationship between owners and animals interchanged in consideration of how they use the animals. In the present, animals are evidently the sources of food, labor, and transport (Hansen et al., 2024). Pet ownership is defined by Scoresby (2021) as the basic form of human-animal interactions. According to Krezler (2022), the Oxford English Dictionary defines the word "pet" as "a domestic or tamed animal that is raised for pleasure or companionship," which separates it from other animals with a natural and professional environment.

On the other hand, Zoanette (2023) stated that there are differences between the various kinds of pets. For example, assistance animals are trained animals that perform tasks or behaviors that help lessen or recover one's disability. Moreover, therapy animals work alongside health professionals who provide more structured and goal-directed treatment. Lastly, companion animals are classified as animals with no specialization or use by health professionals but still offer mental and physical benefits to their owners.

In a local study of Parreño (2022), the findings reveal that the majority of the respondents concluded that they classified their pets as part of their family. Furthermore, the majority also stated that their pets have the same privileges as a part of the family. In addition, Macasa and Galvo (2024) stated that during the midst of the global pandemic due to COVID-19, their study found that pet ownership and social support are beneficial for physical and mental well-being.

Also, a separate study regarding the role of companion animals on the well-being of college students in the Philippines unveils that companion animals or pets are significant in maintaining the good well-being and happiness of the students and take away their loneliness since companion animals give comfort by simply petting or playing with them (Equillo et al., 2022). As for Quing (2024), compared to non-pet owners, pet owners have lower levels of stress, resulting in higher quality of life because of the role of pets in their lives. They also added that the social domain of pet owners is much stronger than non-pet owners. Moreover, the study by Faner (2024) concludes that there is a relationship between pet attachment and the behavior of humans, specifically in the context of human-animal interaction or HAI. They suggest that the emotional connection of humans with pets presents them with an increased prosocial attitude, and also found out that humans always see their pets as creatures deserving of care, resulting in them being empathetic individuals. These local studies present that pet ownership is primarily

beneficial in the context of Filipino households regarding their health and behavior.

According to a recent survey from the United States, approximately 67% of households had at least one pet, equivalent to about 63 million with at least one dog and 42 million with at least one cat in their households (Scoresby et al., 2022). These definitions indicate that "pets" are widely known as companions of humans that help sustain one's life by providing various benefits to their owners.

The studies above clearly state that pet ownership has existed for a long time and is evolving in how owners utilize it. They also state that pets are vital to humans' lives, especially regarding physical and mental health.

According to Tan (2021), during the COVID-19 pandemic, pets are most likely beneficial for mental health as they interact with humans and provide good physical activities and healthy behaviors that benefit human health. This indicates that owning a pet can be beneficial for the owners' physical and mental health.

Recent studies about the physiological and social lives of older adults reported that pet ownership can improve one's well-being, life contentment, and happiness also may decrease loneliness and other mental problems or symptoms. Additionally, pet ownership may increase human life productivity and is crucial in sustaining a good pet-owner relationship (Obradovic et al., 2021). A study conducted in Australia unveiled that dog ownership presented an important protection against loneliness for adults living alone during the COVID-19 pandemic. Moreover, pet ownership was also associated as an instrument in reducing loneliness and levels of depression and its symptoms (Ikeuchi et al., 2021). Pet ownership also provides benefits to the physical health of humans because of the obligations of the owners in taking care of their companions, such as grooming and feeding, which may become an everyday habit that can result in encouragement of being more physically active and increase their physical skills. In addition, in some previous studies, dog owners reportedly have a less sedentary lifestyle than non-dog owners since they are more engaged in exercise and spend much time walking. Also, engagement with pets may decrease blood pressure, as touching a pet can create a calming effect. In comparison among non-pet owners, the risk of cardiovascular diseases is lower among pet owners as these owners ultimately have a more active and stress-free lifestyle and a level of well-being (Meire & Maurer, 2022).

However, pet ownership may cause negative effects on the psychosocial aspects of humans when their pets die, which include grief and loss of social support. The impacts of disruption and deprivation of social routines, increasing pet health problems, and the need for extra time in taking care of their pets may also negatively affect the pet owners' physical and mental health (Barcelos et al., 2023). Statistically, 41% of pet owners are most likely depressed compared to non-pet owners (Chakma et al., 2021). This clearly shows that pet ownership does not only provide benefits but also has negative effects on human health and behavior. This concludes that pet ownership also presents disadvantages in human health and behavior.

Ultimately, according to Amiot (2022), the presence of pets is favorable towards human wellness. Some studies have confirmed the positive outcomes of pet ownership, but some also find negative relationships. The studies uncovered a positive connection between pet ownership and human wellness. For example, dog owners reported an increase in self-confidence. Adult owners became more participative in daily activities than the non-pet owners. In some studies, it is shown that pets have helped humans attain their personal goals by making their pets an inspiration. On the other hand, other studies proved that there are some negative effects between the presence of pets and human well-being compared to those who are non-pet owners. New pet owners do not report any decrease in stress and loneliness compared to those who are non-pet owners.

In summary, it was clear from the aforementioned related literature that there are contradicting arguments about the influence of pet ownership on human health and behavior. Therefore, it was unclear whether pet ownership has positive or negative impacts on human lives. One of the possible reasons behind these influences is the different lived experiences of the pet owners. It was revealed that pet ownership does not only positively affect the

productivity, well-being, and lifestyle of the pet owners; it also negatively implicates their lives in such different situations. However, these related studies also convey the lack of existing studies regarding the influences of pet ownership on human health and behavior within the Filipino context or set up. These thoughts were supported by numerous existing literature and studies regarding the various influences of pet ownership on human health and behavior.

2.2 Methodology

This part contains the method of research design, population sampling, research instruments and the data gathering procedure that shall explain the design and methods of the research study.

2.2.1 Research Design

According to Hassan (2024), qualitative research is a study that prioritizes analyzing and understanding the deep or in-depth meaning of "how" and "why" certain phenomena and human behavior happen, therefore, it is often categorized as a non-numerical method of collecting data. The research design follows phenomenological principles to investigate pet owners' life experiences in Barangay San Jose, Navotas City. Using a phenomenological type of qualitative research design proves suitable because this study needs to understand and describe how pet ownership influences human health and behavior to what participants experience and perceive. This research uses personal testimonies and self-reported experiences to grasp how pet ownership influences health outcomes in residents of Barangay San Jose, Navotas City.

2.2.2 Population Sampling

There were fifteen (15) respondents involved in this study. The participants were chosen through a purposive sampling method to be interviewed about their experiences in pet ownership. This method is suitable because, in this way, the researchers were able to identify what particular influences or changes are being seen in the health and behavior of pet owners.

2.2.3 Research Instrument

Given that this study is qualitative, the researchers utilized interviews as their research instrument in collecting information and data. Interviews are referred to as a method of gathering data in which the researchers interact with the respondents by asking questions relevant to the study. Unlike the other research instruments, interviews seek detailed information in which they aim at conducting qualitative research (Mckee, 2024). Utilizing interviews as a research instrument helped the researchers to gain an understanding of the experiences of individuals. The interviews contained questions that answered about the changes in the lifestyle of pet owners or how the pet ownership influenced their everyday life. The answers collected from the respondents are considered a way to discover if pet ownership has positive or negative effects.

2.2.4 Data Gathering Procedure

In order to gather data, the researchers utilized interview questionnaires. To have a useful set of data for the study, the researchers first carefully formulated questions that were relevant to the objectives of the study. Then, it is passed to their research adviser for rechecking and validating the interview questionnaires. Once the questionnaires are validated, the researchers are set to start gathering the data.

3. RESULTS AND DISCUSSION

The researchers accumulated fifteen (15) respondents in gathering the data for the study. The following figures show the demographic profile of the respondents:

Figure 1. Presents the Sex of the Respondents

Sex	*Frequency*
Female	*13*
Male	*2*

The demographics of the participants show that thirteen (13) women constitute the bulk of survey participants. The majority of respondents belong to the female category, thus demonstrating that women prefer pet ownership or research participation. The male participants make up only two (2) of the entire fifteen (15) respondent group, demonstrating a minor presence in the study

Figure 2. Present the Age of the Respondents

Age	*Frequency*

13 - 19	12
20 - 29	2
30 - 39	1

A majority of twelve (12) people fall between 13 to 19 years old among the group of respondents. The high number of pet owners creates a substantial segment of the research sample, thus demonstrating widespread teenage interest in pet ownership. Two (2) of the respondents fall into the age range of 20 to 29 years old, while the age group of 30 to 39 years old contains only one (1) participant.

Fig 3. Present the Classifications/Types of Pet the Owners Have

Classification /Type	*Frequency*
Dog	15
Cat	4
Fish	1

The research data indicates that dogs stand as the most popular pet choice because all fifteen (15) respondents chose dogs for pet ownership. Among the participants themselves cats stand as the second most popular choice of pet because four (4) individuals have decided to adopt these furry companions. According to the results, only a single participant keeps fish, which is the least popular pet in this research.

To present the data gathered, the researchers utilized a tabular format. This is to present the common themes or responses from the respondents and to effectively identify the frequencies of the common themes. There were ten (10) interview questions that are classified by the researchers into three (3) sections based on their SOP.

Table 1. Influence of Pet Ownership on Human Health

Question	Common Themes	Frequencies
1. Have you faced any physical health benefits due to pet ownership? If yes, in what ways? If not, why?	a. Pet care provides exercise b. Chasing and playing with pets boosts energy c. Pets reduces stress, aids sleep d. No physical health benefits	a. 9 b. 3 c. 2 d. 2
2. Do you believe that taking care of your pet such as walking and grooming your pet lowers your risk of having health implications? If yes, in what ways does this improve your health? And if not, why?	a. Yes, walking pets lowers heart disease risk, and aids weight loss. b. Yes, keeping pets clean lowers the risk of disease from parasites like ticks c. Yes, feeding and playing with pets reduces laziness and promotes productivity	a. 13 b. 3 c. 2
3. Do you balance the physical demands of pet care with your own physical well-being? If yes, in what way? If not, why?	a. Yes, by incorporating activities that enforce pet and self care at same time b. Yes, by balancing the schedules for pet and self care c. No, because of unbalanced	a. 6 b. 5 c. 4

	schedule between work and pet care	

For Question 1, which explores if there are any physical health benefits that pet ownership influences, there were four (4) common themes. “Pet care provides exercise” got the highest frequency as it has 9 mentions, “chasing and playing with pets boosts energy” gets 2 mentions, while, “pets reduces stress, aids sleep” and “no physical health benefits, just photos and talking” got the lowest frequency with 2 mentions.

For Question 2, which explores if there are chances that taking care of your pet lowers your risk of having health implications, there were three (3) common themes. Walking pets reduces stress, lowers heart disease risk, and aids in weight loss got the highest frequency as it has thirteen (13) mentions. While three (3) agreed that keeping pets clean lowers the risk of disease from parasites like ticks. And lastly, the two (2) respondents agreed that feeding and playing with pets reduces laziness by promoting activities.

And for question 3 which explores the balancement between pet and self care of the pet owners with their pets. The data revealed that there were three (3) common themes among the participants’ responses. Six (6) participants agreed that they balance the physical demand of their pet while taking care of themselves by incorporating activities that enforce pet and self care at same time , while five (5) of them also agreed by balancing their schedules for pet and self care. However, four (4) of the participants disagreed because of the unbalanced schedule between work and pet care.

Table 2. Effects of Pet Ownership on Human Behavior

Question	Common Themes	Frequencies
4. How has pet ownership impacted your stress level and ability to cope with challenges in life?	a. Stress reliever b. Provides emotional support c. Helped sleeping habit	a. 12 b. 5 c. 1
5.What emotions do you feel in taking care of your pet?	a. Happy b. Annoyed c. Sad d. Stressed e. Fulfilled f. Excited g. Love h. Rattled i. Overwhelmed	a. 14 b. 5 c. 3 d. 3 e. 2 f. 1 g. 1 h. 1 i. 1
6. In what ways does pet ownership change your perspective in life?	a. Becomes appreciative b. Becomes caring to animals c. Realization of big responsibility d. Positive Impact in general e. Realization of purpose f. Preferred pet friendly place	a. 7 b. 4 c. 2 d. 1 e. 1 f. 1
7. Have you noticed any changes in your routines or habits since you began to take care of a pet that makes you more responsible in doing things other than taking care of your pet?	a. Became responsible in general b. Increased responsibility c. Nothing changed d. Become well disciplined e. Improved eating habits	a. 8 b. 6 c. 1 d. 1 e. 1

Question 4 explores how pet ownership impacted their stress level and ability to cope with challenges in life. There were three (3) common themes: pets as a stress reliever got the highest frequency as it has twelve (12) mentions, providing emotional support got 2 mentions, and helping to control sleeping habits got 1 mention.

Question 5 explores about the emotions do you feel while taking care of your pet, there were nine (9) common themes: feeling happy got the highest frequency which has 14 mentions, getting annoyed got five (5) mentions, sad and stressed both had three (3) mentions, fulfilled got two (2) mentions, while excited, love, rattled, and overwhelmed only got one (1) mention.

Question 6 explores about how pet ownership changed their perspective in life, there were six (6) common themes: becomes appreciative has the highest frequency as it has seven (7) mentions, becomes caring has four (4) mention, realization of big responsibility has two (2) mentions, while positive impact in general, realization of purpose, and preferred pet friendly places all had 1 mention.

Question 7 asks if there are any changes in their routines or habits when they started taking care of pets that makes them more responsible, there were five (5) common themes: becomes responsible in general got the highest frequency as it has eight (8) mentions, increase responsibility got six (6) mentions, Nothing changed, became well disciplined, and improved eating habits all got one (1) mention.

Table 3. Differentiation of Influence Regarding the Type/Classification of Pet Own

Question	Common Themes	Frequencies
8. What particular reasons do you have in choosing the specific type of pet that you own?	a. Preference of physical characteristics and behavior of pet (e.g. cuteness, energy, convenience of taking care of) b. For Security of household c. No Particular reason d. As a gift	a. 10 b. 4 c. 2 d. 1
9. How will you compare your situation/experience with your pet to those other pet owners with different types of pets in our community?	a. More responsible than other pet owners b. More happier compare to other owners c. It depends on the situation of the owners d. Did not notice any differences	a. 5 b. 4 c. 4 d. 2
10. Do you think that your behavior and physical health would be different if you owned a different type of pet? Why or Why Not?	a. Yes, because pets have different characteristics, behavior, and needs. b. No, it still depends on how owner take care their pets c. No, they all do the same thing	a. 7 b. 4 c. 4

Question 8 asks the participants' reasons for choosing the specific pet that they own. Based on the findings, there were four (4) common themes:

preference of physical characteristics and behavior of pet got the highest frequency with ten (10) mentions, meanwhile, pet as a security of household got four (4) mentions; three (3) respondents stated that they have no particular reason, and lastly, “as a gift” only got one (1) mention.

For question 9, which explores the comparison of the situation/experience of the owner to those other pet owners with different types of pet in the community. The data findings revealed that there were four (4) common themes in the responses of the participants. Five (5) respondents believed that they are more responsible than the other pet owners, while, four (4) respondents believed that they are more happier compare to other owners, however, also four (4) respondents believed that it depends on the situation of the owners, and lastly, two (2) respondents did not notice any difference.

Question 10 explores the differentiations of behavioral and physical state of the owner if they own a different kind or type of pet. There were three (3) common themes in the findings. Seven (7) participants stated “yes, because pets have different characteristics, behavior, and needs” which accumulated the highest frequency among the themes. However, four (4) participants stated “no, it still depends on how owners take care of their pets”, meanwhile, four (4) also stated “no” because they believed that all pets do the same thing.

4. CONCLUSION AND RECOMMENDATION

The main purpose of this study is to determine the diverse influence of pet ownership on human health and behavior. This study also aims to identify if there are negative or positive impacts when it comes to Human Health and their Behavior.

The researchers found out that pet ownership has a great impact on pet owners in terms of human health and behavior as the pets relieve their stress and help them improve their overall personality. One of the biggest impacts that pet ownership brings is that the pets make their days better as they interact with each other. The habits and routines that have changed because of owning a pet also helped them become more productive and physically fit because of different activities with the pets. It is revealed that this can also reduce health risks such as heart disease and other risks, and it is proven that the release of happy hormones can help prevent diseases from spreading around your body. The satisfaction and happiness that the owners feel while taking care of their pets also connect with how they will act about certain things other than pet owning, just like how they will be productive and responsible everyday.

Thus, the overall impact of this study is positive. The researchers found that pet owners' behavioral habits and health conditions are associated with how they care for their pets. The responsibilities associated with pet ownership are a big factor in shaping one’s behavior not only regarding pet ownership but also regarding perceptions of other things.

Upon the concluded information above regarding the research questions, the researchers would like to recommend pet owners to:

- be mindful and choose pets according to the capabilities of taking care of them
- make sure that they are responsible enough to be a pet owner, such as providing the needs of their pet.
- attend seminars that will foster their knowledge regarding owning an animal or pet.

The researchers also suggest to the local administration to create programs that could help the pet owners in taking care of their pet such as monthly seminars that shall foster and improve the awareness and knowledge of the pet owners about pet ownership. And lastly, for future researchers, they suggested firmly investigating the influence of pet ownership on human health and behavior, especially in the context of Filipino or local households to provide much inclusive data and information.

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View of FACTORS AFFECTING THE KNOWLEDGE, ATTITUDE, AND PRACTICES OF PET OWNERS ON RESPONSIBLE PET OWNERSHIP IN MAGALANG, PAMPANGA, PHILIPPINES: A CROSS-SECTIONAL STUDY. (2023). Uplb.edu.ph. https://ovcre.uplb.edu.ph/journals-uplb/index.php/PJVM/article/view/548/526

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Impact of TikTok on Youth Identity:
How TikTok Influences Self Perception and Social Interaction
Among Navoteño Teens

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Abstract: With a special focus on the Grade 11 group at San Jose Academy, this study analyzes the complicated impacts of TikTok on the social relationships and self-perception of senior high school students in Navotas City. Given how prevalent TikTok is in today's youth lifestyle, it is essential to understand how it affects character development. This study uses a qualitative design to investigate the complex relationship between online involvement and offline reality, going beyond plain numbers to capture different perspectives of students.

The methodology focuses on using semi-structured surveys to collect detailed, descriptive information. Participants are asked to share personal stories and significant thoughts about their TikTok usage through open-ended questions, which explore how the app affects their relationships, sense of self, and sense of identity in general. In order to guarantee valid and useful data, the study focuses on active TikTok users. Thematic analysis is used to find patterns and common experiences in the responses collected.

The literature now under print highlights how important this study is. According to studies, TikTok acts as a platform for cultural interaction and self-expression, enabling young Filipinos to express their creativity and handle social situations. However, societal comparison, unrealistic beauty standards, and the possibility of negative effects on mental health are all brought up. Considering how common social media use is among Gen Z and how much time many of them spend on the internet, a greater understanding of these factors is needed.

By focusing on Navoteño teenagers, this study gives a localized perspective that recognizes the unique social and cultural situations affecting their lives. The results will give educators, parents, and legislators important new information that will guide what they do for promoting social media use in a safe manner and nurturing young people's identity development in a world that is becoming more digital. The final objective of this research is to offer an accurate understanding of how TikTok influences San Jose Academy students' relationships and self-perception in order assist with future treatments and improve digital well-being.

Key Words: *tiktok; self-perception; self-image; social interaction; youth identity*

I. INTRODUCTION

1.1 Background of the Study

Since its launch in 2016, TikTok has emerged as a prominent social media platform, originally known as musical.ly and owned by the Beijing-based company ByteDance. The app has gained widespread recognition for its engaging content and has become a popular source of entertainment, especially during the pandemic, when it provided a much-needed distraction from daily stress. TikTok appeals to users by allowing them to interact with content that resonates with their interests, making it particularly popular among teenagers who often view it as a source of happiness (House of Marketers, 2025).

The platform enables creators to showcase their talents and creativity, which can inspire others to confront important issues at a young age. Additionally, many teenage users actively seek opportunities for volunteer work and academic advancement through various programs available on the app (Opportunities for Youth, 2024).

The influence of TikTok extends far beyond mere entertainment; it raises significant concerns regarding its impact on youth identity. The digital environment created by TikTok can sometimes lead to negative experiences, such as cyberbullying and exposure to harmful content (Harris, n.d.).

As users increasingly engage with the platform, there is a risk that their behaviors and decisions may be shaped by the content they consume (Barta, Zuo, & Wang, 2023). This situation highlights the importance of understanding how social media affects self-perception and social interactions among adolescents.

According to Sanctuary Personnel (2023), while TikTok offers opportunities for self-actualization and personal growth, it also presents challenges that can negatively impact mental health. Issues such as anxiety, depression, and feelings of isolation may arise from excessive use or negative interactions on the platform. Therefore, it is essential to address these potential risks while also acknowledging the positive aspects of TikTok as a space for creativity and connection.

In light of these dynamics, this study titled "Impact of TikTok on Youth Identity: How TikTok Influences Self-Perception and Social Interaction Among Navoteño Teens" aims to explore the complex relationship between TikTok usage and identity formation among teenagers in Navotas City. By focusing on this particular demographic, the research seeks to uncover how TikTok influences self-image, social interactions, and overall identity development during this critical stage of adolescence.

The significance of centering this study on San Jose Academy lies in its unique environment that combines academic rigor with moral and spiritual development. This context provides an opportunity to examine how the values instilled by the school interact with the influences of social media. By understanding how TikTok shapes the experiences of students within this particular educational setting, the research aims to highlight both the positive aspects of creativity and connection fostered by the platform and the potential risks associated with its use. This dual focus will contribute valuable insights into how digital engagement impacts youth identity formation in a local context marked by cultural and educational significance.

1.2. Statement of Objectives

In today's world, many students are spending significant time on social media platforms like Instagram, Twitter, Facebook, and especially TikTok. Recent studies indicate that this increased usage can lead to harmful behaviors and excessive online engagement. This study aims to understand how TikTok affects the mental health and social interactions of teenagers in Navotas City.

The research will explore local teens' experiences with TikTok and its influence on their daily lives, focusing on how it shapes their self-perception and identity as members of Generation Z. This is crucial because TikTok has become a major part of youth culture, with many young people using it regularly. However, it can also contribute to feelings of isolation and loneliness, particularly for those who struggle with anxiety or depression.

Another key objective is to examine how TikTok impacts social interactions among Navoteño teens. The study will analyze its effects on their ability to form relationships and communicate face-to-face, especially given concerns about increased isolation due to excessive online activity. Research suggests that spending more time on TikTok may lead to decreased body image and higher levels of depression.

By investigating both the positive and negative effects of TikTok on self-perception and social interactions, this research will highlight critical areas of concern for the youth in Navotas City. While TikTok offers creative opportunities and connections with peers, it is essential to understand the risks, such as cyberbullying and potential declines in mental health. This study will provide insights into how TikTok's influence affects the self-identity of senior high school students in the community.

1.3. Significance of the Study

This research holds notable importance to the following education-related group of individuals:

Students. This study is significant for students as it equips them with knowledge and tools to navigate the complexities of social media and help them recognize the potential positive and negative effects of their online activities. The findings will provide insights into how excessive social media use and dependency can lead to both the desirable and undesirable effects for the development of their self-perception as a senior high school student in Navotas City.

Parents. By highlighting the relationship between social media usage and self-perception, this research equips

parents with knowledge that can guide them in making informed decisions about their children's social media engagement. Understanding these dynamics allows parents to set appropriate boundaries and foster healthier online habits while respecting their independence.

Educators. The findings will provide teachers with insights that can help educators better understand their students' motivations and challenges, fostering a more supportive learning environment. Consequently, teachers can develop more effective teaching strategies that include usage of social media in a positive way. This may include platforms like TikTok to engage students and enhance learning experiences.

School Administrators. The findings of this study can support the integration of Social-Emotional Learning (SEL) programs within schools. As educators increasingly recognize the importance of teaching non-academic skills, this research can provide evidence-based strategies for fostering emotional regulation, communication skills, and responsible decision-making among students.

Policymakers. This study may advocate for the implementation of digital literacy programs in schools, equipping students with the skills to navigate social media responsibly. Policymakers can use this information to curate an educational curriculum that includes training on healthy social media use.

Researchers. This study addresses gaps in current research by focusing specifically on Navoteño teens and their experiences with social media. Such localized study is essential for developing context-specific strategies to mitigate negative impacts.

1.3. Scope and Delimitations

This research focuses on the impact of TikTok on self-perception and social interactions of senior high school Navoteños. By concentrating on this demographic, the research seeks to understand how engagement with TikTok influences the way these adolescents view themselves and interact with their peers. The geographic focus on Navotas City allows for a localized examination of the cultural and social dynamics that shape the experiences of young people in this community.

The findings from this study may not be generalizable to teenagers from different cultural backgrounds or regions outside of Navotas City. The research will not extensively examine factors such as family background or socioeconomic status, as the primary focus is on TikTok's direct impact on self-perception and social dynamics.

This study does not address any other implications that are unrelated to the development of the youth's self-identity and the quality of social interactions in the digital world. The research will be limited to senior high school students in Navotas City who may be aged 16 to 18 years, excluding younger adolescents or older individuals who may have different experiences with social media. Furthermore, although other social media platforms may also influence youth identity, this study will specifically focus on TikTok, thereby narrowing its analysis. This decision is made to ensure a more in-depth understanding of TikTok's unique features and their effects on users.

Lastly, the study will capture only a snapshot of TikTok's influence at a specific point in time, which may not be reliable for future changes in social media trends or user behaviors.

II. METHODOLOGY and RRL

2.1 Review of Related Literature

The influence of TikTok on Filipino youth identity formation is a growing area of interest among researchers. Smith (2022) explores the motivations behind social media usage among students, which can complement further analysis of how TikTok serves as a platform for self-expression and identity exploration. Understanding why students engage with these platforms can add depth to discussions on the implications for self-perception and social dynamics. The article "TikTok on SNSU Students: Engagement and Influence" highlights that "TikTok is very popular among the young and has become for many a mode of free and creative self-expression." This highlights not only the platform's popularity but also its critical role in enabling Filipino youth to express their creativity and individuality in a manner that resonates with their cultural identity. Further into this geographic context, where cultural expression is deeply intertwined with social interactions, TikTok serves as a vital space for youth to navigate their identities. The platform allows users to create content that reflects local traditions, humor, and social issues, thus fostering a sense of belonging among peers. The paper's findings indicate a strong correlation between TikTok usage and its impact on students' engagement and self-perception as it mentions that "young people use TikTok for positioning themselves in their peer group and to understand where he/she stands in the peer group" (Ngilangil, 2022). This suggests that TikTok not only facilitates personal expression but also plays a crucial role in social dynamics, helping users to construct their identities in relation to others. The platform encourages users to share snippets of their lives, talents, and opinions, which can significantly influence their self-esteem and social standing. As they receive feedback through likes, comments, and shares, they gain insights into how they are perceived by their peers. This feedback system can reinforce positive self-images or lead to challenges in self-acceptance if the responses are negative.

The article "How TikTok is Making an Impact on Pop Culture and the World" from ABS-CBN (2020) mentions that TikTok has given rise to a new generation of influencers, asserting that "many users have gained fame and recognition through their TikTok presence," which can lead to opportunities in other media and advertising. This creative outlet can enhance self-esteem and foster a sense of community among users, as they connect with like-minded individuals who share similar interests (Ngilangil, 2022). The ability to gain recognition and potentially become influencers can empower

youth, giving them a sense of purpose and belonging in a digital age where social connections are vital.

Contrarily, this also presents significant challenges to youth self-image. The platform is filled with unrealistic beauty standards and idealized portrayals of life that can lead to negative self-perception. Brown (2022) points out that over one-third of Gen Z spends more than two hours a day on social media, which may correlate with over exposure issues. One notable study titled "Effect of social media usage patterns on academic performance and psychological well-being of undergraduate students." discusses that regular exposure to carefully selected content and idealized lifestyles on TikTok can cause students to feel inferior and have lower self-esteem. Comparing themselves to others on the platform often leads to feelings of unhappiness and a negative self-image (Khan et al., 2024).

As also noted by Iwamoto and Chun (2020), the growing use of social media in everyday life has led students to compare themselves to others or to set unrealistic expectations for themselves and those around them. This behavior can result in various emotional consequences.

Claridad et al. (2023) discusses that the features of the application can be categorized into two relevant categories: (1) Interactive Features, and (2) Video Production Features, justifying this study's utilization of TikTok's user-centric features as its independent factor.

This is supported by Yang's (2022) research, which highlights TikTok's wide range of frequently updated features—such as interactive features that enable users to view, like, comment on, share, and save videos. Collaborative tools such as duets and stitches, along with live streaming and video replies, further enhance user engagement. Claridad's paper discussed their respondents' statements on how the filters in the application altered their perspectives which allowed for their self-expression more freedom. On the contrary, Student Voice (n.d.) discusses that students often seek validation through shares, comments, and likes on social media, which can lead to repetitive checking behaviors. Such habits may negatively impact their productivity and focus on academic tasks. As said by Chiva Cedrún, L., & Civila, S. (2024) In contemporary society, the influence of social media on young people, along with its impact on interpersonal dynamics and self-perception, is classified as a pervasive phenomenon that not only shapes everyday interactions, but also significantly shapes the construction identity and virtual socialization patterns.

2.2. Methodology

This chapter discusses the research methods of this qualitative research study. It consists of the research design, population sampling, research instruments, and the method that has been used for data collection, which presents the process of the research study.

2.2.1. Research Design

This study will use a qualitative research design to gather in-depth information from Grade 11 students at San Jose Academy about the impact of TikTok on their self-perception and social interactions. To ensure that a variety of perspectives are obtained, a diverse group of students who actively use TikTok will be selected. The aim is to have around 20 to 30 participants, which will allow for detailed responses while keeping the analysis manageable.

To gather data, a survey will be created that includes open-ended questions. This format will help explore students' experiences with TikTok in depth. Key areas of focus will include how often they use TikTok, how it affects their self-esteem and body image, and how it influences their relationships with friends. The questions will be designed to encourage students to share personal stories and reflections, providing a clearer picture of how TikTok impacts their lives.

The surveys will be administered either in person or online, depending on what works best for the students. Participants will be informed about the purpose of the study and how their insights can help understand TikTok's influence on youth identity. Each survey will take about 15 minutes to complete. Before starting, informed consent will be obtained from the students to ensure they are comfortable participating. Confidentiality will be emphasized, allowing participants to share their thoughts freely.

Once the survey responses are collected, the data will be analyzed using thematic analysis. This means looking for common themes and patterns in what the students share about TikTok's influence on their self-perception and social interactions.

This qualitative methodology aims to provide a comprehensive understanding of how TikTok affects Grade 11 students at San Jose Academy.

2.2.2. Population Sampling

The participants in the study are all Grade 11 students enrolled in San Jose Academy, regardless of their chosen academic strand. This type of sampling is non-probability sampling that is selected based on the specific criteria or convenience.

2.2.3. Research Instrument

To get the data that is needed for this research, the researchers will use questionnaires to survey the Navoteño teens about the impact of TikTok on their self-perception and social interaction. The questionnaires consist of ten (10) items to collect the different perspectives and opinions of our respondents. This consists of 3 parts; part I is to gather the profile information of respondents, including their name, age, gender, and the most active social media app they used. Their name will remain optional as a symbol of respect to their privacy. The questionnaires consisted of ten (10) questions about the usage of TikTok. Part II of the research instrument was to know the interests and motivations of teenagers that use TikTok daily. Part III consists of ten (10) questions about

the effect of TikTok on Navoteño teens. To answer these questions, respondents must choose between yes or no and put down a check as an answer.

2.2.4. Data Gathering Procedure

The study will involve the participation of 15-16 students of San Jose Academy—a grade 11 senior high school in Navotas City. The first procedure is that the researchers have done a paper questionnaire with the selected participants during recess or lunch hours, and the participants should have knowledge regarding the ***Impact of TikTok on Youth Identity: How TikTok Influences Self-Perception and Social Interaction Among Navoteño Teens***. The students of San Jose Academy are the first batch to answer the questionnaire.

III. RESULTS AND DISCUSSION

The findings in this chapter discuss the impact of TikTok on youth identity and how it influences teenagers. It employs a methodology to conduct this study and investigate the experiences affecting teenagers as individuals and to gain information from the respondents. The purpose of this qualitative study is to interpret the data that has been collected by the researchers in interviewing the respondents. In addition, this chapter consists of research methodologies, the design that has been used in the study, the method of data gathering, and an analysis of the collected data.

Chapter 4 will present and interpret the results of the data that were collected by the researchers. It includes the demographic profile of the 15 respondents, such as their names, ages, and genders.

Figure 1. Profile of the Respondents

Age	Number of Respondents
16	10
17	4
18	1

The total age obtained from our respondents is that there are ten (10) teenagers who are around sixteen (16) years old. We also gathered four (4) teenagers who are seventeen (17) years old. Lastly, there is one (1) respondent who is eighteen (18) years old. In total, 15 respondents participated in this study.

Figure 2. Gender of the Respondents

Gender	Frequency	Percentage	Rank
Female	10	10%	1
Male	5	5%	2
Total	15	15%	

The total age obtained from our respondents is that there are ten (10) teenagers who are around sixteen (16) years old. We also gathered four (4) teenagers who are seventeen (17) years old. Lastly, there is one (1) respondent who is eighteen (18) years old. In total, there are 15 respondents who participated in this study.

Figure 3. Frequency of Tiktok Usage

Frequency	Number of Respondents	Percentage
Everyday	6	40%
Often	3	20%
Sometimes	5	33%
Do not use	1	6%

As shown in the table, it is the frequency of TikTok usage where the majority of respondents (40%) use TikTok every day, while the least number of respondents (6%) stated that they do not use TikTok.

To properly analyze the information gathered, the researchers use a tabular format. This format helps organize and summarize the responses of fifteen (15) respondents, making the data easier to understand. The table consists of answers to ten (10) interview questions, categorized into two (2) SOPs, highlighting the common and main themes from the responses.

Table 1. Effect of TikTok to the Holistic Being of Teenagers

Questions	Commonalities	Frequency
1. How often do you use TikTok?	a. Teenagers used TikTok every day b. Often used TikTok c. Sometimes used TikTok d. Do not use TikTok	a. 6 b. 3 c. 5 d. 1
2. How does TikTok affect your ability to build personal habits for your lifestyle?	a. Improved habits b. Being involved in trends c. Affects sleeping routine d. Both have positive and negative effects	a. 8 b. 2 c. 2 d. 2 e. 1

	e. Is helpful for academics	
3. Have you found content on TikTok that is personally relatable? If yes, do you feel connected with strangers who have the same experiences as you?	a. Can relate to some content on TikTok b. Cannot relate to the contents on TikTok	a. 14 b. 1
4. Do you usually compare yourself with the influencers on the app? If yes, how so?	a. Compare themselves with the influencers b. Do not care about these famous influencers c. Enjoy the content and become motivated	a. 7 b. 5 c. 3
5. When you post on TikTok, do you value the number of views, likes, and comments? Do the numbers affect your mood toward posting more content?	a. Post on TikTok to satisfy individuals b. It does affect the mood of a teenager c. Does not affect any person d. TikTok is private and for friends only e. Do not post on TikTok	a. 3 b. 1 c. 3 d. 2 e. 6

For Question 1, which explains when teenagers use TikTok, there were four (4) common themes. The highest frequency is that teenagers use TikTok every day, with 6 mentions. The second is that teenagers don't usually watch TikTok, with 5 mentions. Teenagers often use TikTok, with 3 mentions. Lastly, the least frequency that was found is that 1 of the respondents does not use TikTok.

For Question 2, this explains whether TikTok has affected the ability and changes in the lifestyles of teenagers; it has five (5) common themes. The most frequent is that teenagers improved their habits, which has 8 mentions. Three (3) themes were identified, and each has 2 mentions: firstly, teenagers just want to be involved in trends; secondly, TikTok is affecting a person's sleeping routine; and thirdly, it has both negative and positive effects. After that, we got 1 mention for TikTok being helpful in academics.

For Question 3, this focuses on whether teenagers can relate to the influencers' content based on their own experiences on TikTok. There are only two (2) themes: Teenagers mostly relate to the content, which makes it more interesting to watch on TikTok, and they want to avoid feeling alone in the experiences they have; this theme has 14 mentions, while another respondent cannot relate to the content on TikTok and has 1 mention.

For Question 4, it discusses whether teenagers usually compare themselves to famous influencers. This contains three (3) themes: We have the highest frequency with 7 mentions, which indicates that teenagers compared themselves to these influencers. Some teenagers have 5 mentions for not caring about TikTok influencers. Teenagers who have 3 mentions also just want to enjoy the content and actually feel motivated because of influencers.

For Question 5, which explores whether teenagers affect their mood to post more content when they value the number of views, likes, and comments on TikTok whenever they post. There were five (5) common themes. The highest frequency that were gathered was that teenagers don't usually post on TikTok; it received 6 mentions. Two (2) themes received 3 mentions each: one (1) theme is that teenagers don't feel affected as individuals by posting content, whether they value the post or not, and the other one is that some teenagers post TikTok content simply to satisfy themselves. Additionally, 2 mentions came from teenagers who stated that their TikTok account is private and for friends only, which is why they post. Lastly, 1 teenager indicated that their mood does affect their decision to post on TikTok.

Table 2. Influences of TikTok on the Social Behavior of Teenagers

Questions	Commonalities	Frequency
6. Have you observed changes in your attitude and humor because of the content you watch on TikTok? If yes, how?	a. Adapt it into real life b. It does not affect teenagers c. It changes the humor of teenagers	a. 1 b. 1 c. 13
7. Being that TikTok is a social media, how can you feel connected with your peers when you use TikTok?	a. TikTok helps improve skills b. It deepens relationships with friends	a. 1 b. 14
8. Have you experienced direct or indirect bullying through	a. Experienced bullying on TikTok	a. 2 b. 11

TikTok? If yes, how did these types of experiences affect your ability to manage your social life?	b. Does not get involved c. Has experienced both negative and positive opinions from others d. Does not care about the negative side, but respects the opinion	c. 1 d. 1
9. Have you ever felt pressure to conform to certain beauty standards while using TikTok? If so, please describe.	a. I felt insecure because of beauty standards b. It boosts my confidence more c. I am content with who I am	a. 4 b. 5 c. 6
10. In what ways do you think TikTok has changed how teenagers express themselves?	a. It changes the personality of an individual to be satisfied with themselves. b. The teenagers have become more aware of what is happening in this generation c. Negative effects have overpowered the positive ones d. It affects decision-making and sets a standard for actions, regardless of whether they are right or wrong	a. 3 b. 6 c. 2 d. 4

For Question 6, which observed changes in teenagers' attitudes and humor due to TikTok content, there are three (3) common themes. Two (2) of these themes are tied with 1 mention each, which explains that this adapted their attitudes and brought these changes into real life, while the other theme is that it doesn't change who they are. It also received 13 mentions confirming that TikTok influences the humor of teenagers.

For Question 7, which explains whether TikTok has been a helpful social media app for feeling more connected with peers, it contains two (2) common themes. One of them received 14 mentions in total, indicating that TikTok deepens the relationships that teenagers have with their peers through communication. The other theme received 1 mention, highlighting it as an improvement to a skill.

For Question 8, which asked if teenagers have experienced direct or indirect bullying through TikTok and how these experiences affected their ability to manage their social lives, there are four (4) common themes. The theme with the highest frequency has 11 mentions, where teenagers report that they do not experience bullying on TikTok. Unfortunately, there were 2 teenagers who experienced bullying on TikTok. Additionally, there were two (2) themes that were tied, each containing 1 mention. The first is that a teenager experienced both negative and positive comments or opinions from social media. The other is that this teenager does not care about others' opinions but just wants to respect them.

For Question 9, this pertains to teenagers and whether they feel pressure to conform to certain beauty standards while using TikTok. This has three (3) common themes: First, these teenagers feel content with who they are and proud of being themselves, which received 6 mentions. Second, most teenagers are becoming more confident because of these beauty standards, receiving 5 mentions in this study. Lastly, teenagers also feel insecure because of the negative effects it has, which received 4 mentions.

For Question 10, which explores how TikTok has changed teenagers' ways of expressing themselves, consisting of four (4) common themes: it received 6 mentions from teenagers who agreed that TikTok is a platform useful for raising awareness in this generation. TikTok can affect a person's decision-making and has become a goal to set standards, regardless of whether they are right or wrong, with 4 mentions about this. Additionally, there are 3 mentions from teenagers that TikTok is changing them into new people and making them satisfied with who they are. The least mentioned aspect is that 2 teenagers agree that the negative side of TikTok overpowers its positive side.

IV. CONCLUSION AND RECOMMENDATIONS

The results of this study gave important information on how TikTok affects Grade 11 students at San Jose Academy's social relationships and self-perception. Understanding the effects of TikTok on teenagers requires an awareness of a number of serious problems that are emphasized in the findings. As a sign of a high degree of engagement with the platform, the majority of participants use TikTok on a daily basis. TikTok appears to be a big part of their everyday life based on their frequent usage.

The impact of TikTok on habits and lifestyle is another important issue. TikTok can help users create better habits, according to several participants, however, some users find that it disrupts their sleeping habits. The need of balanced usage to prevent negative impacts and gain the benefits of its beneficial effects is made clear by this dual impact.

Most participants think TikTok content relatable, which boosts their desire to use the app. Some people, though, feel disconnected from its content. Teenagers also frequently compare themselves to TikTok influencers, which, depending on personal experiences, may motivate or create insecurity.

By encouraging conversation and sharing experiences through trends and humor changes caused by the platform, TikTok also greatly helps with the development of closer connections between friends. While TikTok's beauty standards provide some teens more self-confidence, others feel insecure or are content with their identities without peer pressure.

Overall, this study shows that use of TikTok among teenagers at San Jose Academy has both positive (better habits, stronger peer relationships) and negative (sleep disturbances, comparison-induced insecurities) effect. These results suggest that although social media sites like TikTok give opportunities for creativity and communication, they also pose mental health and development of identities issues that should be carefully taken into account by educators, parents, and legislators.

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The Relationship Between Glossophobia and English Proficiency of Grade 11 and 12 Senior High School Students in Humanities and Social Science of San Jose Academy

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Abstract: The Philippines is one of the largest English speaking nations in the world making Filipinos known for being globally competitive because of their versatility in foreign languages considering it to be one of their work advantages. In the academic setting, the student's ability to speak English fluently is a priority that the nation's educational system takes into account. However, despite the fact that English is covered in basic education classes across the country, Filipinos, particularly students, still experience troubles with constructing words effectively, having a low self-esteem affecting their confidence whenever presenting in front of the public and because of the limitations in their vocabulary. These factors have led to the students acquiring speech anxiety or glossophobia. This study explores how the students' level of English proficiency correlates to their speech anxiety in the Humanities and Social Sciences in San Jose Academy whereas they shared their experience about their glossophobia that hinders them from speaking English effectively.

Key Words: Glossophobia; Speech Anxiety; English Proficiency

1. INTRODUCTION

1.1 Background of the Study

Public speaking is essential in numerous instances, influencing how we interact, communicate, and influence others. Establishing our public speaking abilities can set us apart from our peers and lead to potential career progression. Speaking in front of an audience can be a life-changing experience that leads to self-discovery and personal development. Self-assurance and self-esteem can also be increased by overcoming the fear of public speaking and learning how to confidently address an audience. It improves your ability to communicate in general, gives you the confidence to express your own viewpoints, and fosters personal development by encouraging you to step beyond your comfort zone. People can unleash their ability to inspire others, communicate effectively, and make a lasting impression by becoming proficient in the art of public speaking (Jhangiani, 2023).

However, there are approximately 15-30% people worldwide who are experiencing speech anxiety and this phobia is affecting the major process of their communication within their society, hindering them to fully express and engage with others emotionally and rationally wise. These types of people who possess glossophobia find themselves in a situation where they are trapped within their own thoughts, troubles in sharing their ideas, and questioning themselves about their capabilities to construct words fluently and effectively, causing them to believe that everyone is not always there to listen and other people's presence only brings judgements towards them (Lucchetti, 2023).

One of the main problems that has a big contribution to the poor English proficiency of students is the glossophobia or their fear of public speaking. Because even though Filipinos are engaged in speaking English, not the whole population of students have the courage to speak in front of a crowd or even just inside their classroom answering a simple recitation. With the reason that they don't feel confident with their English proficiency, that includes their fear of being judged because they've mispronounced an English word or a spotted grammatical error in their work. Results showed a high level of public speaking anxiety, along with the indicators of trait anxiety, context anxiety, and audience anxiety. (Cuamag, et al., 2024).

In 2016, Philippines ranked 13 out of 72 countries in the english proficiency ranking of east and southeast asian countries, and the latest ranking of Philippines in the year 2022 shocked a few, since it

drops to 22 out of 111 countries. The high English proficiency of Filipinos can drop over time. It could be due to the lack of guidance and showing importance when it comes to enhancing the methods of teaching English language that affects student's English proficiency. Even though the Philippines is among the competitive countries learning English and having English as their secondary language, there is still a big percentage of Filipinos who are having a hard time speaking English that hinders their communication process that leads to speech anxiety (EF EPI, n.d).

To introduce the study, it investigates the relationship between glossophobia or speech anxiety and the level of English proficiency of senior high school students in Humanities and Social Sciences (HUMSS) in San Jose Academy. Whereas, the strand HUMSS is relevant in building relationships between students by creating a strong connection throughout good communication promoting a globally competitive environment for all students of the San Jose Academy.

As researchers with the course of Humanities and Social Sciences we would like to break the stigma associated with questioning the capabilities of a student's communication skills and avoid normalizing judging against students who struggle expressing their own thoughts and constructing words fluently in English.

This study wants to address what are the cause and effect of students specifically in HUMSS experiencing the phenomenon of glossophobia and also if their level of proficiency in English interferes with their ability to communicate properly in crowds.

This study can stand as an instrument for students as one of their guides when it comes to learning about the phenomenon of glossophobia, addressing in this study that the importance of exploring one's phobia can be everyone's guide for improved understanding and learning.

1.2 Statement of Objectives

Confidence in public speaking is relevant because it served as the foundation upon which effective communication was built (Renquintina, 2023). Posited that confidence not only enhanced the speaker's credibility and persuasiveness but also instilled trust and engagement in the audience. Confidence in public speaking not only helped individuals overcome the fear associated with addressing an audience but also fostered self-esteem and trustworthiness (Sionel, 2021).

Knowing the importance of effective communication and avoiding any language barriers in building strong relationships in our community, there are still few students from the strand Humanities and Social Sciences (HUMSS) at San Jose Academy struggling with their constructiveness and effectiveness speaking fluently in English because of speech anxiety. The purpose of this study is to examine the relationship between the English proficiency of the students and their glossophobia which affects their ability to communicate, make an outstanding academic performance, and overall self-assurance when speaking in English. As well as the ways of coping and understanding their perspective on dealing with glossophobia to not only help them overcome it but also to help others know how to cope with it too.

1. How does glossophobia and English proficiency relate to each other?
2. How does the student's fear of public speaking hinder their ability to utilize their English proficiency?
3. What are the common coping mechanisms of HUMSS students to help them control their glossophobia?

1.3 Significance of the Study

This study will serve as a valuable resource for students and future researchers by providing insight into how glossophobia affects students and raising awareness on how to address this fear with respect and sensitivity. The following groups and individuals will greatly benefit from this research:

Students. Students who struggle with glossophobia will benefit the most from this research, as it explores how their fear of public speaking affects their English proficiency. Additionally, the study highlights different coping mechanisms students use to manage this fear, which may inspire them to build confidence through various strategies. By gaining a better understanding of their experiences, they can work towards improving their academic growth. The classmates of students with glossophobia interact with them the most, making their support essential. By reading this research, they will be encouraged to create a positive and supportive learning environment. Furthermore, it promotes a culture of understanding and collaboration, where students can help those who are struggling by fostering a space where students feel safe to participate and express themselves without the fear of judgment.

Parents. Since parents play a crucial role in providing emotional support to their children, this

research will help them to understand glossophobia and how it affects their child's academic growth. With this knowledge, parents can offer more effective support at home and work alongside teachers to guide their children both academically and emotionally.

Teachers. Educators have a significant influence on students with glossophobia. This study will provide teachers with insights into how they can adjust their teaching methods to accommodate students who struggle with public speaking. By understanding their students' needs, teachers can implement strategies that foster a more inclusive and encouraging school environment.

School Administration. This research will help schools develop a deeper understanding of glossophobia and help them find ways to improve a more supportive learning environment for affected students. It can guide school administrators in providing teacher training programs and improving school policies, programs, and curricular to better address the needs of students with glossophobia.

Future Researchers. This research can be a useful reference for future scholars, offering a better understanding of glossophobia and its link to English proficiency. Moreover, it can serve as a basis for future studies on effective approaches to overcoming the fear of public speaking and improving communication abilities.

1.4 Scope and Delimitations

The researchers identify the scope and delimitations considering them to applicable and realistic expectations in assessing and doing the research. This study is focused on senior high school students who are under the strand of HUMSS, consisting of Grade 11 and grade 12 students in San Jose Academy.

Also this study aims to gather the students' experiences whenever they face a large group of people where their techniques and strategies in communication are gathered. Thus, The study covers the connection between glossophobia and the level of english proficiency of Senior high school students in San Jose Academy in order to measure their performance in terms of their communication skills.

However, this study will not cover the following, the study will strictly evaluate its relevance to the HUMMS strand in San Jose Academy and it will not include students in other grade levels, strand or institutions since the coverage of the study focuses on the participation of the experience inside the Humanities and Social Sciences of Grade 11 and 12 Senior High School Students.

2. Methodology and RRL

2.1 Review of Related Literature

The majority of people are not born public speakers; rather, they undergo study to do so. They experience thoughts involving nausea and profuse perspiration due to fear and anxiety when they are in front of an audience and the center of attention. Glossophobia is the term used to describe the intense fear that people who are afraid of speaking in front of others experience in social settings and performance scenarios. (Fagsao, 2021). It is an anxiety disorder that is typified by an excessive and ongoing fear of a scenario or thing. A sample of Grade 11 HUMSS students at Parang National High School who suffer from glossophobia were interviewed about their experiences and how it impacts both their academic performance and personal lives. People with glossophobia often feel nervous and afraid when they have to speak in front of a crowd. As a result, they may avoid speaking in public to prevent embarrassment or rejection from others. Over time, glossophobia may suffer detrimental effects on their emotional well-being and academic achievements (Lasin, et al., 2023).

Filipinos, particularly students, have consistently undervalued the significance for fluency in that language due to a variety of social and individual circumstances. Because fear corresponds to speaking English, these variables created a growing problem with students' proficiency in the language.

Glossophobia influences students' willingness to engage in class discussions and presentations, whereas stress was shown to have detrimental impacts on students' motivation and interest. The results have shown that interpersonal variables significantly influence pupils' academic performance and surroundings. Two elements that affect students' academic lives include stress, which is a complicated intellectual or emotional pressure brought on by other people in their environment and glossophobia, resulting in anxiety of public speaking (Shabbir, 2025).

The individuals who experience stuttering face significant challenges in life due to its nature as a chronic communication disorder. The study discovered several reasons why students experience stuttering when speaking English. These include nervousness

about speaking, fear of making mistakes or errors, struggling with unfamiliar vocabulary, experiencing peer teasing, low self-assurance, and physical conditions, such as tongue structure, that impact speech clarity. The researchers suggested that these challenges could be addressed by setting aside time for regular practice, incorporating English into daily conversations, building social connections, and strengthening communication skills. Additionally, promoting confidence, interest, active participation, and enthusiasm for learning English can greatly reduce instances of stuttering (Ugalingan, et al., 2023). Everyone should be able to communicate effectively in a variety of settings, regardless of their line of work. Few research addresses the setting of educators, despite the fact that scholars have provided studies demonstrating the communication fears and proficiencies of speakers of many languages (Pontillas, 2020).

This problem persists, particularly among ongoing students, despite an increasing amount of research on teaching strategies and therapies to lessen public speaking fear. Finding real coping mechanisms that students could use in real-world circumstances is an approach to reducing this kind of worry. Several researchers have tried to investigate the social and personal aspects of students in order to recommend appropriate coping mechanisms to lessen their fear of public speaking (Tee, 2020).

In today's globalized world, being proficient in English is essential for growing people who can communicate well. Students' capacity for social interaction and communication in a common language is crucial just like in Malaysia. The Philippines is also maintaining the second language proficiency in English. Nevertheless, even though both countries were formerly exposed to English since elementary school, there have been instances where pupils, particularly those at universities, public speaking fear is still a common problem among Malaysian and Filipinos students, which impacts their involvement and performance in the classrooms. Relating to the relevance of comparing our country to other developing countries. (Khaidzir, et al., 2024).

Using 'Record Your Recitation' (RYR) as a Strategy in Developing the Speaking Skills of Selected Grade 9 Students, the online learning modality through 'Record Your Recitation' (RYR) aims to address the challenges Grade 9 students face in developing their speaking skills, as part of a plan to enhance these skills, which were brought by emergency remote teaching. The RYR program selected 10 Grade 9 students to participate over the course of 8 weeks. The first four weeks focused on developing explanation skills, while the final four weeks emphasized expressing opinions. Every week, students submitted recorded speaking performances, which were evaluated by the teacher-researcher using a custom rubric. Feedback was given via email, and the performances were analyzed using mean scores and ANOVA. The study showed consistent progress in students' speaking abilities, as evidenced by the performance analysis and students' self-ratings. While students faced some difficulties, their overall experience was positive. The teacher-researcher also encountered challenges related to time constraints during the RYR implementation (Santos, 2023).

Using Project VES (Vocabulary Enhancement Strategies and Comprehension) to Enhance the Vocabulary Size of senior high school students, states that numerous nations have faced an increase in learning gaps as one of the devastating effects of the COVID-19 pandemic. Due to the absence of physical classes, students had limited chances to interact with their peers and teachers. This lack of engagement hindered their ability to learn and understand new words, a crucial skill for excelling in standardized tests. This study assessed the effectiveness of Project VESC (Vocabulary Enhancement Strategies and Comprehension), a program designed to boost vocabulary through games and activities. Through the use of inferential analyses and grades from two grading periods, as well as pre- and post-tests based on Nation's vocabulary test, the research demonstrated a significant improvement in the experimental and control group's performance. These results suggest that similar programs could help enhance vocabulary in senior high school students, with the recommendation to incorporate vocabulary-building activities across all subjects. Pertaining to the communicative skills of students with some having glossophobia and how their proficiency in English is related (Tubilan, 2023).

2.2 Methodology

2.2.1 Research Design

The researchers adopts a qualitative approach conducting an exploratory research whereas the study will focus on finding the relationship between the level of English proficiency of Grade 11 and 12 HUMSS students and their glossophobia, investigating the phenomenon by analyzing the gathered data and results exploring the respondents answers which is the selected participants from the two section in HUMSS of San Jose Academy pertaining to the experiences of the students having difficulties with speech anxiety affecting them in their class performance and overall in the academic field.

2.2.2 Population Sampling

The study will conduct a purposive sampling consisting twenty (20) participants from the selected students in HUMSS, gathering data from Grade 11 St. Francis De Sales and Grade 12 St. - John Baptist de La Salle that have difficulties in speaking fluently in English and experiencing glossophobia or speech anxiety.

2.2.3 Research Instrument

The researchers prepared 10 sets of questions that they will be answering throughout the distributed surveys and standardized interviews, filling the gaps that the researchers seek to answer in investigating the relationship between students' level of English proficiency and their glossophobia. The research questions were validated by Mrs. Mariz April F. Yongot-Yongot, a Practical Research 1 Teacher at San Jose Academy and the researchers' research adviser.

2.2.4 Data Gathering Procedure

There were two (2) procedures conducted in gathering the data from the selected students in order to obtain the needed amount of responses with the limited time given to the researchers during the time of the data gathering process. The first one is face-to-face interviews that happened during their free period or break while the other one is the distribution of surveys in their respective classes. This is done to consider the time differences of both grade levels. They were then oriented towards answering the following questions highlighting that there are no right or wrong answers and for the distributed survey they were instructed to write down their answers corresponding with the given questions.

3. RESULTS AND DISCUSSION

The survey result indicates that the majority of students experience glossophobia, often tracing it back to pre and post-pandemic periods. Shaking and stuttering are the most common physical symptoms, and for some, this anxiety negatively impacts their academic performance. To cope, most rely on self-improvement and self-encouragement. Additionally, the majority of students rate their English proficiency between 6 to 10, with responses showing a mix of anxiety and comfort in using the language.

Table 1. Glossophobia. Result 1

Questions	Theme	Answers	Code
1. Do you experience glossophobia or speech anxiety when facing the public?	Experiencing glossophobia or speech anxiety	a. Yes b. No c. Sometimes	a. 16 b. 1 c. 3

Table 1 shows the number of responses to a question on having glossophobia. Based on the responses of 20 students, 16 students answered "Yes", 1 student answered "No", and 3 students answered "Sometimes". The result indicates that the majority of the students experience glossophobia or speech anxiety.

Table 2. Glossophobia. Result 2

Questions	Theme	Answers	Code
2. When did your speech anxiety start to show?	Start of speech anxiety	a. Post pandemic b. Pre pandemic c. Recent d. Unsure	a. 7 b. 7 c. 5 d. 1

Table 2 shows responses to a question on speech anxiety. Based on the responses of 20 students, 7 students answered "Post-pandemic", 7 students answered "Pre-pandemic", 5 students answered "Recent", and 1 student answered "Unsure". The result indicates that the majority of the students' speech anxiety started post and pre-pandemic.

Table 3. Glossophobia. Result 3

Questions	Theme	Answers	Code
3. Do you ever feel any physical symptoms that hinder you when speaking in public (e.g., sweating, shaking,	Physical Symptoms	a. Shaking b. Stuttering c. Sweating d. All of the above e. Others f. None	a. 7 b. 7 c. 1 d. 2 e. 2 f. 1

stuttering)? If there is anything more, what is it?			

Table 2 shows that majority of students mostly experience shaking (7) and stuttering (7), there's also a student who experience sweating (1) as a physical symptom of their anxiety and other students admitted they experience all of the given choices above (2) meanwhile some students specified the physical symptoms they experience that's classified as others (2). And only one (1) out of all the interviewed students answered "none".

Table 4. Glossophobia. Result 4

Questions	Theme	Answers	Code
4. Does your phobia directly or indirectly affect your academic performance and personal life?	Phobia affecting academic performance and personal	a. Yes b. No c. Not really d. Sometimes	a. 9 b. 4 c. 5 d. 2

Table 4 shows that most student's phobia directly affects their academic performance (9) meanwhile four (4) of them answered "No", for some students, their phobia sometimes adds a heavy impact to their academic performance (2), hindering them to perform well. While the remaining (5) students shared that their phobia does not affect their overall performance and personal life.

Table 5. Glossophobia. Result 5

Questions	Theme	Answers	Code
5. What are your ways and strategies to overcome your glossophobia? Can you please elaborate?	Strategies	a. Self encouragement b. Self improvement c. Socializing with friends	a. 7 b. 10 c. 3

Table 5 shows responses to a question on ways and strategies to overcome glossophobia. Based on the response of 20 students, 10 students answered "Self-improvement", 7 students answered "Self encouragement, and 3 students answered "socializing with friends". The result indicates that the majority of the students use self-improvement as their way and strategy to overcome glossophobia.

Table 6. English Proficiency. Result 6

Questions	Theme	Answers	Code
6. Are you confident with your level of English Proficiency ? Yes/No. On a scale of 1-10, how would you rate your English skills when speaking? Can you please elaborate?	Level of English Proficiency and rating of english skills	a. Yes (6-10) b. No (0-5)	a. 13 b. 7

Table 6 shows responses to a question related to the students' confidence level of English proficiency on a scale of 1-10, with 0-5 indicating "No" and 6-10 indicating "Yes". Based on the response of 20 students, 13 students answered "Yes" and 7 students answered "No". The result indicates that the majority of the students rate their English Proficiency with a level between 6 to 10.

Table 7. English Proficiency. Result 7

Questions	Theme	Answers	Code
7. Can you tell us about your experiences when using the English language in your lessons and studies? You can give any	Experiences on using the English language	a. Anxious b. Comfortable c. Self expression d. Language excellency	a. 8 b. 8 c. 1 d. 3

examples.			

Table 7 shows responses to a question related to the students' experiences on using the English language. Based on the response of 20 students, 8 students answered "Anxious", 8 students answered "Comfortable", 1 student answered "Self-expression", and 3 students answered "Language Excellency". The result indicates that the students experience anxiety and comfort when using the English language.

Table 8.. English Proficiency. Result 8

Questions	Theme	Answers	Code
8. What do you feel when people are listening to you speak in English? Can you please elaborate?	Feeling	a. Low self-esteem b. Confident	a. 12 b. 8

Table 8 shows the result of what students feel about their English proficiency when speaking in front of a crowd. (12) have a low self esteem meanwhile (8) of the students shared that they feel confident.

Table 9.. English Proficiency. Result 9

Questions	Theme	Answers	Code
9. What are your weaknesses where you would like to improve your English skills? You can give any examples.	Improving English skills	a. Fluency b. Confidence c. Vocabulary d. Grammar e. None f. Other	a. 3 b. 5 c. 5 d. 4 e. 2 f. 1

Table 9 shows that students opened up about their weaknesses that they would like to improve when it comes to their English proficiency. Five (5) believes that by having confidence, it would help them improve their English skills with also a broad vocabulary (5) to expand their knowledge that can help them with fluency (3) and grammar (4). While (2) answered "none" and one (1) shared their own answer beyond the choices that's classified as "other".

Table 10.. English Proficiency. Result 10

Questions	Theme	Answers	Code
10. What are your strategies to improve your English Proficiency ? Can you please elaborate?	Strategies	a. By practicing b. By studying c. None	a. 10 b. 9 c. 1

Table 10 shows that almost the majority of the students believed that by practicing, their English proficiency would improve (10) while some believed that they can improve their English proficiency by studying (9) meanwhile one (1) student answered "none" .

4. CONCLUSION AND RECOMMENDATION

4.1 Conclusion

This study reveals a significant connection between the level of English proficiency among San Jose Academy Senior High School students enrolled in the Humanities and Social Sciences (HUMSS) strand and glossophobia, or speech anxiety. The study explains how this type of fear can hinder successful communication, reducing students' capacity to speak English with confidence, particularly when giving a speech in front of an audience.

By looking at the underlying reasons and effects of glossophobia, the data has been separated into two cases. The majority of the students who are experiencing low self-esteem whenever speaking in English in front of the public have an effect on their academic settings. The student's English skills contributed significantly towards facing their fear in public, where some of them find themselves feeling anxious, resulting in nervousness and anxiety making the students think negatively more about what other people might say. On the other hand, the students who are confident about their ability to express themselves in public whenever speaking in English have minor difficulties adapting to their academic settings. Thus, making them feel more comfortable about expressing

themselves in public. However, there are similarities between the two cases whereas, the students goal and objectives in terms of improving and enhancing their English vocabulary.

The study fosters a more accepting and encouraging environment for students who have trouble speaking in front of an audience. Both educators and learners can benefit from the findings of the research, which highlight how critical it is to manage speech fear in educational settings. The report also promotes a more compassionate and inclusive approach to teaching and learning by calling for an end to the stigma and criticism related to students' linguistic difficulties. Long-term, this study supports creating a beneficial, encouraging atmosphere that develops students' communication abilities, which will boost their confidence and future academic achievement..

4.2 Recommendation

As the researchers have gathered sufficient data on how glossophobia and English proficiency affect students, they have provided the following recommendations to help improve both areas.

Practice Regularly. Students may incorporate English into their daily lives by speaking with family, friends, classmates, teachers, and others. Interacting with different people allows students to receive feedback and gradually build confidence over time, as these individuals can offer encouragement and support. Additionally, practicing self-talk can help students track their own progress and further develop their public speaking skills, reducing their fear.

Building Interpersonal Relationships. The researchers encourage students to expand their social circles or join groups, which can help lessen their fear of public speaking. Engaging with larger audiences will allow students to gain valuable experience, improve their presentation skills, and enhance their interactions, leading to more efficient public speaking.

Breathing Techniques. It is important for students to practice proper breathing techniques, as these can help calm their nerves in front of an audience. Controlled breathing allows them to relax and speak more clearly and confidently in public.

Observing. The researchers encourage students to observe individuals who specialize in public speaking and possess strong English proficiency. Watching how these speakers handle large crowds, express their ideas, and use fluent language and engaging vocabulary can provide valuable insights for improvement.

Participation. The researchers promote active participation in school events or any public speaking opportunities. These experiences help students develop communication skills, improve English proficiency, boost motivation to speak, express thoughts more clearly, and enhance critical thinking.

Reading Books or Other Media to Encourage English Proficiency. In today's digital era, devices are widely used, and the researchers encourage students to read both online and physical materials. Reading enhances vocabulary, improves grammar, and strengthens comprehension skills, all of which contribute to better English proficiency.

Writing. Writing allows students to freely express themselves, fostering creativity and improving their English proficiency. Regular writing practice helps students develop better grammar, expand their vocabulary, and strengthen their ability to communicate effectively.

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The Underlying Influences of Social Media on the Behavioral Perspective of Generation Alpha in San Jose Academy

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Abstract: In this generation, it is very notable that social media has developed into a powerhouse in society, with almost the whole world using it for various reasons like communicating, assistance in everyday life, entertainment and many more. Although the spread of social media is deemed helpful for many people, especially tech savvy, it poses potential threats to many if it affects their overall behavior. Some might say that social media is harmful when use is not properly contained, while some argue that a little risk is nothing compared to progress it brings. Based on the phenomenological research approach, the researchers conducted an interview with (15) junior high school students of San Jose Academy who belong to the age group Generation Alpha "(Gen Alpha)" using the purposive sampling technique, the researchers collected the respondents' lived experiences and insights. The findings shows that social media use could find favorable impacts on developing oneself, communication skills, and interest, especially with teenagers belonging to Gen Alpha as it enhances their skills and knowledge with the use of social media. However, findings also show that social media eventually deteriorates the bonds and connections of teenagers with the real world as they are now more inclined to the use of social media. Recommendations suggest that schools should initiate seminars and meetings that could enhance the awareness of Gen Alpha. It also suggests that parents should practice observance of their children in order to limit their use of social media platforms that could possibly impact them negatively.

Key Words: *behavioral perspective; influence; generation alpha; social media*

1. INTRODUCTION

1.1 Background of the Study

In modern times, social media has greatly become a huge benefactor of trends within this generation. Social media has become more than just a platform for sharing pictures and status updates, it has now become a powerful tool in shaping how to communicate, connect, and even think. With billions of users in various social media platforms such as Facebook, Instagram, TikTok, and X (formerly Twitter), social media are bound to have some serious influence over personal relationships and decision-making across the globe.

According to Tirendi et al. (2024), social media have an undeniable power to break down barriers and distances, ensuring immediate interaction between individuals who are physically far apart. Furthermore, social media is the most used virtual place in the world, considering that there are now 5 billion active users, approximately 60% of the global population, which, according to official UN estimates, has recently surpassed 8 billion people.

Additionally, with the ever-evolving nature of social media, influences could reach sectors like advertising, politics, and entertainment. Algorithms drive the content we consume, shaping our perceptions by reinforcing biases and prioritizing engagement over accuracy.

Nowadays,, social media has a lot of impact

on people,, especially Generation Alpha (people born between 2010 and 2024). These people have grown up in a fully digital world, surrounded by technology from a very young age. This has had a profound impact on their development as students. The hypothesis shows that social media has a crucial role, especially from a child's perspective, as they could possibly mirror everything they see and hear on social media.

In a recent 2022 poll of 1,300, people found that 35% of teenagers use at least five social media apps every day, including Facebook, Instagram, Twitter, YouTube, and TikTok (Mayo Clinic, 2024). While these platforms are frequently employed for sharing content and interacting, they may also have drawbacks, especially among younger users. Unattended social media use may introduce kids to illicit material that is presented as kid-friendly, which can lead them to engage in inappropriate behavior. The prolonged use has also been connected to sleep deprivation, which impairs concentration, energy, and academic achievement. Early media exposure is related to hyperactivity, inattention, and impaired memory because children may prioritize irrelevant information they come across online (Zoromba et al., 2023).

Children are growing up surrounded by mobile devices and interactive social networking sites such as Twitter, Myspace, and Facebook, which have made social media a vital aspect of their life. Social networks are transforming the behavior in which young people relate with their parents and peers, and how they use technology (Rao et al., 2022).

The effects of social networking are twofold, on a positive note, social networks could act as invaluable tools for professionals. They achieve this by assisting young professionals to market their skills and seek business opportunities. Social networking sites may also be used to network efficiently. On the negative side, the internet is laden with several risks associated with online communities.

However, based on studies conducted by Bozzola et al. (2022), we must keep in mind that media usage may be related to some adverse consequences especially in the most vulnerable people, such as the young. The aim of the review is to focus on risks correlated to social media use by children and adolescents, identifying spies of rising problems and engaging in preventive recommendations.

1.2 Statement of the Problem

This study seeks to uncover the underlying influences of social media on Generation Alpha's behavioral perspectives, emphasizing the way this impacts their psychological well-being, decision-making, interactions with others, and self-perception. The study specifically aims to address a series of questions that would help the researchers gain valuable insight.

The first aspect of the study examines the effects of extended use of social media on Generation Alpha's (born 2010-2024, specifically junior high school students 7-10) emotional intelligence and social skills. Furthermore, this will also examine the behavioral effects social media use has on this generation. Lastly, the role of social media platforms in the social interactions and communication skills of Gen Alpha.

With these inquiries, the study will undergo a series of investigations to shed light upon the effects of social media on generation alphas's behavioral perspective.

1.3 Significance of the Study

The findings of this study will provide the society with some knowledge on factors that social media affect the generation alpha on their behavioral perspective. The following will benefit from this study:

Generation Alpha. This study will provide them with knowledge on how social media has affected them, especially on their behavioral perspective. They can get key information about their condition.

Parents. This study will help them because they are the ones often with children, they also notice more how a child's behavior changes, so because of this study they can gain enough information on how they can handle a child's behavior and how they can further guide their children.

Community. As one of the people the child interacts with when they leave their home, because of this study you can get information on how you can help a child to get engaged in your community.

Teacher. The study will present different information about the effect of social media on Generation Alpha, through this study, teachers will be able to conclude its possible effect on the behavior of their students so that they can take steps to help it.

Future Researcher. This study can be used by future researchers as a reference for their future

research to get information about the impact of social media on gen alpha.

1.4 Scope and Delimitations

This study is only limited to those who belong to Generation Alpha. Its main objective is to explore the underlying influences of social media on the behavioral perspectives of Generation Alpha, emphasizing particularly on how their social behaviors, values, and attitudes are formed by their digital contacts. The study aims to uncover subjective experiences as well as complicated insights about the association between social media and behavioral development through in-depth focus group discussions and interviews.

2. METHODOLOGY and RRL

2.1 Review of Related Literature

Social media has become so influential nowadays that it has partially troubled everyone. With the incorporation of various social media platforms, social media is bound to leave its impact on its users. Consequently, the consumers of the said platform are so immersed in it that they fail to see the negative side effects of it. This literature review will investigate the recent studies of its impact especially on the generation alpha.

Developments in information and communication technology have contributed to the growth of virtual contacts, which are influencing human communication and having an impact on the economy, education, and social connections, among other areas of life. On the other hand, motor, sensory, or cognitive problems that impair movement, touch perception, and information processing are increasingly interfering with physical connections. Furthermore, during the past five years, behavioral models and values have garnered a lot of attention from researchers in the fields of psychology, sociology, and management due to their critical role in influencing human behaviors (Meirisa et al., 2024).

According to Andriievska et al. (2022), elementary students are particularly susceptible to the influences of social media that affect their perception and choices. Additionally, the emergence of digital media, particularly in communication technology, has brought a massive change in how the youth communicate and express themselves.

Emotional intelligence and digital competency have been combined to create the recently proposed idea of digital emotional intelligence (Audrin & Audrin., 2023). According to the authors' concept, digital emotional intelligence is impacted by the knowledge and abilities related to digital competence, while trait emotional intelligence influences attitudes toward digital competence. This demonstrates the mutually reinforcing relationship between digital competence and emotional intelligence, implying that both DC and EI support one another's growth in the digital environment.

According to Zaki et al. (2023), Generation Alpha is mostly affected by what they see on various social media platforms, the things they do and want all vary on what they see online, in addition, Gen Alpha also expects the media platforms to answer all their inquiries and questions. Additionally, social media use can cause poor mental health through validation-seeking practices, fear of judgement, body comparison, addiction, and cyberbullying. It also shows social media's good impacts on adolescent wellbeing - through connection, support and discussion for those with similar cases (Popat & Tarrant, 2022).

According to Dagaojes et al. (2023), social media plays a role in the self-expectancy and behavior of young adults. It is said that whenever they do selfies, some use filters as a way to boost their self-esteem. Results show that an average of 2.90 teens and young adults use filters in their photos sometimes, this shows that there is a significant relationship between social media use and how they behave on it.

In addition, Daza et al. (n.d) state that the findings indicate that Benguet State University students are quite educated about social media and occasionally use it, while they are also very knowledgeable about sexual education but rarely use it. There is no discernible difference in the degree of sexual behavior and social media awareness and practice by sex or year level. There is a notable variation in the degree of sexual behavior and social media use by age.

In a study conducted by Lim et al. (2022), during COVID-19 pandemic, the surge of the virus rapidly increased and the mental health of college students deteriorated due to the alarming news featured online. However, The findings indicate a negative correlation between employees' reluctance to change and organizational citizenship behavior and social media crisis communication. Furthermore, OCB considerably exacerbated the detrimental impact of social media crisis communication on the employees'

reluctance to change, according to the moderating effect analysis. This finding suggests that when OCB is highly expressed among employees, social media crisis communication may have a greater effect on reducing their resistance to change (Puyod, 2021).

According to Cleofas (2022), his findings show that 24.2% of those surveyed have social media disorder (SMD). Students who use TikTok frequently and hail from lower-middle-class families are more likely to have SMD. Social media has both positive and bad effects, according to a qualitative investigation of the narratives of 121 students with SMD.

Social media has truly changed how the world interacts with one another, with endless streams of platforms and applications, social media ought to change the way how relationships, academics, and mental faculties work. While social media does provide opportunities for creating connections with various individuals, it also brings a lot of challenges, such as lessening physical interaction with one another and an increased rate of digital dependence.

Most teenagers, especially Generation Alpha; born from 2010-2024, are susceptible to the effects brought by social media which leads to it having a crucial role in shaping their perspective and behaviors.

2.2 METHODOLOGY

2.2.1 Research Design

The qualitative research design used in this study was phenomenology. A phenomenological investigation explains the shared interpretation of multiple people's experiences with a phenomenon. The researchers reduced the experiences to a more straightforward interpretation of the substance of the event in this type of qualitative investigation.

The researchers investigated the phenomena of social media's underlying effects on Generation Alpha's behavioral perspective within San Jose Academy. This research design will examine the core of their experience with social media's influence on their behavioral perspective.

2.2.2 Population Sampling

This study will focus on the cohort of Generation Alpha within San Jose Academy; specifically Grade 7-10 learners, this includes those born between 2010 and 2024 (or the relevant age range within those years if focusing on a specific cohort). They are often characterized as having grown in a totally digital environment with significant exposure to social media since infancy.

This study will use purposive sampling technique, meaning the participants will be chosen based on exploration, which can be done in greater depth on some subjects with focus groups or one-on-one interviews with fewer selected participants.

2.2.3 Research Instrument

The questionnaires were prepared by the researchers themselves in order to collect data from the participants on the influence of social media on their behavioral perspective. The questionnaires consist of open-ended questions that aim to elicit elaborate and thorough responses that would provide the researchers with a deeper understanding of what are the influences of social media on behavioral perspectives of Generation Alpha. *2.2.4 Data Gathering Procedure*

The research instrument was thoroughly validated in this study. It was approved and confirmed by Mrs. Mariz April F. Yongot-Yongot, the researchers' adviser in Practical Research 1, before being distributed to the respondents. The researchers administered the survey by distributing questionnaires to a total of (15) respondents from grade 7 to 10 learners of San Jose Academy. Before answering the survey questions, participants reviewed the terms and conditions provided by the researchers. Throughout the data collection process, all respondents were informed of the study's purpose and assured that their participation was voluntary.

3. RESULTS AND DISCUSSION

This chapter contains the data that were collected. These data are carefully arranged and evaluated to provide context and insight. Every piece of information and data related to the study's issue is meant to strengthen the foundation to the claims.

Table 1. Effects of extended use of social media on Generation Alpha's emotional intelligence and social skills

Question	Common Themes	Frequencies

1. Does social media help you understand the emotions, feelings, and thoughts of others?	a. Less interaction b. Express emotions c. helps communication d. Think first	a. 2 b. 5 c. 7 d. 1
2. Do you think social media affects you in how you interpret your own feelings and thoughts?	a. Affects thinking b. Minimal influence c. Expresses emotions	a. 10 b. 2 c. 3
3. Does the use of social media affect you on how comfortable you are with communicating with others?	a. Easier communication b. More confident online c. Reduces real-life comfort d. Online safety concerns e. Minimal impact	a. 5 b. 6 c. 2 d. 1 e. 1

The first table shows information about the effects of extended use of social media on Generation Alpha's emotional intelligence and social skills. The first question is about the use of social media in understanding the emotions and feelings of others. There were (7) junior high students who answered that social media helps them in communicating with others, (5) stated that social media helps express others emotions, (2) said that it doesn't help them understand as it lacks physical interaction, and (1) that answered social media allows them to think first to understand others.

The second question shows the effects of social media on self-interpretation of feelings. There were (10) respondents who answered that social media affects the way they think, (3) stated that social media helps them express their emotions well, and (2) which said that it has a minimal effect on them.

The third question which examines the comfortability of using social media to communicate with others. There were (6) respondents that stated that social media makes them more confident when communicating, (5) which said that social media makes communication more easier, (2) that social media reduces real-life comfort and both (1) responded with having online safety concerns and having minimal impact.

Table 2. Positive and negative behavioral effect of social media on Generation Alpha

Question	Common Themes	Frequencies
4. Do you think social media has any effects, may it be good or bad, especially to your personal growth?	a. adapting b. less socializing c. Connected yet overused d. Gained knowledge, exposed to anomalies	a. 1 b. 1 c. 7 d. 6
5. How do social media platforms affect your imagination and inventiveness?	a. Games and interactive platforms b. Learning and discovery c. Encourages creative thinking	a. 2 b. 3 c. 10
6. Do you think social media helps you to develop new interests and hobbies?	a. New trends b. Inspired content c. Passion and discovery d. Less bonding	a. 4 b. 4 c. 6 d. 1

Table 2 is all about the positive and negative effects of social media on generation alpha. The fourth question examines the good and bad effects of social media on one's personal growth wherein there are (7)

respondents who answered that they are very connected to the point that it is on the brink of overuse, (6) who answered that they have gained knowledge and insight yet they are faced with multiple anomalies, and both (1) respondents on adapting to changes and less socializing.

The fifth question is all about the effects of social media on the creativity of Generation Alpha wherein there are (10) respondents who said that social media platforms encourage their creative thinking skills, (3) who said that social media allows them to learn and discover new things, and (2) respondents which said that social media allows them to have exposure on different games and interactive platforms that boost their imagination.

The sixth question talks about social media as a medium for developing new interests and hobbies, wherein (6) respondents said that with the help of social media, they are able to ignite their passion and discover more hobbies, there are both (4) respondents that answered social media helps them follow new trends and create inspiring contents, and (1) respondent said that it doesn't help as it promotes less bonding time for the family.

Table 3. Role of social media in communication

Question	Common Themes	Frequencies
7. How does social media help you communicate with other people?	a. Bridging distances b. Enhancing social skills c. Facilitating Engagement	a. 9 b. 3 c. 3
8. Do you think you express yourself better using social media rather than Face to Face?	a. face-to-face b. social media c. both	a. 4 b. 8 c. 3
9. In what ways has social media influenced your willingness to have meaningful, comprehensive conversations?	a. Negatively impacts b. Positively impacts c. Has no effects d. Effects depends	a. 2 b. 11 c. 1 d. 1
10. Have you observed any behavioral changes as a result of social media?	a. Digital dependence b. Less interaction c. Sensitive emotions d. Ignored duties e. Sleep disruption f. responsible	a. 4 b. 1 c. 7 d. 1 e. 1 f. 1

Table 3 is all about the role of social media in communication. The seventh question examines the help of social media when it comes to communicating with others, wherein the majority (9) of the respondents answered that social media helps them bridge distances, which resulted in instant messages, and both (3) respondents answered that social media helps them communicate by enhancing their social skills and facilitating their engagement when it comes to communicating.

The eighth question is all about expressing oneself on social media, wherein the majority(8) of the respondents answered that social media is the best way to express themselves further, (4) of the respondents answered that they express themselves better face to face because they can personally communicate it with others, and the remaining (3) respondents said that they could express themselves in both ways.

The ninth question is about the influence of social media in having a meaningful conversation, wherein the majority (11) of the respondents answered that it positively impacted them to have a meaningful conversation, (2) responded that they are negatively affected by it, and both (1) that answered

that it has no effects and it depends on the context of the conversation.

The last question examines if there are changes in the behavior of Generation Alpha, wherein a majority (7) of the respondents have become more emotionally sensitive, (4) who are digitally dependent, and (1) for being introverted, negligence to household chores, sleep disruptions, and being responsible.

4. CONCLUSION AND RECOMMENDATION

4.1 Conclusion

The findings of this study highlight the impact of social media on the behavioral perspective of Generation Alpha. Based on the researcher's findings, social media usage significantly influences their thinking patterns. Additionally, with the help of Social Media they find it easier to communicate with others and be comfortable in the matter of communicating.

Students have different perspectives on how social media affects their personal growth. Some say that it has a good effect, especially in terms of communication, but still overused. Social Media Platforms also influence their imagination inventiveness, and ignite their passion to discover more hobbies.

Generation Alpha students find their way of expressing themselves by using social media, and the majority of the respondents indicate that the usage of social media has positively impacted them to have worthwhile conversations, lastly, the outcome of using social media made the Gen Alpha even more emotionally sensitive.

4.2 Recommendations

With these findings, the researchers came up with the following recommendations to alleviate the following negative impacts of social media on Generation Alpha.

Awareness. Based on the findings of this study, Generation Alpha are more likely to change due to their exposure to social media. To overcome this crisis, schools should initiate seminars regarding the negative side effects of social media if not used properly, and users themselves, especially Generation Alpha should have an awareness of whether or not they are being negatively impacted by what they see and hear on social media platforms.

Extracurricular Activities. Based on the findings of this study, respondents are more susceptible to overuse of social media. To solve this issue, schools should implement extracurricular activities to reduce the amount of screen time spent by children on social media. Organizing activities such as sports, drawing, dancing, or writing would help divert the child's attention onto safer activities while developing their interests and hobbies.

Parental Observation. Parents should examine the effectiveness of social media on their children. With this they could monitor and mitigate the negative effects of social media on their children.

Digital Literacy. Digital literacy would help children learn more about social media how it could negatively toll on them. With this, they could set limits upon themselves.

Promote a balanced schedule. With the overwhelming usage of social media among children, parents should apply rules and regulations regarding the use of social media, create zones and schedules on when they could only use social media platforms.

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Exploring Residents' Perception of Philippine National Police Visibility and Its Impact on Public Safety in Barangay San Jose, Navotas City

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Abstract: Philippine National Police's (PNP) main task is to ensure the safety of the residents within the community. In this qualitative research, the researchers explored the perspectives of the residents of Barangay San Jose on the performance and visibility of PNP in Navotas City. This method helped the researchers to gather the respondents' insights and to further analyze the problem within the community. This research understood the factors that influenced the views of the residents. There were a total of fifteen (15) respondents who allowed the researchers to collect their thoughts by answering the prepared ten (10) questions through an individual interview. With these insights provided by the residents of Barangay San Jose, the researchers concluded that the residents acknowledged the efforts and services of the PNP, and believed that PNP are trustworthy when it comes to public safety. In addition, participants also responded that regardless of the accusations that are spreading about the PNP, the residents were confident that the PNP has integrity and the ability to serve the nation well. However, there were also a few negative insights about the service of PNP, such as lack of police personnel, delayed response time, lack of consistency in patrolling and monitoring, and many more. Taking these findings into consideration, the researchers provided recommendations on how to further improve the performance of PNP in securing the safety of the city and to gain the public's trust. Therefore, the researchers anticipated that these suggestions would help and support the PNP and residents to address the issue.

Key Words: *Philippine National Police; police officer; visibility; public safety; residents*

1. INTRODUCTION

1.1 Problem and its Background

The Philippine National Police (PNP) is known to be the greatest local and national police force in the Republic of the Philippines. PNP's main duties are to provide law enforcement services and ensure the decrease of crimes in the community. However, the PNP's reputation has been severely harmed by a number of accusations from various sources, which have affected locals' views of how well the PNP maintains public safety.

Police officers' determination and progress are greatly influenced by their level of preparation. In contrast to other professional occupations, police officers devote a significant amount of time at the beginning of their careers to planning and preparation, in line with Pastrana (2024). In order to develop their skills and physical characteristics, police cadets may spend up to three years in training. They are now regarded as police officers and constantly deal with situations unique to their jobs. This is relatively lengthy given that police officers respond to various and difficult situations, so it makes sense to start preparing daily duty requests. However, it was not the same for the residents because their opinion says otherwise. (Anderson et al., 2018; Gershon et al., 2019; Paton, 2019).

Furthermore, according to OCTA research by Caliwan (2023), based on the answers of the 1,200 adults, it showed that 80 percent believed in the nation's police force, with twenty-one (21) percent saying they "strongly trust" the PNP and fifty-nine (59) percent of the respondents answered that they "somewhat trust" the service of the PNP in the public. The remaining twenty (20) percent, on the other hand, were not satisfied, pointing to a drop in the PNP's performance. This conflicting reaction underscores persistent concerns about the efficacy of law enforcement and the necessity of additional advancements to win back the public's trust.

Moreover, Gilbas et al. (2022) claimed that few Filipinos approve of the PNP's efforts in peacekeeping and crime prevention in the Philippines; there are still reports suggesting otherwise. However, in 2023, the National Capital Region Police Office (NCRPO) conducted an investigation in Navotas City to seek justice for the victim who was killed by the PNP due to a false accusation and inadequate investigation. These news reports alarmed many residents of Navotas City, leading to a decline in public trust towards the PNP (Caliwan, 2022).

1.2 Statement of the Problem

The community's public safety is the responsibility of the Philippine National Police. However, citizens' perceptions of the PNP are still shifting as a result of several accusations that are making the rounds on various platforms. Therefore, the researchers' objective is to first identify the impression of residents in Barangay San Jose on the Philippine National Police presence in their neighborhood. In addition, the researchers want to acknowledge how the residents perceive their safety and security within the community. Lastly, this study also aims to explore the factors that influence the residents' perception of PNP. With these given objectives, the researchers will utilize this as a guideline on how to conduct the questions that will be asked to the respondents.

1.3 Significance of the Study

The significance of this study is to acknowledge the perception of the residents in Navotas City on Philippine National Police visibility and their performance in ensuring the safety of the community. In addition, to know what are the factors that influence the residents' perspective. Understanding the significance of this research will help the residents, police officers, community, and future researchers to gain knowledge.

Residents. The findings of this study will help residents to better understand the significance of police visibility and the maintenance of peace and order in the community. It benefits the residents by increasing awareness about the presence of the Philippine National Police (PNP) officers and making the PNP realize the protection the society needs. At the end of this study, the residents will have additional knowledge about the importance of police visibility.

Philippine National Police. The study will provide insights into residents' perspectives regarding the presence of Philippine National Police (PNP) officers, allowing police to enhance their services to the community. The result of this study will serve as a basis for improvement to better serve the community in terms of public safety.

Community. The findings of this study will support efforts to reduce crime rates, which is crucial for ensuring public safety in Barangay San Jose, Navotas City. The community will be benefited by maintaining a public safety in the society to reduce the risk of crimes and providing protection for the residents in Barangay San Jose, Navotas City.

Future Researchers. This study will serve as a valuable resource for future researchers interested in examining the impact of police presence in communities. For future researchers, this will also serve as the review of related literature when conducting a research topic that is related to police presence.

1.4 Scope and Delimitations

This study will be conducted in Barangay San Jose, Navotas City, to examine the residents' perspectives on the presence and performance of the police within their community. It will specifically focus on residents of Barangay San Jose who are willing to share their opinions regarding the Philippine National Police (PNP) and its impact on the area. Additionally,

the scope of this research will be limited to gathering insights solely on the views of Navotas residents regarding the performance of the PNP.

The research will be carried out within a specific time frame, given certain time constraints. The study will have certain limitations, including a participant selection capped at a minimum of fifteen (15) respondents. Data will be collected through an interview developed by the researchers, ensuring consistency in gathering information.

2. METHODOLOGY and RRL

2.1 Review of Related Literature

This study examines the factors that influence residents' perceptions of the Philippine National Police (PNP) visibility. This literature review will explore various viewpoints, research findings, and provide insights into how the PNP's performance affects public opinion. By analyzing existing studies and perspectives, the review will shed light on the ways in which the PNP's actions and presence shape the thoughts and attitudes of the community.

Mendoza et al. (2020) highlighted that the Philippine National Police (PNP) faces various challenges, including issues related to governance, corruption, and national security threats. According to a study by Torres (2021), the focus is on individuals and households, aiming to understand their views, experiences, and perceptions regarding the presence and activities of the PNP in their communities. Additionally, Casilao (2023) noted that an increased presence of PNP officers patrolling the barangay could lead to a greater sense of security and safety among residents.

This visibility often provides reassurance, especially in areas perceived as crime-prone. Berners-Lee (2020) stated that increased police visibility enhances perceived safety; regular patrols and public safety programs can lead to a reduction in crime rates and improved community cooperation. Residents in areas with frequent police patrols and high visibility often report feeling safer and more secure in their neighborhoods. However, Ramos (2020) raised concerns about distrust arising from political influence. In some cases, residents may feel that the PNP is overly influenced by local politics, leading them to believe that the police's actions are not genuinely aimed at ensuring public safety but rather driven by political agendas. This perception can result in a lack of faith in the police's impartiality and effectiveness.

Sayvan and Kochel (2021) explained that residents' perceptions of safety and trust in police officers are influenced by changes in policing strategies, especially in high-crime areas. Their study highlights how residents' interactions with police, including during the pandemic, shape these perceptions.

Pickett et al. (2022) noted that some communities view police officers as "untrustworthy agents" or outsiders, leading to distrust and fear, which is amplified by police presence and performance in neighborhoods.

Mourtgos et al. (2022) argued that high turnover in police agencies can hinder community engagement. Police strategies must align with public opinion to foster trust, and increased police visibility contributes to more positive perceptions of police services (Yesberg et al., 2023).

Positive perceptions of law enforcement are shaped by factors such as length of residence, educational background, political ideology, and the quality and frequency of interactions with officers. Research suggests that fostering frequent and meaningful engagement between law enforcement and residents while considering individual characteristics can strengthen trust and improve police-community relations. These insights are essential for developing policies that promote a positive perception of the police (Lee et al., 2020).

The relationship between police presence, how people see them and trust in the community is complicated. In the Philippines, problems such as corruption, bad governance, and political interference make it hard for the public to trust the police. However, having more police officers visible, especially in areas with high crime rates, can make residents feel safer. On the other hand, if people believe that police actions are influenced by politics, it can lose the public's trust.

Meanwhile, international studies show that how police interact with the public greatly affects how people feel about their safety and trust in law enforcement. Changes in police methods, especially during times of crisis, can either improve or harm public trust, depending on how well police work with the community. Things like how often police interact with

people, the quality of those interactions, and staff turnover can all impact public opinion. Personal factors, like political views and education, also affect how people see the police.

This research supports the researchers in understanding how police visibility, interactions, and the way they are managed affect how people trust them. The findings can help create better policies to improve police work, reduce corruption, and avoid political influence in policing. It also emphasizes the need for regular community engagement and trust-building between police and residents to ensure safer neighborhoods. Moreover, the studies provided show that strategies need to be adapted to local situations so that safety measures are both effective and supported by the community.

2.2 Methodology

2.2.1 Research Design

This research adopts a qualitative approach to explore and gain deeper insights into the problem. In addition, qualitative research also collects participant behavior, perceptions, and experiences (Tenny et al., 2022).

An exploratory design was used, because it seeks "clues" to uncover current events, requiring researchers to be flexible and constantly questioning their understanding. In addition, it also answers the question “What?” and “How?”. The researchers selected this design to conduct an in-depth investigation into residents' perceptions and the impact of police visibility on public safety in Barangay San Jose (Stevens et al., 2012).

2.2.2 Population Sampling

The researchers collected data from fifteen (15) residents of Barangay San Jose, Navotas City, while utilizing purposive sampling in choosing the respondents of the study. The reason why the researchers chose purposive sampling, also known as judgment sampling, is because it is used when the population is small and specific, as well as to gather information on a particular occurrence. In addition, the interviewees resided in Barangay San Jose, which is why the researchers selected purposive sampling. (McCombes, 2021).

2.2.3 Research Instrument

The researchers obtained the necessary data for this research using the ten (10) prepared questions, which focused on the performance of police officers’ presence. The respondents were the residents of Barangay San Jose, Navotas City, who willingly answered the questions based on their experiences. The researchers assessed the residents’ satisfaction with the presence of the Philippine National Police (PNP). In addition, the researchers used the collected data to determine whether the PNP’s presence contributed to enhancing public safety for residents in Barangay San Jose.

2.2.4 Data Gathering Procedure

This study gathered valuable insights and information from each respondent through structured individual interviews. These interviews were conducted at the residences within Barangay San Jose, Navotas City. Respondents were selected based on their availability and willingness to participate in the study. The researchers guaranteed that all data collected during the interviews is handled with the utmost care and confidentiality. All responses were securely stored and only used for the purpose of this research. Additionally, no information provided by respondents will be shared, published, or displayed outside of the research context.

3. RESULTS AND DISCUSSION

The chapter of this study presents the collected data by the researchers from the selected respondents.

There are fifteen (15) respondents in all. The following figures reflect their demographic profile:

Figure 1. Presents the sex of the respondents

Sex	Frequency
Male	6
Female	9

The first figure shows there are nine (9) females who participated, while men represent only six (6) of the total fifteen (15) respondents.

The researchers presented the data gathered in a tabular form. This approach allows the researchers to show the common themes of the responses and effectively assess the frequencies. The researchers categorized the ten (10) questions separately to further examine the views of the residents of Barangay San Jose on the Philippine National Police.

Table 1. Result 1

Question	Common Themes	Frequency
1. Do you perceive Navotas City as a safe residence place? On a scale of 1 to 10, with 10 being the highest, please rate based on your views. If so, why?	a.) Strong sense of safety based on personal experience. b.) Concern over rising crime. c.) Confidence in crime resolution and safety d.) Acknowledgment of safety issues with a realistic perspective. e.) Moderate safety with a focus on vigilance. f.) Safety with minor external issues g.) Mixed trust in authorities affecting safety perception	a. 5 b. 3 c. 2 d. 2 e. 1 f. 1 g. 1

The first question asks the perception and ratings of the residents of Barangay San Jose on the safety level of Navotas City. There are seven (7) common themes: five (5) respondents said strong sense of safety based on personal experience, three (3) concern over rising crime, two (2) confidence in crime resolution and safety, two (2) acknowledgment of safety issues with a realistic perspective, one (1) moderate safety with a focus on vigilance, one (1) safety with minor external issues and lastly, one (1) mixed trust in authorities affecting safety perception

Table 2. Result 2

Question	Common Themes	Frequency
2. What do you think is the main task of the PNP in our city?	a.) Response-based action and investigation by the PNP. b.) Consistent patrolling with challenges in crime prevention. c.) To serve and protect d.) Maintaining peace and ensuring security e.) Law enforcement and community assistance f.) Focus on tackling drug-related issues	a. 5 b. 4 c. 2 d. 1 e. 1 f. 1

The second question asks the opinions of respondents about the Philippine National Police's main task in Navotas City. There are six (6) common themes: five (5) respondents said response-based action and investigation by the PNP, four (4) consistent patrolling with challenges in crime prevention, two (2) to serve and protect, one (1) maintaining peace and ensuring security, one (1) law enforcement and community assistance, and lastly, one (1) focus on tackling drug-related issues

Table 3. Result 3

Question	Common Themes	Frequency

3. Do you feel that the PNP Navotas is trustworthy in handling community concerns or complaints? Why or why not?	a.) Trustworthy and prompt action in handling serious cases b. Trust in the PNP with occasional delays in response c.) Reliable and responsive support from the PNP d.) Dedication and trust in the PNP's protective efforts. e.) Trust in the PNP's effective leadership and management f.) Trust in the PNP's role in maintaining order and stability	a. 6 b. 3 c. 3 d. 1 e. 1 f. 1

The third question asks on whether the residents of Barangay San Jose trust the Philippine National Police (PNP) in Navotas in handling community concern or complaints. There are six (6) common themes: six (6) respondents answered to reliable and responsive support from the PNP three (3) to PNP is trustworthy and prompt action in handling serious cases, three (3) to trust in the PNP with occasional delays in response, one (1) dedication and trust in the PNP protective effort, one (1) to tot trust in the PNP effective leadership and management and lastly, one (1) to trust in the PNP role in maintaining order and stability.

Table 4. Result 4

Question	Common Themes	Frequency
4. How do the activities of the Philippine National Police (PNP) affect your level of trust in them regarding community safety?	a. b. PNP's proactive activities in promoting safety, increasing trust in them b. Trust in the PNP despite occasional concerns c. Minimal effect of PNP activities on trust d. Not affected e. Public perception of law enforcement's role f. Community trust in law enforcement	a. 6 b. 2 c. 2 d. 2 e. 2 f. 1

The fourth question asks if the activities of the Philippine National Police (PNP) affect the level of trust of residents in Barangay San Jose on the Philippine National Police regarding community safety. There are six (6) common themes: six (6) respondents responded that PNP's proactive activities in promoting safety, increasing trust in them, two (2) to trust in the PNP despite occasional concern, two (2) to minimal effect of PNP activities on trust, two (2) to not affected, two (2) to public perception of law enforcement's role and lastly, one (1) to community trust in law enforcement.

Table 5. Result 5

Question	Common Themes	Frequency
5. Do you have any specific experiences or events that influenced your perceptions of the Philippine National Police (PNP) Navotas? If so, could you please share?	a.) Lack of direct experience with law enforcement b.) Community concerns about Crime c.) Readiness to seek help when necessary d.) Positive personal experience with law enforcement e.) Influence of law enforcement on personal discipline and behavior f.) Sacrifice and commitment of law enforcement g.) Firsthand involvement and familiarity with law enforcement h.) Safety and security as influenced by law enforcement i.) Personal impact of crime on perception of law enforcement	a. 6 b. 2 c. 1 d. 1 e. 1 f. 1 g. 1 h. 1 i. 1

The fifth question asks whether the respondents have experienced an incident involving the PNP. There are nine (9) common themes founded: six (6) respondents on the lack of involvement with the law enforcement, two (2) on the community concerns about

crimes, one (1) in readiness to seeking help, one (1) in positive personal experience, one (1) in influence of law enforcement, one (1) in sacrifice, and the last one (1) in personal impact of crime on perception of law enforcement.

Table 6. Result 6

Question	Common Themes	Frequency
6. What do you think are the biggest challenges the PNP Navotas face in maintaining safety and order in the city?	a.) Illegal Activities b.) Sacrifice and bravery in law enforcement c.) Community responsibility and cooperation in ensuring safety and security d.) The PNP's efforts to fight crime, particularly drug-related issues, in maintaining safety and order e.) Clueless f.) The shortage of police personnel	a. 7 b. 3 c. 2 d. 1 e. 1 f. 1

The sixth question asks about the difficult challenges the Philippine National Police (PNP) could encounter. There are six (6) common themes we found for this question: seven (7) of the respondents believe that illegal activities or crimes are the challenge that PNP are experiencing, three (3) on the sacrifices and bravery of the law enforcement, two (2) in communities responsibility and cooperation, one (1) in the efforts of fighting crime, one (1) in clueless, and lastly, one (1) in the lack of police personnel.

Table 7. Result 7

Question	Common Themes	Frequency
7. Were your perceptions influenced by what you see on television and social media?	a.) Not influenced by TV or social media b.) The influence of media on public perception c.) Personal judgment and independence from media influence d.) The importance of critical thinking and fact-checking in media consumption	a. 8 b. 5 c. 1 d. 1

The seventh question asks if the perceptions of the residents in Barangay San Jose were influenced by what you see on television and social media. There are four (4) common themes: eight (8) respondents answered that they are not influenced, five (5) to the influence of media on public perception, one (1) to personal judgment and independence from media influence and lastly, one (1) to the importance of critical thinking and fact-checking in media consumption.

Table 8. Result 8`

Question	Common Themes	Frequency
8. What is your overall impression of the Philippine National Police (PNP) in Navotas City?	a.) PNP's proactive activities in promoting safety, increasing trust in them b.) Trust in the PNP despite occasional concerns c.) Minimal effect of PNP activities on trust d.) Not affected e.) Public perception of law enforcement's role f.) Community trust in law enforcement	a.) 6 b.) 2 c.) 2 d.) 2 e.) 2 f.) 1

The eighth question asks the overall impression of the residents of Barangay San Jose on Philippine National Police in Navotas City. There are six (6) common themes: two (2) respondents answered to trust

the PNP despite occasional worries, two (2) to minimize the impact of PNP activities on trust, two (2) to not affected, two (2) to public perception of law enforcement's role and lastly, one (1) to community trust in law enforcement.

Table 9. Result 9

Question	Common Theme	Frequency
9. Would you trust the PNP regardless of the issues and problems they've caused?	a.) Trust in the PNP despite challenges b.) Faith in the PNP's commitment to help c.) Dependence on the PNP for support and protection d.) Acknowledgment of the PNP's duty to act	a.) 12 b.) 1 c.) 1 d.) 1

The ninth question asks if the residents would still trust the Philippine National Police regardless of the issues they've caused. There are four (4) common themes: twelve (12) respondents said trust in the PNP despite challenges, one (1) to faith in the PNP's commitment to help, one (1) to dependence on the PNP for support and protection and lastly, one (1) to acknowledgment of the PNP's duty to act.

Table 10. Result 10

Question	Common Themes	Frequency
10. Do you have any suggestions for PNP Navotas to improve their service?	a.) Upholding integrity and adherence to the law b.) Increased police visibility and youth-focused measures c.) Positive response and collaboration with the community d.) Improving accessibility and responsiveness e.) Enhanced patrolling and monitoring f.) Continuous improvement in performance	a.) 3 b.) 3 c.) 3 d.) 2 e.) 2 f.) 2

The tenth question asks the suggestion of the residents of Barangay San Jose on how the Philippine National Police (PNP) further improve their services in ensuring public safety. There are six (6) common themes: three (3) respondents stated that PNP should uphold integrity and adherence to the law, three (3) mentioned that they should increase police visibility and youth-focused measures, three (3) to positive response and collaboration with the community, two (2) to improve accessibility and responsiveness, two (2) to further enhance patrolling and monitoring in the city and lastly, two (two) respondents said that PNP should continue improving in performance.

4. CONCLUSION AND RECOMMENDATION

To summarize the responses of the respondents from the data gathered, the majority of the residents of Barangay San Jose in Navotas City are confident that the city is well-secured based on their personal experiences, while the rest have concerns regarding the safety of the community. With these results, it shows that Navotas City is a safe place.

Philippine National Police (PNP), on the other hand, received positive comments from the residents by answering the questions that the PNP is trustworthy by complying with their job and showing great service in ensuring public safety in Navotas City.

Furthermore, the majority of the respondents' perceptions were not affected by accusations that are spreading about the PNP on television or social media, only believing from what they see. In addition, twelve (12) out of fifteen (15) respondents would still trust the PNP despite allegations because they acknowledge the power the PNP holds to protect the community.

Residents have different views and opinions about the visibility and impact of PNP on public safety, but based on the result of the data gathered, most of the respondents acknowledged the efforts of PNP in providing protection in Navotas City and have a positive viewpoint of PNP.

To further enhance the services of the PNP, the residents shared their thoughts that the PNP should

uphold their integrity and increase police visibility within the city.

By analyzing these findings, the researchers provided recommendations, which will help PNP to improve their performances and gain the trust of the local residents.

Enhance police patrols and presence**.** Increase the visibility of policemen, especially in crime-prone areas within the city. Consider more police personnel and prolong the hours of patrol to ensure the safety of the neighborhood.

Community engagement programs**.** To build the trust and relationship between the PNP and residents, the PNP should launch a program, where police officers could interact with the residents.

Improve response time. Based on the responses, PNP should ensure faster response time to emergencies and to calls for help. This can increase the trust of residents in the PNP and enhance the safety of the community.

Promote transparency in police operations**.** Regularly report publicly the crime statistics, policing strategies, and community safety initiatives. Through transparency, the residents will build trust in the PNP.

These recommendations are based on the collected data from the residents' perspectives, experiences and suggestions. The researchers expect that these will help in improving the performance, services and visibility of the PNP, which will lead to a secure and safe residence place.

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Adult's Perception of Gentle Parenting Style and Their Outcomes in Barangay San Roque, Navotas City

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Abstract: Multiple parents have struggled to find the best parenting style needed for their children's development as the children's development starts with the parents as they're the ones who are the primary foundation for their development, Adults' perspectives are needed for this to see the different perspective of adults to seek guidance and evidence if Gentle parenting is the best parenting style for the children's development. The researchers use Qualitative research to see the different perceptions and outcomes for Gentle parenting and interviewing respondents that are in the age group of twenty-six (26) to forty-five (45) that are in Barangay San Roque in Navotas City. The finding shows that most adults see Gentle parenting as a great option for parenting as it helps children to grow notable emotional intelligence creating a strong bond with people and their parents, though there are challenges that are faced such as needing a deep understanding and great patience it's still a great parenting practice. This study highlights that Gentle parenting is a great option for parenting as children need this emotional guidance for their development and every child needs understanding as every child is unique.

Key Words: Behavioral Development; Children; Gentle Parenting; Moral; Adult's Perception.

1. INTRODUCTION

1.1 Background of the Study

Many first-time and experienced parents have struggled with parenting due to the pressure of being perfect raising a child. The moral and behavioral development of a child starts with the parents, as they serve as the primary foundation of the child's development. They are the ones who build and guide a child's personality, morality, and behavior. Parenting significantly influences children's moral and behavioral development; there are many different parenting styles, and gentle parenting is one example. Gentle parenting focuses on enforcing positive reinforcement derived from empathy, understanding, and respect; it nourishes the child's emotional needs while establishing healthy boundaries. Recently, parents have been more interested in the approach of gentle parenting since it gives enlightenment on the nature of cooperation and understanding with children rather than submission (Walters, 2024). This study seeks enlightenment for the gentle style of parenting, which empowers not only parents but is also beneficial for the children, with the aim of proving the influence of gentle parenting on the development of children. It can help gain traction to slowly raise the use of the gentle style of parenting as a whole.

The importance of parenting style in child development has been acknowledged for a long time. Permissive or indulgent parenting style has been similarly linked to a range of undesirable outcomes, from sleep problems in preschool-aged children to entitlement, narcissism, and lower work ethic in young adulthood. Yet despite all of this and more, most of the research on parenting style remains correlational. Furthermore, not much is available to demonstrate a method by which it may be modified. If such a method were available, though, it might enable a true experimental test of the effects of parenting style via a

direct manipulation and a follow-up observation (Carroll, 2021).

Parenting is a broad concept that includes consistent and long-lasting attitudes and behaviors related to raising children. Given the different roles that mothers and fathers play in the family, parenting practices and styles during childhood and adolescence may vary based on the genders of the parents and adolescents (Yaffe, 2020).

The purpose of this study is to explore the different perspectives that parents perceive gentle parenting and its possible outcomes. This study also aims to investigate the connection between parents and their children. It focuses on how it will affect the children's morals and behavior. Developing such research is a good tool for raising awareness among parents and future parents. Gentle parenting is a compassionate and respectful approach that improves a child's emotional and social well-being, and it is essential for children who are growing up or about to grow up in order for them to develop or learn love and respect for others, because what is done to a child will be done to those who follow. Gentle parenting seeks to guide a child's mental development while maintaining appropriate boundaries.

1.2 Statement of the Problem

In Navotas City, there is a wide variety of people's perception on the different parenting styles. Many of the people think they fully grasp the concept of the different styles of parenting, but these assumptions lead to misconceptions. Gentle parenting, a style known for not involving any form of negative punishment, it is misunderstood. The curiosity has led to the creation of this study. Their main purposes of uncovering the varied perceptions people have about gentle parenting and which is most prominent.

1.3 Significance of the Study

The significance of this study is to explore an adult's perspectives on gentle parenting style. Understanding the effects can also help parents, children, and students provide sufficient nurturing for the kids. In particular, the following will be benefits to this study.

Parents. They might be aware of how their parenting approaches may influence the behavior of their children. This will enable them to provide greater understanding of how to raise their child appropriately and the effects it will have on them as their kids grow up.

Students. This study will benefit students as it aims at what gentle parenting can affect children's moral and behavioral development. It can give them more knowledge and deepen their understanding about how gentle parenting can affect children's moral and behavioral development.

Children. This study aimed for a child to have a good relationship with their parents. Improve their self-esteem, and they can manage their behavior towards other people, not only for their parents. As a result, this will help them to develop healthy relationships with other people. Furthermore, they become more positive, confident, and self-assured individuals.

Future researchers. This research will help them in understanding the issue and the effects of gentle parenting. Additionally, this study broadens their comprehension that helps in expanding their knowledge about this topic.

1.4 Scope and Delimitation

This research will focus on people from Navotas City. The study will utilize interviews to gather data from the participants, with the aim of examining the perception of people towards gentle parenting on the moral and behavioral development of children.

The research will be conducted within an unspecified time frame. There are certain limitations to this study, including a participant cap of people, all of whom must be a citizen within Navotas City. Furthermore, the findings may not be generalizable to all age groups, as the study specifically focuses on Navoteños. Additionally, the research is limited by the specific characteristics required for participant inclusion.

2. METHODOLOGY and RRL

2.1 Review of Related Literature

Gentle parenting is one of the things that the children need to experience while they are young. Especially when they are growing up. Growing up with gentle parenting has a positive effect on them and gives them an advantage when it comes to performing appropriately around their parents and other people. The same way that children see their parents, so do other people, and you will serve as an example for them.

Adult perception is also crucial in this study to understand how different individuals view gentle parenting.

Since a child's immediate environment, especially their family, greatly shapes their personality, parental influence on a child's development is crucial. The family is a vital setting for personality development because it is the smallest social unit. Parents play a vital role in creating a nurturing atmosphere that supports children's healthy personality development. In spite of obstacles like hectic schedules and digital distractions, parents must place a high value on being involved in their children's lives by giving them love, care, guidance, and discipline. Parents are crucial in helping children develop into well-rounded people who can succeed in society by cultivating family harmony and instilling values. Understanding and actively fulfilling parental responsibilities is therefore crucial to supporting children's positive personality development, which in turn promotes their general well-being and success in life. (Hanifa & Lestari, 2024).

According to Musngi et al. (2023), the aim of parenting techniques globally is to guarantee that kids remain in a safe and healthy environment that will equip them to be ethical, responsible adults. Moreover, according to a study by Yoo and Smetana (2021), using inactive distinctions score role-playing, it was found that children's effortful control led to more differences between moral and conventional judgments, but only when the parents had high levels of positive affect. Although raising young children has never been easy, there is evidence that it may be becoming more difficult. The rise of "gentle parenting," a parenting style that departs from more traditional, discipline-heavy parenting types and promises to raise happier, healthier kids, has been fueled by the pandemic's isolation, the pressure to meet strict parenting standards, and the deluge of "expert" parenting advice on social media. (Pezalla & Davidson, 2024).

In addition, Alsagon et al. (2024) stated that gentle parenting shapes a child's value system and character development by openly encouraging communication and mutual respect, allowing children to develop excellent character, love, and caring, among other things.

In a study conducted by Supriyatno and Susilawati (2020), parenting is the process through which parents and children interact in the family. Since the child's birth, parenting styles have been used and modified based on the child's age and developmental stage. Early childhood education serves as the first step in helping kids develop their character. Children's social and personal development is greatly impacted by the role parents play in forming their character. The five roles that parents play in forming their children's character are teaching by example, establishing an early education system, establishing a habituation system, fostering a culture of communication between parents and children, and using the justice principle to manage available time. As a result, it can be said that parents' role in forming their children's character is a significant mission that calls for active participation, in-depth knowledge, and unwavering dedication (Masnawati & Masfufah, 2023).

Durrant (2020) highlighted that the goal of positive discipline in everyday parenting (PDEP) is to change parents' perceptions of their role from one of coercion and control to one of collaborative problem solving and respectful mentoring. Instead of changing children's behavior, PDEP aims to change how parents perceive and react to their behavior, moving them away from punishment and toward positive disagreements resolution. Through program activities, parents can see conflict from their children's perspective and learn that children use their behavior as a means of expressing their needs and feelings. However, children's emotional socialization is influenced by their parents' actions, especially their emotional socialization behaviors (ESBs). In addition to providing children with an example of emotion regulation techniques, parental regulation also influences the quality of parents' ESBs, which aids in emotional socialization. Given the level of parental involvement in treatments for emotional and behavioral disorders in children, which frequently seek to foster self-regulation in the child, parental emotion regulation is crucial from a clinical standpoint (Hajal & Paley, 2020).

In a study conducted by Bradley and Greeff (2024), there are currently few studies investigating parents' perspectives about positive parenting in general, and none that look at why parents choose to use a positive parenting style. Therefore, to investigate the factors that encourage parents to use a positive parenting style. In order to empower both parents and their children, it can be used in interventions to support parents in adopting a positive parenting style and to offer advice on how to keep up these parenting techniques.

2.2 Methodology

2.2.1. Research Design

This qualitative research will use phenomenology as a research design. The researchers

investigate the study of the experiences and understand perceptions of individuals toward a certain topic.

Phenomenological investigation examines people's lived experiences and interpretations of concepts or phenomena, aiming to explain their ongoing significance through the experiences of multiple people.

2.2.2. Population Sampling

In this study, twenty (15) participants aged twenty-six (26) to forty-five (45) years old from San Roque were chosen as our sample. The researchers used purposive sampling to interview and select adult participants in order to get their perception of gentle parenting and what they believe are the outcomes of the parenting style. To provide a solid basis for the study, the researchers would only interview people who are located in San Roque and adults who have their own perspectives on gentle parenting. This would allow the researchers to analyze and acquire insights from adults on gentle parenting and its outcomes.

2.2.3. Research Instrument

The study used questionnaires in order to get the data necessary to support the research. The questionnaire consisted of ten (10) questions based on the objective of the study. The respondents were tasked with answering the questionnaire based on their current knowledge, understanding, and opinion of the topic given that it is relevant to the research.

2.2.4. Data Gathering Procedure

After getting approval for the interview questions from the research advisor, the researchers will conduct an interview within the jurisdiction of Navotas City. Using the approved interview questions, it will be done with the maximum cap of respondents given for sufficient data needed. The interview will be done with confidentiality to protect the data given by the respondents to fully ensure their trust; the interview will also be done within 10-15 minutes to maximize the output given. After the interview, the data collected will be coded and summarized for straightforward analysis.

3. RESULTS AND DISCUSSION

This chapter presents the data that the researchers collected from the chosen participants.

There are a total of fifteen (15) respondents in this research. Their demographic profile is reflected in the following figures:

Figure 1. Presents the age range of the respondents.

Age Range	Frequency
37 - 40	4
40 - 45	11

The majority of the respondents are ages forty (40) to forty-five (45), and the remaining respondents are ages thirty-seven (37) to forty (40).

Table 1. Result 1

Question	Common Themes	Frequency
1. What do you think is the difference between gentle parenting and another parenting style?	a.) Gentle Parenting enforces positivity while the other shows punishment. b.) Gentle Parenting provides understanding while the other shows authoritativeness. c.) Gentle parenting shows calmness while others enforces fear. d) Gentle parenting shows connection while the other shows control.	a. 2 b. 5 c. 1 d. 7

This table examines how adult's perceive the differences between gentle parenting and other parenting styles. As per results shown, seven (7) respondents have stated that gentle parenting shows connection. The other parenting style shows control. Five (5) respondents have stated that gentle parenting provides understanding, while the other shows authoritativeness. Two (2) respondents have stated that gentle parenting enforces positivity, while the other shows punishment, while the other one (1) respondent

has stated that gentle parenting shows calmness, while others enforce fear.

Table 2. Result 2

Question	Common Themes	Frequency
1. What do you think are the benefits of gentle parenting to both parents and children?	a.) Stronger parental bond. b) Notable emotional expression. c) Feeling understood.	a. 7 b. 5 c. 3

This table analyzes the adult's perspective about what the benefits of gentle parenting are for both parents and children. As per the results shown, seven (7) respondents have stated that gentle parenting creates a strong bond between parents and children, five (5) respondents stated that there are notable emotional expressions, while three (3) respondents have stated that both parents and children will feel understood.

Table 3. Result 3

Question	Common Themes	Frequency
1. What do you think are the benefits and disadvantages of the gentle parenting style?	a.) Time, consistency, and patience. b.) Interaction and maintaining a connection. c.) Confidence and emotional well-being while managing behavioral issues. d.) Cons of gentle parenting and gentle struggles.	a. 5 b. 4 c. 3 d. 3

This table analyzes the adult's perspective about what are the benefits and disadvantages of gentle parenting. As per results shown, five (5) respondents have stated that time, consistency, and patience are the disadvantages and advantages of gentle parenting. Four (4) respondents stated that interaction and maintaining a connection are the advantages and disadvantages of gentle parenting. Three (3) respondents have stated that confidence and emotional well-being while managing behavioral issues and three (3) respondents stated that the cons of gentle parenting and gentle struggles are the advantages and disadvantages of gentle parenting.

Table 4. Result 4

Question	Common Themes	Frequency
1. What are your overall thoughts about gentle parenting and its effects on children?	a.) Effectiveness of children and positive development of emotions. b.) Promoting change, fostering respectful discipline, and fostering trust between parents and children. c.) Difficulties in maintaining consistency and outside obstacles with social pressure. d.) Manipulation risk.	a. 5 b. 4 c. 3 d. 3

This table analyzes the adult's perspective about what their overall thoughts are about gentle parenting. As per results shown, five (5) respondents have stated that gentle parenting shows effectiveness when it comes to the children's positive development of emotions, four (4) respondents have stated that gentle parenting promotes change, fostering respectful discipline, and fostering trust between parents and children, three (3) respondents have stated that there are difficulties in maintaining consistency and outside obstacles with social pressure, and three (3) respondents also stated that there are manipulation risks.

Table 5. Result 5

Question	Common Themes	Frequency

1. Do you think gentle parenting has some advantages over other parenting styles? Please clarify.	a.) Striking a balance between authoritative and gentle parenting while changing to meet the needs of every child. b.) Appropriate for increasing bond between parents-children attachment and emotional growth. c.) Positive reinforcement and recommendation. d.) Providing direction and aiding in decision-making e.) Everyone will experience less stress.	a. 3 b. 4 c. 2 d. 2 e. 4

This table analyzes the adult's perspective about what are the advantages of gentle parenting, as per results shown, four (4) respondents have stated that gentle parenting is appropriate for increasing bond between parents-children attachment and emotional growth, four (4) respondents also states that gentle parenting can cause less stress to everyone, three (3) respondents have stated that Gentle parenting causes a striking a balance between authoritative and gentle parenting while changing to meet the needs of every child, two (2) respondents have stated that gentle parenting causes positive reinforcement and recommendation and two (2) respondents stated that gentle parenting provides direction and aiding in decision-making.

Table 6. Result 6

Question	Common Themes	Frequency
1. How do you respond to the challenges of this parenting style?	a.) Being consistent. b.) Time and effort. c.) Patience and understanding. d.) Involvement in sports. e.) Clear boundaries.	a. 1 b. 4 c. 5 d. 1 e. 4

The sixth question asked the respondents how they respond to the challenges in this parenting style. There were five (5) common themes: five (5) for patience and understanding, four (4) for time and effort, another four (4) for clear boundaries, one (1) for being consistent, and lastly, one (1) for patience and understanding.

Table 7. Result 7

Question	Common Themes	Frequency
1. What do you think are the challenges that parents face when it comes to a gentle parenting style for their children?	a.) Having a long patience. b.) There are no challenges. c.) Time management. d.) Can be easily manipulated. e.) Lack of support.	a. 7 b. 1 c. 4 d. 2 e. 1

This table analyzes the adult's perspective about the challenges that parents face when it comes to a gentle parenting style for their children. As per results shown, seven (7) respondents said having a long patience, four (4) for time management, two (2) can be easily manipulated, one (1) for lack of support, lastly, one (1) for no challenges.

Table 8. Result 8

Question	Common Themes	Frequency

1. Do you think these challenges that parents face are a sign that there are better alternatives for parenting style against gentle parenting?	a.) There are no better alternative approaches. b.) There are better alternative approaches. c.) Not necessarily.	a. 3 b. 5 c. 7

This table analyzes the adult's perspective on how these challenges that parents face are a sign that there are better alternatives for parenting style against gentle parenting, as per results shown, seven (7) respondents have stated that these challenges are not necessarily a sign that there are better alternatives to gentle parenting. Five (5) respondents have stated that due to the challenges of gentle parenting that there are better parenting approaches. Three (3) respondents have stated that even if there are challenges, there are no better alternatives.

Table 9. Result 9

Question	Common Themes	Frequency
1. What do you think will be the children's outcome when gentle parenting is in use?	a.))Depends on the parenting practice. b.) Strong emotional intelligence. c.) Notable decision making skill. d) Healthy Self esteem.	a. 3 b. 7 c. 3 d. 2

This table analyzes the adult's perspective on what will be the children's outcome when gentle parenting is in use, as per the results shown, seven (7) respondents have stated that gentle parenting will cause children to have a strong emotional intelligence. Three (3) respondents have stated that gentle parenting will cause children to have notable decision-making skills. Three (3) respondents have stated that it depends on the parenting practice. Two (2) respondents have stated that gentle parenting will cause children to have healthy self-esteem.

Table 10. Result 10

Question	Common Themes	Frequency
1. How do you think gentle parenting will impact children in the long run	a.) High Confidence. b.) Emotionally healthy. c.) Strong connection with people. d) Responsible e) Goodwill.	a. 2 b. 4 c. 4 d. 3 e.2

This table analyzes the adult's perspective on how Gentle parenting will impact children in the long run, as per the results shown, four (4) respondents have stated that children will be emotionally healthy due to Gentle parenting. Four (4) respondents state that Children exposed to gentle parenting will have a strong connection with people. Three (3) respondents stated that children will be responsible due to gentle parenting. Two (2) respondents have stated that children who are exposed to gentle parenting will have high confidence. Two (2) respondents have stated that children will grow to have goodwill due to gentle parenting.

4. CONCLUSION AND RECOMMENDATION

4.1 Conclusion

To summarize the responses of the respondents from the data gathered, the majority of the residents are from Barangay San Roque in Navotas City. Many of the parents are aware about the different parenting styles for children, while some of them do not know that a gentle parenting style exists. Despite this, many parents believe that gentle parenting should be improved, especially for the children's growth.

Parents have different perspectives about how gentle parenting styles are effective for their children. Most adults have said that gentle parenting creates a strong parental bond between the parents and the child, though gentle parenting needs constant time management and patience. It's still a great parenting style, as it creates a room in order for children's emotions and behavior to develop significantly.

4.2 Recommendation

Every child is unique, and every child needs

guidance from their parents for them to grow. Constant guidance and patience are needed as children are still vulnerable to exposure to multiple environments; creating a good and positive environment is needed for good development for the child.

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The Relevance of Foreign Language and Literacy in the Growth of Secondary Students at Navotas National High School

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Abstract: This study explores the relevance of foreign language and literacy in the academic and personal growth of secondary students at Navotas National High School. As globalisation continues to shape education and employment opportunities, the ability to learn and use foreign languages has become an essential skill. This research aims to determine the benefits of foreign language literacy in terms of academic performance, cultural awareness, and future career opportunities. Using a qualitative approach, the researchers conducted surveys among selected students to gather their perspectives on how learning foreign languages influences their skills and knowledge. The students also feel that foreign literacy presents chances of personal development, better understanding of different cultures, and involvement in global networking. It presents them with the opportunity to engage in higher studies in other countries, access foreign media and resources, and enter into cross-cultural partnerships. In addition, foreign literacy has the potential to enhance their communication skills so that the students are more confident in dealing with people of different cultures and ready to carry out different professional tasks that demand multilingual skills. Findings reveal that students recognise the significance of foreign literacy in expanding their vocabulary, improving communication, and increasing job opportunities. However, challenges such as lack of interest and limited resources hinder their progress. This study highlights the need for improved teaching strategies and curriculum enhancements to maximise the advantages of foreign language education for students.

Key Words: culture; globalization; global competitiveness; foreign literacy; secondary curriculum

1. INTRODUCTION

1.1. Background of the Study

In a world where understanding, appreciating and acknowledging cultural differences and learning various languages such as Mandarin, Nihongo and English, is an essential skill for engaging in diverse contexts. Literacy as a foundation of education is much more than just knowing how to read and write certain languages; it also gives the ability to improve communication in diverse contexts, widen the perspective on cultural differences, and enhance skills as a student to be more globally competitive.

Including foreign literacy in curriculums allows students to experience and explore more. It is also important for shaping minds and being culturally aware. Language is part of culture, and culture is a part of a language (Cakir, 2016). However, many schools often prioritize local literacies, leaving foreign literacies behind. This may cause students to be unaware and may make them unskilled.

According to Anwar (2021), there are two skills that English learners should develop, the receptive and productive skills. Receptive consists of listening and reading skills, while

productive skills are writing and speaking skills. Though, the studies showed that learners have low interest in reading, speaking, and listening. Additionally, lack of ideas and grammar problems becomes an issue.

In recent years, the advantages of incorporating literature into the teaching of second or foreign languages have come to light again. Through activities like reading logs and explicit vocabulary learning, various young adult novels were used in these programs. Data for this six-month exploratory multiple case study was gathered from semi-structured interviews, reflective journals, related documents, and artifacts of the teacher participants. This study highlights the necessity of teacher training in the application of this pedagogical approach, along with implications for future practice and research, by outlining some of the challenges and misunderstandings teachers face.

The new era of globalization has made it necessary to learn foreign languages. It is motivated by the evolving demand for multicultural communication and membership in the global labor market. Globalization has connected nations across the world, and hence, it is necessary for people to be able to speak many languages in order to remain competitive and up-to-date worldwide. In addition to economic benefits, foreign language acquisition has the effect of personal growth via enhanced memory, critical thinking, and creativity.

1.2 *Statement of the Problem*

Navotas National High School offers foreign language subjects for students to help them become aware of their country, but students don't seem to grow when it comes to learning foreign languages. As a result, it hinders their learning progress when it comes to foreign language and literacy. However, the lack of foreign schools adds to the problem. The goal of this study is to find recommendations on how to improve their skills and make them interested when it comes to learning native languages. The study aims to discover the relevance of foreign literacy to the growth of the students, emphasizing the way it impacts their development, critical thinking, and communication skills. Finally, suggestions based on their findings will be made

1.3 Significance of the Study

This study focuses on the importance of foreign literacy in the secondary school curriculum in Navotas City. It aims to show how learning foreign languages can help students develop better communication skills and prepare them for global opportunities.

Students. The students who are learning foreign literacy and language can boost their confidence, improve their academic performance, and open more opportunities for their future career choice. It will also help them become aware of different cultures.

Teachers. This study can help teachers find better ways to teach foreign languages and make lessons more engaging for students. It may also help them develop new teaching strategies and materials to improve students' learning experiences.

School Administrators. The findings of this study may help school administrators improve the curriculum by ensuring that students develop skills that meet international standards. It can also guide them in planning training programs for teachers to enhance foreign language instruction.

Future Researchers. This study can serve as a reference for future research on foreign literacy in education. It may also encourage further studies on effective teaching methods and how learning foreign languages impacts students' future careers.

1.4 Scope And Delimitation

This study will be conducted in Navotas National High School to see the relevance of foreign literacy to the development of secondary students. The study focuses on how foreign literacy is combined into their curriculum. The study is limited to the foreign languages commonly taught in the Philippines education system (English, Spanish, Mandarin, and Japanese). The study includes selected public schools in Navotas City.

This research will focus on secondary education, specifically analyzing the curriculum

and teaching methods used in this educational stage. Also, it's specifically examining the role of foreign language literacy, such as English, Mandarin, Japanese, and Spanish, in the curriculum. It will not address other subjects or areas of the curriculum that do not involve foreign language.

2. METHODOLOGY AND RRL

2.1 *Review of Related Literature*

Foreign language learning plays an important role in secondary students' cognitive, social, and academic development. For schools such as Navotas National High School, foreign language literacy and fluency promotion open up opportunities for better academic performance, intercultural awareness, and employment opportunities in the world's increasingly interconnected economies. But, the current curriculum needs to improve its specificity, internal coherence, and integration of some essential principles of 21st century learning and language teaching and learning (Barrot, J.S., 2020)

The ability to communicate in more than one language opens up limitless opportunities in various fields. For example, in the business world, foreign language skills enable one to collaborate with international partners, understand the global market, and increase competitiveness at the international level. In education and research, foreign language skills allow access to a wider range of scholarly papers and resources, and facilitate collaboration with researchers from different countries (Sholihah, H.I. et al., 2024).

Learning foreign languages at the school level also assists in the development of literacy skills, which are the core of overall student performance. Based on a recent study on literacy and foreign language instruction in the Philippines, it is clear that students who undertake multilingual learning perform better than their counterparts in different academic subjects, particularly those requiring critical thinking and reading comprehension (Buscagan, P.M. et al., 2023).

Foreign language learning is also important in a globalized educational system for broadening the horizons of students and making them more culturally literate. According to Lacaste et al. (2020), foreign language skills enable students to enjoy and interact with diverse cultural settings, providing an expanded point of view in both academic and personal life. Such exposure not only increases critical thinking but also enhances the emotional and social intelligence of the students, preparing them for multicultural living.

Foreign language learning has not only limited effects on literacy and cognitive development but also has functional benefits, such as enhanced career opportunities and a higher degree of adaptability in a global economy. A study recommends that students familiar with foreign languages have an edge in the competitive job market (Andaya et al., 2020). In particular, they are likely to secure employment in multinational companies or communication jobs across language and culture boundaries. Foreign language study is therefore an excellent tool for preparing students for success.

Furthermore, education and internationalization have made foreign language skills more essential than ever before. The advantages of incorporating literature into the teaching of second or foreign languages have come to light again. (Sun, X., 2021). It was found, through research, that there were greater levels of competence among multilingual students when it came to managing internet forums and the utilization of web-based tools as part of class work (Gass et al., 2020).

Despite these advantages, there are still issues in the provision of foreign language courses. The shortage of qualified language teachers and teaching materials in certain public secondary schools impedes the quality of foreign language acquisition (İleritürk 2024). Yet research indicates that despite the limited resources, creative teaching technologies like online foreign language courses and interactive learning systems can even provide positive contributions to learners.

The field of foreign language and literacy has paid attention to languages other than English. In recent years, an increasing number of countries have incorporated Chinese into their national education systems as an additional foreign language (Jingyi et al., 2024).

According to Ikonnikova et al. (2020), the analysis of the source base allows us to estimate that at the beginning of the 21st

century, learning a foreign language is undergoing significant changes; multilingualism. Also, English has become more important in the past years.

From the above discussion, the suitability of foreign language and literacy to Navotas National High School Junior High School growth cannot be overstated. From enhancing cognitive abilities and literacy to facilitating cultural sensitivity and global career opportunities, foreign language learning has many benefits.

2.2 Methodology

2.2.1 Research Design

The qualitative research design that the researchers used in this study was a descriptive research design since it obtained information.

This qualitative research design proved that it was suitable for this study as it obtained information and opinions about the relevance of foreign languages and literacy. The research design consists of surveys. The survey includes questions about the perception of the students in improving the growth of foreign languages and literacy.

2.2.2 Population Sampling

This study focuses on students in Navotas National High School to understand the relevance of foreign literacy in the curriculum. Purposive sampling will be used to select participants with direct experience in the subject. Students from the secondary curriculum at Navotas National High School are purposefully selected using the purposive sampling technique as the sample size for each selection. There are a total of fifteen (15) students from Navotas National High School that are purposefully selected for the study.

2.2.3 Research Instrument

The researchers employed a survey questionnaire that consisted of open-ended questions for respondents to give their insights and share their experiences. The survey consists of different sections that vary the different responses of the respondents. The first section includes the opportunities the students can get in learning foreign languages and literacy. The next section of the survey assesses how foreign literacy will affect the future job of the students. The third section aims to assess the students' perception on how foreign language helps them to improve their studies as well as foreign language helping them to their future career choice.

2.2.4 Data Gathering Procedure

The research instrument was thoroughly validated in this study. It was approved and confirmed by Mrs. Mariz April F. Yongot-Yongot, the researchers' adviser in Practical Research 1, before being distributed to the respondents. The researchers administered the survey by distributing questionnaires to a total of fifteen (15) respondents from grade 7 to 10 learners of Navotas National High School. Before answering the survey questions, participants reviewed the terms and conditions provided by the researchers. Throughout the data collection process, all respondents were informed of the study's purpose and assured that their participation was voluntary.

3. RESULT AND DISCUSSION

There are a total of fifteen (15) respondents in the study. Their demographic profiles are shown in the following figures.

Figure 1. Present the age range of the respondents.

Age Range	Frequency
14-13	2

15-16	6
17 and above	7

The demographic profile of respondents shows that seven (7) out of fifteen (15) respondents are seventeen (17) above and six (6) out of fifteen (15) respondents are fifteen to sixteen (15-16) and the two (2) out of fifteen (15) respondents are fourteen to thirteen (14-13).

Figure 2. Present the sex of the respondents.

Sex	Frequency
Male	10
Female	5

The demographic profile of the respondents shows that ten (10) males make up the majority of the survey participants, while female respondents represent only five (5) of the total fifteen (15) respondents.

The researchers presented the acquired data in a tubular form. This method allows the researchers to present the common themes or responses from the respondents and efficiently determine their frequencies. The researchers divided the ten (10) survey questions into two (2) sections according to their aims.

Table 1. Global opportunities in learning foreign languages

Question	Common Themes	Frequency
1. In what way can foreign literacy help grow the economy?	(a) It helps to extend foreign relations (b) Wider job opportunities (c) Lessen miscommunication	(a) 11 (b) 2 (c) 2
2. How does foreign literacy prepare you for global opportunities?	(a) Can communicate effectively (b) Improves communication skills (c) It can help in gathering experience	(a) 9 (b) 4 (c) 2
3. In your opinion, how can speaking another language help our countries to work better together?	(a) Promotes mutual understanding (b) Easily communicate with others (c) Improve communication (d) Utilizes skills	(a) 2 (b) 5 (c) 6 (d) 2
4. What are the opportunities you could get?	(a) Work for multinational companies (b) Opportunities to learn new skills (c) A high paying job (d) Domestic Helpers (e) Career Advancement	(a) 5 (b) 3 (c) 3 (d) 2 (e) 2
5. In what way can foreign literacy affect your future career/job?	(a) Increases employability (b) More opportunities (c) Easier way of socializing with others (d) More confidence in speaking (e) Companies want employees who can speak multiple languages	(a) 3 (b) 6 (c) 1 (d) 3 (e) 1 (f) 1

(f) Higher salary

Table 1 presents information about the global opportunities of students in Navotas National High School in learning foreign languages and literacy. The first question examines how foreign literacy helps to grow our country. There were three (3) common themes: Helping to extend foreign relations got the highest frequency; it had eleven (11) responses, while two (2) answered more job opportunities, and two (2) said that it will lessen miscommunications.

The second question examines how foreign literacy prepares the students for global opportunities. There were three (3) common themes: Communicating effectively got the highest frequency; it had nine (9) responses, while four (4) answered it improves communication skills, and two (2) said it can gather experience.

The third question asked the respondents how speaking another language helps the countries work together better. There were four (4) common themes: six (6) of them said that they can improve communication skills, five (5) of them said they have easy communication with others, two (2) of them said they promote mutual understanding, and two (2) of them said that it's utilising the skills.

The fourth question asked the respondents what the possible opportunities are. There were 5 common themes: five (5) of them said that they can work for multinational companies, three (3) of them said they have an opportunity to learn new skills, three (3) of them said they are open to a high-paying job, two (2) of them said domestic helpers, and two (2) of them said they are open to career advancements.

The fifth question asked the respondents how foreign literacy can affect their future careers. There were seven common themes: six (6) of them says more opportunities, three (3) say it increases employability, three (3) say it can have more confidence when speaking, one (1) say companies want employees who can speak multiple languages, one (1) says higher salary in the future, and one (1) says an easier way of socialising with others.

Table 2. Suggestions of the students in improving the skills in foreign language and literacy

Question	Common Themes	Frequency
6. Do you think learning foreign literacy can give you an advantage to get a better job?	(a) It increases the chance of being hired (b) No (c) Yes	(a) 3 (b) 1 (c) 11
7. What are the things that could improve when learning about foreign literacy?	(a) Communication skills (b) Enhances the ability to express your thoughts in other languages (c) Improves understanding (d) Enhances	(a) 9 (b) 1 (c) 3 (d) 2

	reading and writing skills	
8. How does foreign literacy contribute to your overall communication and literacy skills?	(a) Apply certain knowledge (b) Apply certain understanding (c) Improve the ability (d) Widen the vocabulary (e) Enhance the communication	(a) 2 (b) 2 (c) 2 (d) 3 (e) 6
9. Do you think foreign literacy can expand your vocabulary?	(a) Yes (b) More opportunities are open (c) It opens you to new words (d) No	(a) 6 (b) 1 (c) 7 (d) 1
10. What is your suggestion for improving skills in learning foreign languages and literacy?	(a) Reading books (b) Learning their language (c.) Conversation with native speakers (d) Enrolling at foreign language schools (e) Practice regularly (f) Speaking clearly (g) None	(a) 5 (b) 1 (c) 4 (d) 1 (e) 2 (f) 1 (g) 1

Table 2 presents the suggestion of the students in improving their skills in foreign language and literacy. The sixth question asked the students if foreign language and literacy will give them an advantage to get a better job. There are three (3) common themes: eleven (11) of the students said yes, while three (3) of the students gave an opinion that it increases the chance of being hired, and one (1) student said no.

The seventh question asked for the recommendations of the students to improve the things in learning foreign languages and literacy. There are four (4) common themes: nine (9) said that it can improve communication skills, while three (3) answered it improves understanding, two (2) said that it will improve reading and writing skills, and one (1) answered that it enhances the ability to express thoughts in other languages.

The eighth question determines how foreign literacy contributes to the students overall communication and literacy skills. There are five (5) common themes: six (6) said that it enhances the communication, three (3) of them said that it widens the vocabulary, two (2) of them said that it improves the ability, two (2) of them said that it can apply certain understanding, and two (2) of them said that it can apply certain knowledge.

On the ninth question, we ask the respondents if they think that foreign literacy can help them expand their vocabulary. There were four (4) common themes: seven (7) of them answered it opens them to new words, six (6) of them answered yes, one (1) of them said more opportunities are open, and lastly, one (1) of them said no.

The respondents provided suggestions to the last question, which takes a look at how foreign language and literacy improve skills. This question has seven (7) common themes: five (5) respondents suggest that reading books can help improve our skills, four (4) respondents say that having a conversation with native speakers can also help, two (2) of the respondents share that practicing regularly is crucial to improve our vocabulary, one (1) suggests learning their language, one (1) says that enrolling in foreign language schools at an early age will help, one (1) says that speaking more clearly avoids misunderstanding, and lastly, one (1) respondent says none.

4. CONCLUSION AND RECOMMENDATIONS

To summarize the responses of the students from the data gathered, the majority of the students in Navotas National High School mentioned that communication skills are what grow in them in learning foreign languages and literacy. Students also think that learning foreign languages and literacy provides gateways to higher employment opportunities, especially in multinationals.

Students also pointed out that being bilingual or multilingual not only improves their communication but also their overall literacy, allowing them to communicate with people from different backgrounds and cultures.

Finally, the research points out that being more foreign literate requires a commitment to continued learning. Students proposed different suggestions, including reading books, having conversations with native speakers, and practicing frequently. Most also think that early exposure to foreign languages through education and study at language schools can greatly enhance language skills.

The researchers also came up with the following recommendations to help improve the quality of learning foreign languages and literacy.

Teacher training can improve the quality of learning foreign languages and literacy in Navotas City. It focuses on enhancing teaching skills in foreign languages through professional development, focusing on effective methodologies, assessment strategies, and technology used to support learning.

Assessments and monitoring those students and teachers to monitor the effectiveness of foreign language and literacy, understanding the student progress in crucial implementation revisions in foreign language instruction and literacy development programs, ensuring comprehensive and effective learning experiences.

Curriculum enhancement. Review and revise the current curriculum to ensure the stronger integration and effectiveness of foreign language and its development of the literacy of all subject areas. Enhancing the learning and fostering a more effective teaching approach.

Early intervention programs. These programs support the students who struggle with foreign language acquisition or literacy development. These programs assist and support those students who struggle to learn foreign languages and literacy.

Future researchers should examine the impact of multilingual skills and how students influence employability and career advancement and become competitive in global industries.

These recommendations are based on the collected data from the students' perspectives, experiences, and suggestions. The researchers expect that these will help in improving the growth of the students in learning foreign languages and literacy.

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The Relationship Between the Children of Overseas Filipino Workers and Their Academic Performances in San Jose Academy

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Abstract The migration of parents have a profound impact on the educational experiences of their children, particularly for those who remain in the Philippines. This phenomenon emphasizes the vital role that parents play in shaping their children's lives, even in the absence of physical presence. This research aims to examine the perspectives of students who have Overseas Filipino Worker (OFW) parents and assess its impact on their academic performance and overall well-being. The study employed a qualitative phenomenological research approach, which displays a complete analysis of the students' lived experiences. A total of fifteen (15) students were selected through purposive sampling, allowing for the collection of comprehensive qualitative data regarding their insights and experiences. The findings indicate that having a parent employed abroad as an OFW significantly influences the emotional and social well-being of these students, which also affects their performances. Many participants reported a preference for communication with their parents through social media platforms, utilizing text messaging and video calls to sustain their connection. However, they also encountered various challenges in communication, including technical difficulties and complications arising from differing time zones, which can impede regular interaction. Considering these findings, the overall recommendations focus on developing strategies to enhance communication and support systems for these students, thereby ensuring they receive the necessary emotional and academic assistance while navigating the complexities associated with having a parent working overseas.

Key Words: *migration; parents; education; Overseas Filipino Workers; impact*

1. INTRODUCTION

1.1 Background of the Study

Overseas Filipino Workers (OFWs) are the Philippines' "Bagong Bayani," according to former President Corazon Aquino. Many Filipinos are motivated by the promise of higher wages and improved living conditions, often sending remittances back home to support their loved ones. This migration not only impacts their personal lives but also has a great impact on the Philippine economy, as overseas workers play a crucial role in sustaining local businesses and communities. Eugenio L.J. (2023) stated that the Philippine Statistics Authority's evaluation showcased 40% of Filipinos who are migrating are considered to have a low-status. In 2023, the top five destinations for OFWs worldwide were Asia (77.4%), North and South America (9.8%), Europe (8.4%), Australia (3.0%), and Africa (1.3%), with Saudi Arabia leading the way (Philippine Statistics Authority , 2023).

The Philippines is one of the largest sources of migrant workers worldwide, with millions of Overseas Filipino Workers (OFWs) deployed to various countries (Philippine Overseas Employment Administration, 2020). However, the impact of parental migration on the children left behind is a growing concern.

Children of OFWs may experience the feeling of abandonment, anxiety, and depression. Overseas Filipino Workers (OFWs) often miss significant events in their children's lives, causing strain in their parent-child relationship. This emotional distance affects parenting styles, communication, relationship nature, and school performance. The unique parenting

style of OFW parents is complicated by these challenges, involving careful navigation to foster a healthy, supportive family environment (Delfino, 2023). As a result of these emotional and relational strains, the impact of parental absence extends beyond the home, significantly influencing children's educational outcomes. Parental migration has been shown to have a negative impact on children's educational attainment in the Philippines (Liu et al, 2023). Children with migrant parents tend to have lower educational attainment compared to those with non-migrant parents. The negative effect of parental migration on educational attainment is more pronounced for children whose parents migrated when they were younger. Furthermore, remittances sent by migrant parents do not necessarily lead to better educational outcomes for their children. This highlights the need for targeted support for left-behind children to mitigate the negative effects of parental migration.

1.2 Statement of the Problem

The absence of Overseas Filipino Worker (OFW) parent can potentially impact the academic motivation and well-being of their children. Despite the financial benefits of parental migration, the emotional and psychological effects of parental absence on students' academic motivation and overall experience remains unknown. This study aims to explore how students with OFW parents continue to be motivated with their studies, the perceived positive and negative outcomes of having OFW parents, and the students' realizations about having OFW parents.

1.3 Significance of the Study

Having an Overseas Filipino Worker (OFW) parent plays a remarkable impact on the student's academic performance. The findings of this study will be beneficial to the following groups:

Students. This study aims to provide students with insights on how having an OFW parent affects their academics. Additionally, it seeks to offer ideas and strategies to stay motivated and do well in school.

Parents and Guardians. The study can help OFW parents to recognize the challenges faced by their children. This recognition may identify better ways to provide their children emotional and academic support. It can lead to a more positive and supportive environment for the children's growth and development.

Teachers and School Administrators. The results of this study can help teachers and school leaders to support students with OFW parents. This can ensure that students will receive the assistance needed in school. In this way, students can foster a better inclusive learning environment that addresses the challenges they are facing. This will help

Future Researchers. This study can serve as reference for future research on OFW families and academic performance. It assists other researchers to further investigate the topic and expand the range of this study. By structuring the findings, researchers can gain deeper insights into additional experiences of students with OFW families.

1.4 Scopes and Delimitations

This study focuses on students of San Jose Academy who have at least one parent working abroad as an Overseas Filipino Worker (OFW). It aims to examine the relationship between having an OFW parent and the student's academic performance. The study will explore how parental absence affects their motivation, study habits, and overall well-being.

The study only includes students who are willing to participate in in-depth interviews and share their experiences and perspectives regarding the impact of their parents' absence on their academic performance. The study focuses on identifying correlations between parental migration and students' motivation, academic achievements, and overall well-being.

2 METHODOLOGY and RRL

2.1 Review of related literature

Parental migration significantly impacts the educational and psychological well-being of the left-behind children (LBC). According to Nguyen et al. (2022), studies indicate that LBC often experience worse educational outcomes, including lower academic performance, fewer years of education, and a tendency to avoid school. This situation is caused by the emotional distress and social challenges that often accompany parental absence. However, resilience can play a crucial role in helping these children lead happy and adjusted lives, even in challenging situations. Additionally, the report titled Children of Migrant Workers: Supporting the Invisible Student (2024) highlights the significant challenges faced by school-age children of migratory agricultural workers in the U.S. It addresses various economic, social, and

physical health obstacles that impact their education and overall well-being, emphasizing the need for targeted support. Tesfaw (2020) further emphasizes that parental migration can lead to emotional distress, academic struggles, and social challenges for LBC, with studies showing that these children often face feelings of loneliness, poor academic performance, and even substance abuse as coping mechanisms.

While financial stability from remittances can enhance educational opportunities, as noted by Wong (2023), the absence of a parent can negatively affect motivation and academic engagement. The importance of strong family communication and emotional support is crucial in helping children cope with these challenges and maintain their academic focus.

Furthermore, Seliverstova (2022) points out that children living without their parents, especially in rural areas, face higher risks of dropping out of school due to a lack of parental guidance and emotional support. This situation underscores the urgent need for targeted interventions, such as improved educational policies and psychological support programs, to help these children navigate the complexities of their circumstances and perform better academically. By fostering resilience and providing essential resources, communities can play a vital role in supporting LBC, ensuring they have the tools needed to thrive despite the challenges posed by parental migration. Ultimately, a comprehensive support system is essential to mitigate the negative effects of parental migration and foster resilience among LBC, allowing them to achieve their full potential in both education and life.

The impact of parental absence on senior high school students with Overseas Filipino Worker (OFW) parents is a critical issue that affects various aspects of their lives, including academic performance, emotional well-being, and decision-making. Research indicates that the absence of parents can lead to significant challenges, as these students often lack the emotional support and guidance crucial for their development (Dialde, 2021). This situation is particularly poignant in the context of Filipino culture, where family ties are deeply valued, making the separation even more challenging for both parents and children. As a result, students may struggle not only academically but also in their personal lives, facing feelings of isolation, anxiety, and uncertainty about their future. The emotional toll of having a parent working abroad can manifest in various ways, including decreased self-esteem, difficulty in forming relationships, and a sense of disconnection from their familial roots. These challenges underscore the need for a comprehensive understanding of how parental absence influences the holistic development of these students.

Studies have shown that the absence of parents can negatively impact students' motivation and overall academic performance. For instance, the emotional support provided by parents plays a vital role in shaping students' educational outcomes (Tolosa et al., 2024). When parents are absent, children may experience feelings of loneliness and anxiety, which can hinder their focus and engagement in school. Moreover, the lack of parental guidance can lead to difficulties in managing time and responsibilities, further exacerbating academic challenges (Ramos, 2021). These emotional and behavioral issues can create a cycle of underachievement, making it essential to address the root causes of these struggles. Additionally, the pressure to perform well academically can become overwhelming for these students, who may feel they need to compensate for their parents' absence by excelling in their studies. This pressure can lead to stress and burnout, further complicating their ability to succeed. It is crucial to recognize that while some students may thrive despite these challenges, many others require targeted support to help them navigate their complex emotional landscapes and achieve their academic goals (Bondoc, 2023).

To address these challenges, it is essential to strengthen support systems for students with OFW parents. This includes enhancing communication between parents and children, as well as providing additional resources such as counseling and mentorship programs (Peralta, 2023).

2.2 Methodology

2.2.1 Research Design

The researchers employed a qualitative phenomenological method to explore the experiences of children and performance in the absence of their OFW parents. The phenomenological method is appropriate as it seeks to understand individuals' experiences, emotions, and thoughts concerning a specific phenomenon. By focusing on the personal narratives of these students, this study aims to obtain the basis of their experience, providing an understanding of the impact of parental absence especially due to employment in another country.

Through interviews and analysis, the study identified themes and patterns that appeared in their stories. This approach ensured that their voices are heard and understood. The qualitative aspect of the

stay allows flexibility, enabling the researchers to adapt questions and follow up on significant concerns during interviews.

2.2.2 Population Sampling

This study focused on Senior High School students from San Jose Academy who are children of Overseas Filipino Workers (OFWs), as these students had varied perspectives on how having an OFW parent affected their academic performance, drawing insights from personal experiences, family discussions, or observations from peers. To gather relevant data, the study employed purposive sampling, selecting participants based on specific criteria; rather than choosing students randomly, the researchers focused on those with OFW parents who provided meaningful insights into the correlation between their academic performance and their parent's absence due to overseas employment.

2.2.3 Research Instrument

The researchers used an unstructured method to create a set of survey questionnaires that incorporated open-ended questions. This approach allowed respondents to share their insights and experiences in detail, allowing the researchers to gather various information and understand different perspectives. It also made respondents feel more comfortable sharing their own experiences and thoughts.

2.2.4 Data Gathering Procedure

In order for the researchers to conduct an interview, the requisition of validation was made to Mrs. Mariz April F. Yongot-Yongot after it was made. The interview was conducted via messenger with fifteen (15) respondents from different strands. A file about the terms and conditions was given, allowing the respondents to gain information about the purpose of the study.

3. RESULTS AND DISCUSSION

A total of fifteen (15) respondents were utilized in this study. The respondents' demographic profiles are presented by the following figures:

Figure 1. Presents the sex of respondents

Sex	Frequency
Male	8
Female	7

The figure shows that the majority of the respondents are male with a frequency of eight (8) and seven (7) for females.

Figure 2. Presents the strands of the students

Strand	Frequency
STEM	11
HUMSS	4

Majority of the respondents came from the Science, Technology, Engineering, and Mathematics (STEM) strand, consisting of eleven (11) respondents. The Humanities and Social Science (HUMSS) strand only has a total of four (4) respondents.

Figure 3. Presents the parent's profession

Profession	Frequency
Seaman	4
Professional dancer	1
Caregiver	3
Dental hygienist	1
Restaurant manager	1
Carpentry	1
Factory worker	1
Train maintenance	1
Engineer	2

The majority of four (4) professions are seaman, followed by caregiver with three (3) respondents, two (2) engineers, and one (1) for the professional dancer, dental hygienist, restaurant manager, carpentry, factory worker, and train maintenance profession.

The researchers organized the gathered data in a tabular format. This approach helps the researchers to simply identify recurring themes or answers from the survey questionnaire. The 10 questionnaire will be divided into three (3) parts corresponding to its aim:

Table 1. Motivation of students with the physical absence of parents

Question	Theme	Common Themes	Code
1. What motivates you to do continue studying and doing well in school despite your parent's physical absence	Parent's sacrifice motivates the students	a.parental sacrifice b.parental ambition c. family support	a. 9 b. 4 c. 2
2. Are there any role models or sources of inspiration that motivate you to continue studying despite the physical absence of your parents?	Student's role model/inspiration are parents	a. parent b. friends c. personal goals d.successful people e. none	a. 10 b. 2 d. 1 e. 2
3. How do you stay connected with your OFW parent, and how do they support you in your studies?	Connection through social media	a. Text and video b. Emotional support	a. 14 b. 1
4. Do you feel that having an OFW parent has influenced your own goals and aspirations ? If so, how?	By having the desire to finish school	a. Parental role model b. To also work abroad c. Goal driven d. Eagerness to finish studies e. Provision by parents f. future purposes g. none	a. 3 b. 2 c. 4 d. 2 e. 1 f. 2 g. 1

Table 1 displays information about the San Jose Academy's grade 11 students' motivations despite the physical absence of their parents. The first question identifies the cause of the students' motivation. Three (3) common themes were present in the table, showcasing nine (9) respondents using parental sacrifice as their motivation, four (4) respondents using parental sacrifice, and two (2) respondents chose family support.

Second question determines the student's role model or inspirations. There were five (5) common themes in this question. Ten (10) respondents said their role models are their parents, which is the majority of the respondents, Two (2) for friends, one (1) for personal goals, two (2) for successful people, and one (1) for none.

Third question identifies how the students stay connected with their parents. Two (2) common themes were present. This question is composed with three (3) themes. The majority of the respondents utilize texting and video calls as a way to stay connected with fourteen (14) feedbacks, and one (1) for emotional support.

Table 2. Positive and negative outcomes of having an OFW parent

Questions	Theme	Answers	Code
5. As a student with OFW parents, How are you more likely to excel academically due to reduced	Less financial stress is equal to excelling	a. Stress-free b. Homecoming of parents	a. 14 b. 1

financial stress?			
6. What difficulties have you encountered in communicating with your parents due to distance?	Contrast of time zones	a. Technical issues b. Physical distance c.Different time zones	a. 4 b. 5 c. 6
7. How does the absence of OFW parents hinder your academic performance and motivation?	Having difficulty of coping emotions	a. Emotional struggles b. Lower motivation c. None	a. 9 b. 2 c. 4

Table 2 presents the positive and negative effects of having an OFW parent. The fifth question showcases that fourteen (14) respondents are able to excel academically due to reduced financial stress, whereas one (1) respondent stated that the notion of her parent's homecoming motivates the student to excel academically.

The sixth question recognizes the difficulties of the students when communicating with their parents. There were three (3) common themes. Four (4) respondents claimed that technical issues hindered communication, five (5) respondents with the physical distance, and six (6) respondents for different time zones.

The seventh question analyzes the effect of having an OFW parent on academic performance and motivation. There were three (3) common themes. Emotional struggles are the major claims, based on the nine (9) respondents, with two (2) respondents saying that it causes lower motivation and four (4) respondents saying there are no hindrances.

Table 3. Student's realizations of having an OFW parent

Questions	Theme	Answers	Code
8. How have you personally coped with the challenges in academics of having OFW parents?	By having continual connection	a. Self-reliance b. Goal oriented c. Recognition of parent's hardships d. Constant connection with parent e. Hangout with friends	a. 2 b. 4 c. 3 d. 3 e. 3
9. How have you learned to appreciate the sacrifices your parents have made for you? How?	Expressing gratitude	a. Gratitude b. Acknowledgement of hardships c. Determination d. Motivation from parents	a. 9 b. 3 c. 2 d. 1
10. In what ways have you developed a deep appreciation for the sacrifice of your parents?	By recognizing the sacrifices of parents	a. Open communication with parents b Acknowledgement of provision c. Recognition of parent's sacrifice d. Gaining independence e. Physical absence	a. 3 b. 4 c. 6 d. 1 e. 1

Table 3 presents the student's realizations of having an OFW parent. The eighth question displays two (2) respondents utilized self-reliance, four (4) respondents were goal-oriented, three (3) respondents recognized the hardships of their parents, three (3) with constant connection with their parents, and another three (3) by hanging out with friends.

The ninth question, with a common theme of four (4), identifies the way on how the students appreciated the sacrifices of their parents. With the majority of nine (9) respondents, expressing gratitude was their way of appreciation. Three (3) respondents claimed that acknowledgement of sacrifices can cause appreciation. Two (2) respondents claimed that their

determination establishes appreciation, and one (1) respondent claimed that parental motivation is their method of appreciation.

The tenth question identifies the ways on how the students developed a deep appreciation for the sacrifice of their parents. There were five (5) common themes. Three (3) respondents stated that open communication with parents has developed a deep appreciation for the sacrifice of their parents, four (4) respondents with acknowledgement of provision, majority of nine (6) with recognition of parent's sacrifice. In addition with one (1) respondent to gaining independence and physical absence.

4. CONCLUSION AND RECOMMENDATION

4.1 Conclusion

According to the findings of this study, the majority of students with OFW parents face challenges when it comes to academics. The students are determined to excel in school as a method to honor their parent's sacrifices and secure a better future for themselves and their families. Additionally, the students develop a deep appreciation for education, viewing it as a path not only for personal success but also for the aim of decreasing financial problems.

Despite the parent's physical absence, students remain connected through the use of digital communication, which provides emotional and financial support. However, the dispute between the time differences, weak connections, and the feeling of emotional distance hinders both student and parent, which affects the maintenance of a parent-child bond.

4.2 Recommendation

In provision to reduce the effects of having an OFW parent, it is recommended that students should persevere to study diligently despite the absence of their parents. This recommendation can serve as a source of motivation and inspiration as an encouragement to achieve success and understanding of their parent's sacrifices. Furthermore, emphasizing the vital role of institutions providing these students with necessary guidance and support, including counseling activities to help reduce the feelings of longing and separation.

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An Analysis of Residents' Perception Towards Local Government Initiatives in Disaster Preparedness in Barangay Tangos, Navotas City

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Abstract: A vital aspect of community resilience is disaster preparedness, especially in high-risk disaster areas such as Barangay Tangos, Navotas City. Thus, the local government plays a crucial role in reducing the impacts of disaster in the community. This research examines residents' perceptions of local government initiatives in disaster preparedness, determining their awareness, involvement, and level of trust in such programs. Based on a phenomenological research approach, the research conducted a survey of sixteen (16) residents using purposive sampling, collecting qualitative data on their experiences and perspectives. The findings show that although disaster drills and flood control mechanisms are the most recognized programs in Barangay Tangos, most residents are unaware of other disaster preparedness programs. The preferred mediums of communication are through social media and SMS Alerts. However, the respondents felt that information should be disseminated more effectively. Trust in the local government's disaster management initiatives is low, mainly because there is perceived to be a lack of community engagement, resource investment, and access to programs. Recommendations involve increased community participation, building stronger communication measures, enhanced distribution of resources, and promoting interaction among local authorities and residents. Improvements in disaster preparedness programs will lead to a more resilient community in Barangay Tangos.

Key Words: *disaster; disaster preparedness; local government; residents' perceptions; initiatives*

1. INTRODUCTION

1.1 Background of the Study

Natural hazards are one of the most destructive and life-threatening phenomena in the world that pose a significant hazard to humanity and personal possessions of everyone. Being located along the typhoon belt in the Pacific, the Philippines experiences around 19 typhoons each year. It is also vulnerable to frequent earthquakes and volcanic eruptions–making them prone to disasters and its hazards. Navotas City is one of the most affected by the hazards and problems around the country. The purpose of this study is to be able to determine the preparedness and insights of Navoteños about the actions and implementations of their government regarding disaster preparedness.

Disasters are no longer considered an occasional happening, it is not a hazard that is not possible to handle. The concept of "vulnerability" expands, particularly relevant to the existence of civilization and the existence of humans on the planet. Disasters, their causes, and their effects on humans

must be reduced and recognized in the earliest way possible to observe and improve the development of a solution for disaster management. Several studies have shown that actions based on living practices can possibly prevent between 40 and 70 percent of the implementation and execution of Disaster Risk Reduction (DRR) programs in rural areas. The necessity of this is to increase the stability of the community to cope with risks related to disasters. In Kanyasan's study (2018), a community-based DRR, also recognized as the Community-Managed Disaster Risk Reduction training program, aims to improve and authorize the village community (Kanyasan K, 2018).

According to Gundran et al., typhoons, earthquakes, and floods in the Philippines have all served as reminders of the significance of effective disaster preparedness and response systems. Local government units (LGUs), the Department of Social Welfare and Development (DSWD), and the National Disaster Risk Reduction and Management Council (NDRRMC) are just a few of the organizations that the Philippine government has established that are crucial to disaster response. The integration and readiness of these agencies on the ground, particularly in high-risk regions like the NCR, are problematic despite all of these efforts.

Kurata et al. states that problems with policy implementation, a lack of technical skills, a mismatch between the necessary and available skill sets, fragmented resources, and low use of local disaster risk reduction and management funds are the main obstacles to mainstreaming disaster risk reduction and management at the local level in the Philippines. To successfully execute disaster risk reduction and management, the Department of the Interior and Local Government initiated the Disaster Risk Reduction Enhancement at the Local Level Program, which includes significant policy reforms and capacity-building activities. To address structural and coordination obstacles and increase institutional capacities at the national and local levels, the reforms include policies that have been cooperatively coordinated and enacted. It is associated with national talks on consolidating disaster resilience initiatives under a single national body and efforts to make sure disaster management is grounded in evidence, particularly at the local level.

1.2 Statement of the Problem

Barangay Tangos is vulnerable to natural and man-made disasters such as fire and flooding. As a result, the local government conducts a variety of disaster preparedness programs, including earthquake and fire drills, community awareness campaigns, relief and recovery efforts, and early warning systems. However, there is a lack of information about how residents perceive these initiatives or if they are aware of or actively participate in them. The goal of this study is to look at how residents perceive the local government's disaster preparedness programs. Specifically, this study aims to assess if the disaster preparedness programs implemented by the local government of Barangay Tangos are accessible to all residents and to investigate their perceptions towards these programs. Finally, recommendations based on the findings of the study will be made.

1.3 Significance of the Study

Disaster preparedness is vital in achieving community resilience. By assessing the residents' perceptions towards local government initiatives and analyzing whether those initiatives requires improvements, this study will be useful to many different areas of stakeholders, including:

Residents. By analyzing their perceptions, this study can help to further understand certain aspects or areas that residents may not fully understand. It can also help identify the weaknesses of the disaster preparedness programs implemented in Barangay Tangos. Therefore, this study benefits the residents by improving their awareness of disaster preparedness programs, enhancing community participation. Addressing their concerns and needs will lead to improved disaster preparedness programs in the future, and it will foster stronger trust between residents and the local government.

Local Government Officials. This study will help local government officials in Barangay Tangos, as well as many other local government officials in understanding residents' perceptions and experiences,

allowing them to collect necessary information to improve the effectiveness of disaster preparedness programs.

Policymakers. By providing deeper understanding of the residents' level of awareness and satisfaction, as well as their perception of the effectiveness of the disaster preparedness programs implemented by the government, this study may lead to the development of more inclusive, responsive, and effective disaster preparedness policies.

Future Researchers. This study can help future researchers improve and expand their research on local government disaster preparedness initiatives, as well as the value of residents' perceptions of those programs. This could provide information about the effectiveness of local government disaster preparedness measures based on residents' perceptions.

1.4 Scopes and Delimitations

This study focuses on the Barangay Tangos in Navotas City, a disaster-prone coastal site with easy access to the sea that is impacted by typhoons, floods, and storm surges. The study explores policies and programs on disaster risk preparedness by the local government for the community in question. The primary respondents of the Tangos Barangay are the households that have suffered the impact of disasters. Other key informants may consist of local leaders or any members of disaster management committees. With limited time, the study will not be able to cover changes over a longer period in the perception of the residents.

2. METHODOLOGY

2.1 Review of Related Studies

According to the findings of the study by Laingo et al. (2022), the preparedness of Filipinos during disasters is significantly affected by access to sources of information and the media, the publication of evacuation plans, the preparedness of local government units (LGUs), the public's trust in the government, and whether or not they are receiving financial support from the government.

According to Dariagan et al. (2020), the increasing frequency of disasters has challenged the preparedness of highly vulnerable countries (Yadav & Barve, 2019) in Asia Pacific to take action toward mitigating risks (Merone & Tait, 2018). The magnitude 7.2 earthquake that struck the provinces of Bohol and Cebu on October 15, 2013, has challenged the preparedness of the Philippines against natural hazards. After less than a month, tropical cyclone Haiyan (locally named Yolanda) devastated the central Philippines. Disaster plans may lack testing, such as practice drills, to assess their effectiveness before hazards hit (Muir and Shenton 2002 as cited by Tansey 2015). The Philippines performs poorly in disaster management, particularly in financial utilization, information management, leadership, monitoring, collaboration, and coordination with various stakeholders (Commission on Audit Report, 2014).

Typhoons from the Pacific Ocean are always coming within range of Northern Samar, according to Aniag et al. (2024). The frequency of disasters caused by these natural events has increased. The study recommends that an intervention program design be reviewed and considered in order to solve the concerns that have been discovered and improve the effectiveness of Disaster Risk Reduction and Management (DRRM) activities in the barangay.

Yuro et al. (2023) conducted a study in Ilocos Norte to assess residents' levels of disaster management awareness and preparedness. It showed a high level of awareness but also identified gaps in actual preparedness. The findings indicate that targeted educational programs could strengthen community resilience and improve perceptions of local government initiatives.

The study of Cruz (2024) emphasizes the value of community involvement in disaster planning and response. It discovered that while most people have a neutral view toward local government efforts, there is significant variation between their experiences and perceptions. The study suggests that increasing community awareness and education about disaster preparedness could improve overall perceptions and the effectiveness of local initiatives.

The study of Appleby-Arnold et al. (2021) looked into the possibility of citizens creating "cultures of disaster preparedness" that are shaped by their own experiences and ideals rather than being imposed from "above." Although Russo and Rindone primarily focus on disaster preparedness training for professionals, such a progressive strategy also highlights the important role of communication-focused activities for citizens, which may lead to and encourage participation in, for example, physical skills training. The power of these factors in disaster mitigation has been revealed by the large body of research targeting factors like local knowledge, rituals, values and norms, gender roles, collective memory, livelihoods, social cohesion, social exclusion, or trust in authorities. In this regard, Jang and colleagues (2016) contend that community members' intentions to prepare for hazards and feelings of empowerment increase with the frequency with which they "think of and talk about" a disaster.

The study by Ng (2022) discovered that risk perception and intention of preparedness were predictors of disaster preparedness behavior. Perception of risk had a significant impact on intention to prepare, which was helped in part by subjective norms. Risk perception had a significant impact on the mindset and perceived behavioral control but not on the intention of preparedness. Ng's study not only contributes to the existing literature on typhoon preparedness but also provides insights into natural hazards planning and management, as well as disaster risk reduction in Hong Kong.

According to Monteil (2022), several levels of preparation are necessary to lower the risk of calamity associated with significant flash floods. To address this issue, it explores how responsibilities for preparedness are shared among stakeholders. Individual preparedness is an aspect of adaptation to natural hazards. It is defined by the United Nations International Strategy for Disaster Reduction (2015). Also, the researchers have highlighted the importance of individual preparedness in facing exceptional flash floods, especially in cases where the level of risk is too high to be addressed through technical measures implemented by authorities.

A recent initiative to strengthen local governments' disaster management capacities emphasized the importance of increased funding efficiency and institutional capacity building. These enhancements are anticipated to lead to better preparedness and response outcomes, which could positively influence residents' perceptions of their local government's effectiveness. (Jovellanos & Herrera, 2024)

A comparative analysis of Zhai and Lee (2023) examined the factors that influence local governments' disaster preparedness capabilities. It identified critical evaluation indicators such as community engagement and resource allocation, suggesting that these factors significantly influence residents' perceptions of government effectiveness in disaster management.

This research considers the perceptions of residents in Barangay Tangos, Navotas City, towards local government disaster preparedness initiatives. With the rising natural hazards, it is important to know community awareness, participation, and satisfaction with disaster preparedness programs. The research investigates these perceptions to highlight the effectiveness of local government efforts, determine communication or resource gaps, and make recommendations for enhancing future disaster resilience plans. Different studies state that education programs have an important role in building resilience at the community level through an improvement in the residents' understanding of disaster risk and preparedness measures. Improved knowledge and awareness impact local disaster efforts' perception positively, which promotes a sense of preparedness. Additionally, proper disaster preparedness measures are critical in the reduction of future damages through proper organization in responding to emergencies. At the same time, education and properly organized plans not only raise community readiness but also reduce the long-term effects of disasters, eventually enhancing residents' safety and well-being.

2.2 Methodology

2.2.1 Research Design

This study aims to describe and understand the residents' perceptions towards the local government initiatives in disaster preparedness. Therefore, a phenomenological research design is used in this study. This qualitative research design proves suitable for this study as it aims to understand how residents perceive and experience the local government's disaster preparedness initiatives. Phenomenology is specifically designed to explore lived experiences. It seeks to describe the recurring meaning of a group's lived encounters with a concept or phenomenon (Creswell, 2013). The research design consists of a survey. The survey includes questions about the perceived effectiveness of the initiatives, as well as understanding and satisfaction with the local government's actions.

2.2.2 Population Sampling

This study examines Barangay Tangos residents' views on government disaster preparedness. The Purposive Sampling Technique simplified the survey process and allowed the researchers to collect responses from a variety of Barangay Tangos residents. Purposive sampling is a method where the researchers purposefully choose participants according to traits pertinent to the study instead of selecting them randomly. The sampling technique is particularly useful for the researchers, as they have a specific barangay in mind, allowing them to investigate the residents' multiple perspectives. Therefore, a total of sixteen (16) Barangay Tangos residents were purposefully selected using the purposive sampling technique as the sample size for each selection, and study participants completed the survey questionnaires prepared by the researchers.

2.2.3 Research Instrument

The researchers employed a survey questionnaire that consisted of open-ended questions for respondents to give their insights and share their experiences. The survey consists of different sections that vary the different responses of the respondents. The first section includes demographic information of the respondents and the length of their residency in Barangay Tangos, determining their perceptions and opinions about disaster preparedness within their area. The next section of the survey measures the residents' level of awareness on disaster preparedness programs implemented by the local government to assert their understanding and knowledge about the programs administered by the local government in their community. The third section aims to assess the residents' perception of the effectiveness of disaster preparedness programs by the government as well as their recommendations for improvements.

2.2.4 Data Gathering Procedure

This study thoroughly validated the research instrument. Before being distributed to the respondents, Mrs. Mariz April F. Yongot-Yongot, the researchers' adviser in Practical Research 1, approved and confirmed it. The researchers administered the survey by distributing questionnaires to sixteen (16) respondents from Barangay Tangos, Navotas City. Before answering the survey questions, participants reviewed the terms and conditions provided by the researchers. All respondents were informed of the study's purpose throughout the data collection process and assured their participation was voluntary.

3. RESULTS AND DISCUSSIONS

This chapter presents the data gathered by the researchers from the selected respondents.

There are a total of sixteen (16) respondents in this study. Their demographic profiles are shown in the following figures.

Figure 1. Presents the age range of the respondents.

Age Range	Frequency
Below 18	7
18 - 24	1
25 - 34	4
35 and above	4

The majority of seven (7) respondents are under the age of eighteen (18). One (1) respondent is between the ages of eighteen (18) and twenty-four (24), four (4) respondents are between the ages of twenty-five (25) and thirty-four (34), and the remaining

four (4) respondents are over the age of thirty-five (35).

Figure 2. Presents the sex of the respondents

Sex	Frequency
Male	5
Female	11

The demographic profile of the respondents shows that eleven (11) females make up the majority of the survey participants, while male respondents represent only five (5) of the total sixteen (16) respondents.

Figure 3. Presents the length of residency of the respondents.

Length of Residency	Frequency
Less than a year	0
1 to 5 years	1
6 to 10 years	0
More than 10 years	15

The figure shows that the majority of the respondents accounting to fifteen (15) people are residents of Barangay Tangos for more than ten (10) years while the remaining one (1) respondent has been a resident between one (1) to five (5) years.

The researchers presented the acquired data in a tubular form. This method allows the researchers to present the common themes or responses from the respondents and efficiently determine their frequencies. The researchers divided the ten (10) survey questions into two (2) sections according to their aims.

Table 1. Accessibility of disaster preparedness programs to residents of Barangay Tangos.

Question	Common Themes	Frequencies
1. What specific disaster preparedness programs implemented by the local government are you aware of	a) Unaware b) Disaster Drills c) Flood Control System d) Emergency Response Training e) Fire Prevention	a) 4 b) 6 c) 4 d) 2 e) 2
2. In what ways have the local government's disaster preparedness programs been made accessible to you and your community?	a) Public Announcements b) Relief Operations c) Social Media d) Evacuation Centers e) Facilities being near f) Barangay Patrols	a) 4 b) 2 c) 8 d) 2 e) 1 f) 1
3. How do you receive information about disaster preparedness programs of the local government of Barangay Tangos?	a) Social Media b) Public Meetings c) Posters d) Public Announcements e) Neighbors f) SMS Alerts	a) 8 b) 2 c) 4 d) 3 e) 2 f) 3
4. How do you feel about the level of communication from the local government	a) Satisfied b) Requires Improvements	a) 7 b) 9

regarding disaster preparedness in your area		
5. What medium/media do you prefer in receiving information regarding disaster preparedness?	a) Social Media b) SMS Alerts c) Public Announcements d) Flyers e) Posters f) Television Channels g) Public Meetings	a) 9 b) 6 c) 1 d) 1 e) 2 f) 2 g) 1

Table 1 presents information about the accessibility of disaster preparedness programs to residents of Barangay Tangos. The first question examines which disaster preparedness programs residents are aware of. There were five (5) common themes: residents' awareness of disaster drills got the highest frequency; it has six (6) mentions, while (4) are unaware of any disaster preparedness programs, four (4) people are aware of the flood control system, two (2) are aware of fire protection programs, one person (1) on early warning systems, and (1) person is aware of relief operations.

The second question examines how the local government's disaster program has been made accessible to residents. There were six (6) common themes: through the use of social media got the highest frequency as it has eight (8) mentions, three (3) through public announcements, two (2) people said through relief operations, two (2) through public meetings, two (2) through evacuation centers, one (1) through posters, one (1) through neighbors, one (1) through facilities being nearby and accessible, one (1) through barangay patrols, and finally, one (1) through SMS alerts.

The third question investigates how residents receive information about disaster preparedness programs of the local government of Barangay Tangos. There were six (6) common themes: eight (8) of the respondents said from social media, (4) from posters, (3) from public announcements, (3) from SMS Alerts, (2) from neighbors, (2) from public meetings, and lastly (1) from radio and tv.

The fourth question analyzes how the residents feel about the level of communication from the local government in regard to disaster preparedness. There were two (2) common themes: nine (9) of the respondents say that the level of communication from the local government requires improvements, while seven (7) of them say that they are satisfied.

The fifth question asked the respondents which medium/media they prefer in receiving information in regards to disaster preparedness. There were seven (7) common themes: nine (9) of them prefer social media, six (6) said through SMS Alerts, two (2) of them says through posters, two (2) says through television channel, one (1) says public announcements, one (1) says flyers, lastly, one (1) says they prefer public meetings.

Table 2. Perceptions of the residents in relation to the disaster preparedness initiatives of the local government

Question	Common Themes	Frequencies
6. How effective are the disaster preparedness programs implemented by the local government of Barangay Tangos in reducing the impact of disasters in your community?	a) Effective b) Requires improvements	**a) 6** **b) 10**

7. What are the challenges that the local government faces in delivering effective disaster preparedness programs?	a) Lack of participation among the residents b) Residents' level of awareness is too low c) Insufficient Resources d) Emergency Response Problems e) Weak connection between local government and residents f) Inaccessible programs g) Road Problem	a) 5 b) 5 c) 3 d) 1 e) 1 f) 1 g) 1
8. How would you describe the level of trust you have in the local government's ability to manage disaster preparedness in Barangay Tangos?	a) Trusts the government b) Minimal trust c) Unsure	a) 3 b) 8 c) 5
9. What kinds of resources do you feel are the most effective in the current disaster preparedness programs in Barangay Tangos?	a) Communication Systems b) Relief Operations c) Evacuation Centers d) Emergency Response teams e) Disaster Education f) None	a) 6 b) 5 c) 4 d) 2 e) 1 f) 1
10. How do you think the local government of Barangay Tangos can improve the disaster preparedness programs?	a) Information Dissemination Improvements b) Provide more programs c) Making the programs more inclusive d) Proper Budgeting e) Sewer Maintenance f) Regular Community Assessments g) Improve rescue Trainings h) Implement regular disaster drills	a) 4 b) 4 c) 7 d) 2 e) 2 f) 1 g) 1 h) 1

Table 2 presents the perceptions of the residents in relation to the disaster preparedness

initiatives of the local government. The sixth question explores the effectiveness of disaster preparedness programs in reducing the impact of disaster in Barangay Tangos. There are two (2) common themes: six (6) respondents say that the programs are effective, while ten (10) respondents say that the program requires improvements.

The seventh question explores the challenges the local government faces in delivering effective disaster preparedness programs. There are seven (7) common themes presented: five (5) respondents stated lack of participation among residents, another five (5) respondents say that residents' level of awareness is too low, three (3) respondents say insufficient resources, one (1) respondent say weak emergency response, one (1) respondent say weak connection between residents and local government, one (1) response for inaccessible programs, and another one (1) for road problems.

The eighth question determines how residents describe their level of trust in the local government's ability to manage disaster preparedness in Barangay Tangos. This question has three (3) common themes: eight (8) respondents trust the government, five (5) respondents minimally trust the government, and three (3) respondents are unsure whether they trust the local government's ability to manage disaster preparedness programs.

The ninth question determines different kinds of resources that the respondents feel are the most effective with disaster preparedness programs in Barangay Tangos. This question has six (6) common themes: six (6) respondents say communication system, five (5) respondents say relief operations, four (4) respondents say evacuation centers, two (2) respondents say emergency response, one (1) respondent say disaster education, and one (1) respondent answered none.

The respondents provided recommendations to the last question which explores how the local government can improve the disaster preparedness programs in Barangay Tangos. This question has eight (8) common themes: seven (7) respondents suggest making the programs more inclusive, four (4) respondents say there is a need for information dissemination improvements, another four (4) respondents recommend providing more programs, two (2) respondents say proper budgeting, another two (2) respondents suggest sewer maintenance, one (1) respondent recommends regular community assessments, another one (1) to improve rescue training, and lastly one (1) respondent recommends implementation of regular disaster drills in the community.

4. CONCLUSIONS AND RECOMMENDATIONS

To summarize, while the majority of residents of Barangay Tangos are aware of disaster drills such as earthquake drills and fire drills as well as flood control systems, many of them are still unaware of other disaster preparedness programs. Residents prefer receiving disaster preparedness information through social media and SMS Alerts, which shows the platforms' ability to reach a larger audience. Despite this, many residents believe that the local government's communication efforts should be improved, especially its accessibility.

Residents have different views about how well the local government's disaster preparedness efforts are successful in reducing the effects of disasters; some are satisfied, while others believe that they require improvements. The primary challenges to the projects' effectiveness are residents' low level of awareness, poor community participation, and insufficient resources.

Furthermore, the majority of respondents had lack of trust in the local government's ability to handle disaster preparedness, highlighting the importance of increased transparency, participation, and establishing trust efforts. Despite these challenges, residents evaluated communication channels, relief operations, and evacuation centers as the most effective resources in the current disaster preparedness programs.

With these findings, the researchers came up with the following recommendations to help improve the quality of disaster preparedness programs

implemented by the local government of Barangay Tangos.

Boost Awareness. Based on the findings of this study, residents prefer the use of social media and SMS Alerts in receiving information. Initiate a multi-platform communication strategy utilizing the said mediums to raise awareness about disaster preparedness. Details must be straightforward and comprehensible for all residents.

Improve the accessibility of the programs. Provide disaster preparedness programs through various platforms, such as online and mobile units, and arrange sessions at different times and locations to serve all residents, particularly those in vulnerable groups.

Improve the connection between the local government and the residents**.** Organize frequent meetings with barangay leaders and residents to talk about disaster preparedness strategies, gather insights, and enhance transparency. Involve residents in the decision-making process to foster trust and guarantee that the community's needs are fulfilled.

Enhance community participation. Host frequent, inclusive disaster preparedness workshops, public meetings, and practice sessions at different times to serve all residents. Involve nearby schools, companies, and community organizations to promote inclusivity.

Enhance Resource Distribution. Partner with Non-Government Organizations (NGOs) and private firms to obtain extra urgent supplies. Create a centralized resource center for barangays and make sure that barangay staff will undergo ongoing training in resource management.

Enhance the emergency response system. Create a unified communication network for immediate updates and collaboration during emergencies. Perform routine exercises with all parties involved to enhance the emergency response system.

Tackle Infrastructure Issues. Focus on repairing roads and building sturdy evacuation routes and centers to guarantee that essential infrastructure is accessible during calamities

These recommendations are based on the residents' experiences, perceptions, and recommendations. These suggestions will help in improving the government's disaster preparedness programs' accessibility, community participation and awareness, as well as emergency response, resource distribution, and addressing infrastructure issues, which will lead to a more sustainable, resilient, and responsive community.

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Effects of AI Technology, Photomath, in Mathematics Education and the Future of Math Learning

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Practical Research 1

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Abstract: This qualitative study sought the effects of AI technology in mathematics education and the future of math learning. This study used the grounded theory design to illustrate the affectation of Photomath on the two variables. The grounded theory design was also used to explore how Photomath promotes independent learning in Mathematics and how it affects students' academic integrity. This study will use purposive-stratified sampling to get sample participants from the population, purposive was used to get students who had experience with using AI tools. This study is only limited to grade 11 STEM students at San Jose Academy, other strands in Grade 11 are not asked to participate in this study. The data and information gathered were collected through conducting interviews, and Code Analysis was used to analyze the gathered data. The results were divided into two categories: positive and negative effects. The data identified four major themes under positive effects: *Easier learning, Faster comprehension of complex equations and problems, Improved free-solving skills, and Practice or Enhancement of mathematical skills.* Meanwhile, the researchers identified six major themes in the negative effects: *Laziness, Reliance on AI, Unfair advantages, Cheating or Dishonesty, Not learning, and Abandoned responsibility.* Several students regarded AI tools to be helpful in the enhancement of mathematical skills, easy tutor tools, faster building of comprehension, and mathematical education. However, it may result in students' laziness and other negative consequences, such as dishonesty and heavy reliance on AI. According to the information gathered, although AI has a few advantageous effects on both the student's integrity and their mathematical education, its negative effects are more significant.

Key Words: *Academic integrity, Application (Apps), Artificial intelligence (AI), Education, Learning, Mathematics, Photomath, Self-learning, Technology*

1. Introduction

1.1 Background of the Study

The use of technology/instruments in math is nothing new as calculators are given may it be scientific, solar, or others. However, with time passing and technology getting even more advanced the calculator is no longer used often as other things take up its space. One of those is AI apps as it is now a brand new tool to help students with different subjects, especially math. AI tools or apps are different as the user doesn't have to understand the concept and does not need to put it in the formula. With AI apps like Photomath, the user can just take a quick picture of a math problem, even worded ones and it will solve it in different kinds of formulas.

With the development of AI, apps like Photomath have been rising in usage by students since it's an easier and much faster tool than a calculator or learning how to do it. AI apps like these can be used to get an advantage in learning how to use math formulas and understand math concepts. However, with every app, there will always be downsides and disadvantages, which are mostly very apparent with AI apps. The disadvantage common with AI

apps is when the students abuse it to the point where they don't even try to learn and just use it to complete tasks or activities given. These can result in students becoming lazy and making less effort than others, while also getting fake results that do not match their knowledge about the concept. Through this study, the researchers aim to show the effects of AI applications such as Photomath in mathematics education, the future of learning math, and in the academic integrity of students.

1.2 Statement of Objectives

This study aims to determine the effect of how Artificial Intelligence (AI) can evolve, particularly the Artificial Intelligence (AI) tool, Photomath, and how it can be a credible source of information in Mathematics Education and to the future of Math Learning through education integrity.

Specifically, this sought to answer the following questions :

1. How can Photomath affect the Mathematics learning of individuals and the future of Mathematics education?
2. What are the advantages and disadvantages of assessing Photomath in the educational field?
3. What are the effects of Photomath on individuals' academic integrity?

1.3 Significance of the Study

The results of the study will be a great benefit to the following:

The Students. This study will help students achieve better mathematics outcomes and concentrate on those areas where they need more assistance while using Photomath at their own pace. It will help students know how to use photomath to enhance their skills and knowledge in math and learn math with AI in a way that wouldn't affect their academic integrity badly. And it will enlighten them on the effects of AI on learning.

The Teachers. This study will help teachers identify which students require additional assistance and enable students to lessen their reliance on AI Tools such as Photomath. Additionally, AI tools can support teachers in developing their ability to solve problems, help students figure out how to solve problems mathematically, and connect them to the real world around them.

The Inventors, Programmers, Developers, and Technologists. These terms are what people who make or develop the technology are usually called. All are separated based on their field but they correlate with technology. As AI technology has been rising in popularity, this study can help them understand AI's effects on academic integrity and learning better as both the positives and negatives are explained. This can help with how they can invent, program, develop, or even study AI technology, especially in a way that can help student learning.

The Parents: This study can help them teach their kids about AI and its negative aspects and how to integrate it into their learning positively to improve their academic integrity. It can also help the parents improve their child's academic integrity for their own and the school's sake.

Future Researchers. Future researchers who will conduct the same or similar study can benefit from this paper. This study can serve as a reference for their research and help them gather data about their topics. It can show them the negatives and positives of integrating AI into math learning, its effect on math education, and the future of math learning. This study can help them determine whether AI-like photo math effectiveness in helping students learn math in the past was greater compared to their time or is still the same. This can help them track how the technology of AI evolved, and how better it is in the future for students and their academic integrity

1.4 Scope and Delimitations

This study is going to conduct research aimed at the effect and impact of AI technology, photo math in mathematics education, and the future of math learning at San Jose Academy. This research is going to be conducted at San Jose Academy throughout the academic year of 2024-2025. The research focuses on topics commonly covered in mathematics education, such as algebra, geometry, calculus, and trigonometry. The intended participants of this research are the Senior High School Department grade 11 STEM students at San Jose Academy. This study concentrates on the effect and impact of AI technology, and photo math on San Jose Academy students.

This study is going to conduct research with questionnaires of the researchers approved by professionals. The study may be confined to the selected school, which is San Jose Academy. The data that the researcher has gathered will have a defined period, such as the academic year 2024-2025. The study only focuses on photo math and does not include other similar tools. Furthermore, the study employs specific methodologies like surveys, interviews, and performance assessments to evaluate photo math effectiveness and impact on the academic performance of students

2. Review of Related Literature and Methodology

2.1 Review of Related Literature

Local Setting

Technology in Classroom

Amparo (2022) et al. pointed out that it has a significant impact on student achievement in mathematics when technology is introduced into the classroom. The researcher pointed out that it seems more effective to integrate mathematical content and technology in such a way students can engage in playful mathematical explorations. They claimed that Photomath in teaching elementary algebra had an effect on the development of educational practices and that they could fully utilize Photomath in learning.

According to Igcasama et. al (2020), Some research shows that students check their phones in the classroom an average of more than 11 times a day. Spending up to 20% of their in-class time texting, emailing, and checking social media. Due to this, teachers are alarmed that this will cause distractions. With the given problem, teachers were able to realize how to use mobile phones and apps as a part of their lessons. As for math teachers, it is of great help that there are new ways to teach mathematics that can increase the interest and motivation of the students to learn the subject. Such as using different applications like PhotoMath. There are many debates about whether to allow phones inside the classroom because it causes distraction to students.

According to Williams (2020), When it came to finding help with arithmetic tasks, the majority of students claimed they began their search for digital tools for Mathematics elsewhere. Working on a comparable problem, checking over class notes, or asking someone else for assistance are some of the other options. In the end, all of the participants completed their math homework using digital programs or websites. The majority of the students claimed to have utilized digital applications or websites to learn the content; yet, almost all claimed to know someone who had used the programs or websites to cheat.

According to Melchor et al. (2023), The study aims to explore the integration of Artificial Intelligence (AI) in mathematics education for Generation Alpha students. It examines approaches, challenges, and considerations, and assesses the readiness of Philippine tertiary mathematics classrooms for AI integration within the context of Generation Alpha students. The integration of AI in mathematics education offers personalized instruction, fosters critical thinking skills, and prepares Generation Alpha students for the demands of the digital age.

According to William (2020), Students can access a wide range of digital programs and websites to help them complete their math tasks. The issue is with how and why people are using these apps. Websites and applications such as Symbolab, Desmos, and Photomath were among the applications and websites investigated in this study. The research then looked into why students accessed these apps and websites.

Learning with AI

According to Melchor et al. (2023), The study aims to explore the integration of Artificial Intelligence (AI) in mathematics education for Generation Alpha students. It examines approaches, challenges, and considerations, and assesses the readiness of Philippine tertiary mathematics classrooms for AI integration within the context of Generation Alpha students. The integration of AI in mathematics education offers personalized instruction, fosters critical thinking skills, and prepares Generation Alpha students for the demands of the digital age.

Foreign Setting

According to Cope et al. (2020), Students of today are more likely to acquire and explore new information on their own, therefore this effective AI tool can support students in learning more without having to wait for a teacher. Additionally, there are several challenges associated with implementing these technologies for administration, student aid, teaching, and learning.

According to Mohamed et al. (2022), The advancement of technology like artificial intelligence (AI) provides a chance to help teachers and students solve and improve teaching and learning performances. This research aims to add to the conversation by offering a complete overview of AI in mathematics teaching and learning for students at all levels of education.

According to Alqashanin (2022), The use of smart devices and programs they Mathematics instruction and learning, such as Mathway, Geogebra, Photomath, Todomath, Microsoft Math, and others, contribute to the improvement of students' academic performance and comprehension. Additionally, it saves them time and effort and, by minimizing individual differences, aids in closing the achievement gap between kids. Students who used programs for smart devices performed better than those who did not. Thus, the use of smart gadgets in learning and teaching may assist students in improving their academic performance levels, which will ultimately improve the quality of the education they receive.

According to Harry (2023), Artificial Intelligence (AI) can control and develop education through various aspects of learning such as personalized learning, intelligent tutoring systems, and automated assessment. It has the potential to contribute to advanced and integrated learning. But it can also be dangerous concerning the misuse of it by abusing and depending on using Artificial Intelligence.

Photomath

Saundarajan et al. (2020) noted that the Artificial Intelligence Photomath is a mobile app that provides step-by-step solutions for math equations and can enhance math learning for individuals. Mathematics is known as the hardest subject that many students take. With Photomath,

students' learning may have a good and bad influence from it so it's crucial to use it accordingly.

According to Zain et al. (2023), Photomath can solve mathematics problems like decimals, fractions, arithmetic, geometry, and simple linear equations. The ability of Photomath to solve problems is linked to techniques like the identification of characters for reading problem mathematics. Thousands of students use Photomath to solve problems in mathematics. However, not all assignment mathematics can be resolved by application.

Kusi et al. (2024) stated the concerns over the impact of mobile applications such as Photomath, which provide students with immediate help in solving mathematical problems, on the mathematical performance of college education students. While these apps are becoming common, there is still a significant lack of study on their efficacy in higher education.

2.2 Methodology

This chapter contains various methodologies that were used in gathering data and analysis that are relevant to the research. The methodology will include areas such as the research design, the participants of the study, instrumentation, and data gathering procedure.

2.2.1 Research design

The researchers employed the qualitative method and used the grounded theory design to illustrate the affectation of Photomath on Mathematics Learning and the Future of Mathematics Education. Researchers also used this design to explore how Photomath promotes independent learning in Mathematics. The researchers aim to understand how Photomath develops students and possesses academic integrity. Using this design, researchers can gain insight and expand further knowledge in understanding the effects of Artificial Intelligence, Photomath.

2.2.2 Population sampling

The participants of this research will be 16-17-year-old students who are bona-fide Grade 11 STEM students of San Jose Academy school year 2024 - 2025. The research participants were limited to San Jose Academy's nine Senior high school Grade 11 STEM students in Navotas City. This research study strictly requires the same number of participants ages 16-17 years old and a genuine student of San Jose Academy. This study will use purposive-stratified sampling to get sample participants from the population. The researchers used purposive to get students who had experience with using AI tools. To be specific, stratified random sampling will be used so the researchers can gather one (1) from each STEM section for five (5) participants.

2.2.3 Research instrument

The instrument that the researchers will use in this research investigation to collect the data required to achieve the study's goal is a self-administered questionnaire for the interview. To adhere to research ethics, informed permission and participant consent would be also required. Researchers will use questionnaires for their interviews to apply the research problem-related questionnaire of the study, which includes individual experiences. A section will be used to determine the participants' demographic profiles and experiences. The questionnaire will include open-ended questions. Using printed questionnaires to research the effects of AI Technology, Photomath in Mathematics Education, and Future Math Learning on the students of San Jose Academy

2.2.4 Data gathering procedure

Activities Prior:

In the preparation phase, the self-administered questionnaire will be validated with the assistance of the research professor. The activity prior will also include the canvassing of the total number of grade 11 STEM students in each section who are between the ages of 16 and 17. The researchers will use purposive-stratified sampling to conduct the research. The students are going to be selected based on their experience with AI tools.

Execution:

During the execution stage, printed questionnaires that researchers give should include a consent form for participants to read before conducting the interview with the given questionnaires that will be administered during school and completed by the target participants. The researchers will conduct the interview at San Jose Academy Navotas City

Once implemented:

After the participants answer the survey questionnaire, in the Final phase, the researchers will gather the data they got from the survey. The researchers will prepare a summary of the gathered data to achieve the precise data of the study that will answer the research's statement of the problem.

3. Results and Discussions

The primary objective of this research is to determine the effect of AI tools on mathematics education, the future of math learning, and students' academic integrity. Based on their experience, students' opinions toward AI apps like Photomath were investigated.

The findings of this study are grouped into two: The Positive, and The Negative Effects of AI tools on mathematics education and students' academic integrity. Based on the researchers' gathered data, the positive effects of AI apps on mathematics education and students' academic integrity were: Easier learning, Faster comprehension of complex equations and problems, Improved free-solving skills, and Practice or Enhancement of mathematical skills. Meanwhile, the negative effects of AI apps on mathematics education and students' academic integrity were: Laziness, Heavy Reliance on AI, Unfair advantages, Cheating or Dishonesty, Not learning, and Abandoned responsibility.

A) Academics of students (SOP #3)

Question #1: What is the impact of the Photomath App in the Teaching and Learning of Mathematics Education?

Core code - The mathematical learning of students	
Codes	*Code sign*
● Easier to learn and comprehend	Positive
● Students will not learn anything	Negative
● Improve free-solving skills, compare answers and processes, and analyze	Positive
● Can show solution	*Positive*
● Help to learn	Positive
General sign	*Positive*

Question #2: How does photo math affect the student's mathematical scores and academic performance?

Core code - Enhancement of Mathematical skills	
Codes	*Code sign*
● Help comprehend complex mathematical equations appropriate to their mind capabilities	Positive
● Becomes lazy and dependent on the app	Negative
● Help practice and enhance skills	Positive
● Can do assignments at home	Mixed
● Helpful for struggling students	Positive
General sign -	*Mixed*

Summary: The first and second questions' results showed that photomath has both negative and positive effects on mathematical learning and the future of math education. The result of the interview or the answers of the participants were mostly mixed, slightly leaning positive highlighting Photomath's ability to tutor students about math as it can show step-by-step solutions and can answer complex questions, making it easy for students to compare and analyze their answers to the AI. The negative results showed how AI tools like these can be used to just solve a math problem without learning the actual equation or solution.

Positive effects of AI apps on mathematics education

1. Easier Learning

AI like photomath can be a tool to help students learn mathematics much faster and easier. This can be done by

the student using AI tools to learn and not just answer, as these tools can show procedures or step-by-step solutions for solving mathematical problems/equations.

2. **Faster comprehension of complex equations and problems**

Faster comprehension of complex math problems and equations could be done by enhancing general mathematical knowledge or learning complex mathematics as a whole. Photomath can help with amplifying comprehension as it can show how to solve complex math problems and equations on a whim. Students can use Photomath to compare and analyze where their procedure made their answer wrong until they get the right answer.

3. **Improved free-solving skills**

Free-solving skills are where you find a solution to an open-ended math problem without rules. As Photomath can show different solutions to math problems, students can use it to find ways to solve the problem and find the equation easiest for them and fits their mathematical prowess or skill.

4. **Practice or Enhancement of mathematical skills.**

Students can enhance their mathematical skills by practicing solving mathematical problems. Photomath can help students compare and analyze their procedures and the right ones. It could also confirm whether they did it correctly and it could also provide more than one solution, depending on the branch or topic of math the problem is in.

Negative effects of AI apps on mathematics education

1. **Not Learning**

Heavy reliance on these AI tools can produce no progress on the user's skill and knowledge. Some students use these tools to just answer, not to learn, making them clueless about the thing they're solving. Take these AI tools away from them and their actual knowledge or skill will be shown, as they won't be able to solve it alone or without the help of AI, some not even being able to solve basic math problems as they used AI for everything.

B) Assessing Photomath in Educational fieldS (SOP #2)

Question #3: What are the students' assessments regarding Photomath for solving math problems using a mobile camera?

Core code - Photomath camera sensor ability	
Codes	*Code sign*
● Wrong answers due to picture or penmanship	Negative
● Accurate answers	Positive
● Show step-by-step procedure (Positive)	Positive
● Problem for teachers	Negative
● Automatically given solutions and answers	Positive
General sign -	*Mixed*

Question #4: What challenges do students face while using AI-based mathematics learning platforms?

Core code - Errors within the app	
Codes	*Code sign*
● Malfunctions or errors	Negative
● Problem with academic performance	Negative
● Problem with camera	Negative
● Needs WIFI or mobile data, can't be used in school	Negative

Core code - Errors within the app	
• It can lead to different answers	Negative
General sign -	*Negative*

Summary: The third and fourth question results showed both the advantages and disadvantages of assessing photomath in educational fields. The answers of the participants were mixed, some focusing on the errors within the application, photomath, especially with its ability to sense answers with the use of a camera or photos. The participant had mixed opinions about this ability as it is a very convenient and faster way of doing things rather than inputting the whole equation, it still showed a lot of room to improve as errors are common within it.

C) Academic Integrity (SOP #3)

Question #5: How can AI tools or apps like photo math affect a student's integrity? (Honesty, Fairness, Respect, Trust, Responsibility)

Core code - Impact on Academic Integrity	
Codes	*Code sign*
• Too reliant, not responsible for their answer	Negative
• Abandoned responsibility as a student	Negative
• Cheating or dishonesty	Negative
• Unfair advantages	Negative
• Plagiarism	Negative
General sign -	Negative

Summary: In the last question, the result showed the effect of photomath on students' academic integrity. The answers mostly being negative focusing on the core of academic integrity; Honesty, Fairness, Respect, Trust, and Responsibility. In honesty, trust and respect the answer correlating to these are the fact that people use photomath for cheating being dishonest claiming the answer is theirs while it comes from the AI. In fairness, the participant said that the students who use photomath for everything or answer individual activities gain an unfair advantage as another party is helping them with it or just bluntly showing the answer, while the other students do their activities alone. This is connected to the last term of Responsibility as students rely on AI tools too much or for all their activities they are abandoning their responsibility as students to be responsible for their grades and answers.

Negative effects of AI apps on mathematics education and students' academic integrity

2. Laziness

Laziness is the quality of being unwilling to work or use energy. Students' laziness makes them use apps like Photomath, ChatGPT, or other AI apps to do the work for them. When students find these apps that can do their work in seconds it makes them feel like they should just use these tools rather than “wasting their time” on trying to do their work where these tools can do the same quality of work, sometimes even better.

3. Heavy Reliance on AI

Students can sometimes rely on tools/equipment like calculators to help them solve problems or do the work, though heavy reliance on these tools can show a lack of progress within the topic as they can’t do or solve without them. Heavy reliance on AI is even worse as AI can just solve the problem without the user even doing anything but inputting the problem or equation. Photomath makes this worse as all it takes is a clear photo of the equation or math problem and it will solve it for you, it could also do word problems making it deadlier for students as they can even not read the question but just pic it for the AI to solace it for them.

4. Unfair advantages

Reasons for why AI is seen as unfair is because some do the work without the help of AI. Using AI can be seen as unfair as it gives you all the things you need to be able to solve or answer any given question, photomath even providing solutions. Students using AI to help with

assignments is unfair to others as some don't even have access to it and it gives you better grades not according to your work but the AI's work. It's also a misinterpretation of knowledge as it would appear that they possess the knowledge or skill they haven't developed themselves.

5. Cheating or Dishonesty

One of the most known academic integrity is honesty. Since AI is not allowed for students some might lie to just use these tools for their advantage. Submitting work done by AI is dishonest and considered cheating as you are not technically showing your work but the AI's. Essentially submitting someone else work without putting in effort, gives them an unfair advantage over students who solve it without AI.

6. Abandoned Responsibility

A student's responsibility is to be respectful, punctual, and engaged in learning. It also means taking responsibility for grades and actions and being accountable for the consequences, meeting academic expectations, completing assignments on time, participating in class, and doing their best. These responsibilities are important for the student's growth and development as how a student handles these responsibilities shapes how they handle future ones. AI makes it difficult for a student to hold these responsibilities as the negative effects of AI are the complete opposite of these responsibilities. Photomath can make them not take responsibility for their grades as they're not doing the work themselves.

4. CONCLUSION AND RECOMMENDATIONS

4.1 Conclusion

The researchers have explored the impact of those AI Tools such as Photomath on Grade 11 STEM students at San Jose Academy for the school year 2024-2025. In this study, the researchers discovered how it affects the students Academic Performances and it also revealed the positive and negative impact on students performance.

By the use of qualitative research and a thorough study of related literature. The findings have shown both positive and negative impacts of photomath on students' well-being. On the positive side, AI tools like photomath are used to check their answer and do advanced learning. However, the study also showed a negative side, such as students using photomath to cheat and rely their responsibility on it. The findings have shown that the majority of effects that Grade 11 STEM students experience in Photomath are negative. These data or findings were able to answer our research quest based on the opinions and experiences of students with photomath.

Overall with this study, the researchers were able to understand and deepen their knowledge of AI technology being implicated in the educational field. With this study, the researchers were able to get an answer for their statement of objective. The researchers believe that to have AI be better for students, they will need to improve its technology as a whole so that in the future it can be installed in schools without its disadvantages and negatives overshadowing its positives and advantages.

4.2 Recommendation

This paper emphasizes the effects of AI Technology, Photomath, in Mathematics Education and the Future of Math Learning of Grade 11 STEM students at San Jose Academy, therefore the researchers provided recommendations that might contribute to the following:

Students:
1. Students should recognize the effects of using AI Technology, specifically photomath in mathematics education and how they learn math.
2. Students should understand the advantages and disadvantages of AI tools like photomath in education and acknowledge the limitations of Photo math.
3. Students should always prioritize understanding how AI tools like photomath affect one academic integrity and how to use AI tools for their academics without negatively impacting their academic integrity

School:
1. Schools should acknowledge the effects of using AI apps like photo math and how it affects how a student can learn and how it can affect the future of mathematics education.
2. Schools should try to implicate AI tools in the educational field while making sure that the negative effects are less impactful and the positive ones more transparent and effective, specifically photo math
3. Schools should promote transparency for every student who uses AI technology. They should always show solutions and manage to explain the given equation to better improve their academic integrity and mathematical skills.

Future researchers:
1. Future researchers should expand on how AI can affect the future of mathematics education and compare AI technology in their time to the past with studies.
2. Future researchers may additionally examine the study's results and conclusions to better show the advantages and disadvantages of AI tools in the educational field
3. Future researchers should focus on the effects of AI tools like these on the academic integrity of students and how they can be used for the betterment of the student's integrity.

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Gadgets as Academic Tools: Exploring the Effect on Grade 12 STEM Students' Research Writing at San Jose Academy

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Abstract:

The rapid advancement of technology has profoundly impacted academic writing, especially among STEM students. This study investigates the influence of devices—such as smartphones, tablets, and laptops—on research writing, highlighting both their advantages and challenges. Utilizing a qualitative approach, data were collected to evaluate how these digital tools enhance grammar, structure, efficiency, and organization in research writing, while also uncovering potential drawbacks, such as distractions, over-reliance on automation, and diminished critical thinking. The findings indicate that while gadgets are essential academic tools that streamline research and improve writing quality, they also present challenges like social media distractions, procrastination, and dependency on AI-driven writing aids. To mitigate these issues, this study advocates for a balanced approach to gadget usage, emphasizing digital literacy, critical thinking, and responsible integration of technology within academic environments. Educators and school administrators are urged to establish policies and programs that promote effective gadget use while minimizing its adverse effects on students' academic performance. Future research should concentrate on developing long-term strategies to reduce digital distractions and further enhance the role of technology in academic success.

Keywords: Gadgets, Research Writing, STEM Students, Digital Literacy, Critical Thinking

1. INTRODUCTION

1.1 Background of the Study

The rapid advancement of technology has significantly influenced the education sector, particularly in STEM (Science, Technology, Engineering, and Mathematics) fields. As students tackle demanding academic work, they increasingly depend on digital tools such as laptops, tablets, and smartphones for research, writing, editing, and collaboration. These gadgets have revolutionized traditional writing processes by enhancing accessibility, efficiency, and productivity.

Academic writing, which includes research papers, reports, and essays, is a critical skill for STEM students. With the growing dependence on technology in education, it is essential to

examine how STEM students incorporate digital tools into their academic writing. These tools offer several benefits, including faster information retrieval, seamless document editing, and improved collaboration with peers. However, potential drawbacks, such as distractions, reduced critical thinking due to automation, and over-reliance on digital resources, also need to be considered.

Studies show that digital technologies are significantly shaping student writing. A survey of 2,462 Advanced Placement (AP) and National Writing Project (NWP) teachers highlights how tools like social networking sites, cell phones, and online platforms have expanded students' audiences, encouraged personal expression, and fostered collaboration. According to the findings, 96% of teachers agree that digital tools enable students to share their work with a broader and more diverse audience, 79% believe these tools promote greater collaboration, and 78% say they enhance creativity and self-expression.

However, educators also recognize the challenges these tools bring. Many students find it hard to distinguish between formal and informal writing, often using casual language in academic work. There is also a growing need to teach students how to adapt their writing for different audiences and contexts, as short-form digital communication may limit their ability to develop longer, more critical pieces.

This study aims to explore the role of digital tools in the academic writing process of STEM students by assessing their impact on productivity, efficiency, and writing quality. By understanding both the advantages and challenges of technology use, this research seeks to provide insights into how digital tools shape STEM students' academic performance and research writing practices.

1.2 Statement of the Objectives

The increasing prevalence of digital devices such as laptops, tablets, and smartphones in educational environments has sparked a growing interest in understanding their influence on students' academic performance. While these gadgets have become integral tools for research, writing, and productivity, there's still not enough research on how they specifically impact STEM students' academic performance. Given that STEM fields demand critical thinking, precision, and problem-solving skills, it's important to better understand how these technologies influence the students' abilities to succeed in their studies.

This study aims to provide a comprehensive analysis of how the use of gadgets like laptops, tablets, and smartphones affects STEM students academic outcomes, specifically focusing on writing quality, research productivity, and academic efficiency. It seeks to explore the following research questions:

1. How do gadgets like laptops, tablets, and smartphones influence the quality of STEM students' research writing?
2. What do students see as the benefits and drawbacks of using these gadgets for academic tasks in research writing?
3. What challenges do STEM students face when using gadgets for academic purposes?

1.3 Scope and Delimitations

This research aims to determine the effectiveness of utilizing gadgets such as smartphones, laptops, tablets, and other digital tools for academic purposes. The study will specifically focus on 15 Grade 12 STEM students from San Jose Academy who rely on gadgets to enhance productivity, efficiency, and the quality of their written work.

The study will explore how gadgets assist in academic activities such as research, writing, reading, editing, and collaboration. It will also examine how STEM students use these gadgets effectively without misusing them. Data collection will primarily involve interviews to assess the efficiency of gadgets in academic performance of Grade 12 STEM students.

The study will not examine broader factors such as the social, cultural, or environmental impacts of gadget use. It will also exclude the intended purpose of various gadgets beyond academics. Additionally, the research will not include students from other strands, such as Accountancy, Business and Management (ABM) and Humanities and Social Sciences (HUMSS), nor will it consider gadget use outside of academic settings.

This study will be conducted within San Jose Academy, focusing solely on Grade 12 STEM students due to their higher engagement with technological tools in academic activities.

1.4 Significance of the Study

This study focuses on the effects of gadgets on the research writing process of STEM students and explores how these devices can assist the students in creating their academic works. The findings of this study will be beneficial to the following:

Students. This research provides insights into how gadgets influence their research writing, efficiency, and overall productivity. By understanding both the advantages and challenges of using digital tools, students can develop strategies to optimize their writing process while minimizing over-reliance on technology. It encourages responsible and effective use of gadgets to enhance academic performance.

Educators. This study offers a deeper understanding of how gadgets impact students' academic writing and research skills. With this knowledge, educators can refine their teaching approaches, integrating strategies that promotes critical thinking, information literacy, and effective research writing.

Researchers. This study contributes to the existing body of knowledge on technology integration in education, providing valuable data and insights for future research. The findings will inform the development of evidence-based strategies for promoting effective technology use in academic writing.

Administrators. This study provides insights that can aid in developing academic policies and curriculum enhancements. By understanding the impact of gadgets on STEM students research writing, administrators can promote responsible technology use, balance digital integration with traditional learning methods, and ensure that students develop strong research and writing skills.

2. METHODOLOGY AND RRL

2.1 Review of Related Literature

In today's digital era, technology plays a vital role in education, particularly in research writing. The integration of digital platforms, applications, and tools has transformed the way students acquire, process, and present information. Numerous studies have explored the impact of digital literacy and note-taking on students' academic writing skills, particularly among STEM students who engage in complex research work. This review presents relevant literature on the role of digital note-taking, digital literacy, and writing assistance tools in improving research writing skills among senior high school STEM students.

Digital note-taking applications have been widely recognized as effective self-regulation tools that enhance academic performance and research writing skills. According to a study published in the Journal of Educational Technology & Society, students who utilized digital note-taking strategies exhibited improved organization, information retention, and comprehension of complex topics (Calamlam, 2023). The study highlights that digital note-taking fosters active learning, as students can easily categorize, annotate, and retrieve information, which directly contributes to better writing proficiency. Furthermore, the use of these tools allows for structured and well-organized research outputs, benefiting STEM students who often deal with technical and data-heavy research work.

The role of digital literacy in academic writing has also been extensively studied. Baterna et al. (2020) assessed the digital literacy levels of STEM senior high school students and found a strong correlation between high digital literacy and improved academic performance, particularly in writing tasks. The study emphasizes that students who possess advanced digital literacy skills can efficiently use various online resources, citation management software, and word-processing tools to enhance the quality of their research papers. The researchers recommend integrating digital literacy training into the curriculum to further equip students with the necessary skills for academic writing.

Similarly, another study investigated the impact of digital literacy on students' communication skills, including academic writing (Calamlam, 2023). Published in the International Journal of Educational Research, the research found that students with higher digital literacy levels demonstrated better coherence, clarity, and structure in their written work. The study suggests that exposure to digital platforms fosters better engagement with academic content, allowing students to present their ideas more effectively in research writing.

With the increasing reliance on technology, many students and faculty members now utilize writing assistance tools to improve the quality of their research outputs. Llego (2023) conducted a study on the utilization of writing assistance tools among faculty researchers in selected higher education institutions in the Philippines. Using text-mining techniques, the research found that such tools play a crucial role in enhancing the coherence, grammatical accuracy, and overall quality of academic writing. The study highlights the significance of these tools in providing real-time feedback, correcting language errors, and improving the structure of research papers. Given the growing importance of digital tools in research writing, the findings suggest that integrating writing assistance software into students' learning processes can enhance their academic writing skills.

Despite the advantages of digital tools, senior high school students still face challenges in research writing. A study conducted by Paurillo (2019) assessed the research writing abilities of students from the perspective of their teachers. Published in PEOPLE: International Journal of Social Sciences, the study identified common difficulties, such as poor organization of ideas, lack of coherence, and improper citation practices. Teachers emphasized that while students have access to digital resources, many still struggle with structuring their research papers effectively. The study suggests that integrating digital tools, such as citation managers and grammar-checking software, can help address these challenges and enhance students' writing competencies.

The advancement of digital technologies has transformed students' academic writing practices, particularly in STEM education. König, Jäger-Biela, and Glutsch (2020) examined how digital technologies influence students' literacy skills, emphasizing the benefits of virtual reality (VR) and online platforms in enhancing writing comprehension and engagement. Their study highlights how technology fosters accessibility to educational resources, making research and academic writing more efficient. However, they also warned against excessive reliance on digital tools, which may hinder students' ability to develop independent critical thinking.

Similarly, Ferdousi (2022) explored students' acceptance of digital technologies in academic writing. The research evaluated various theoretical models explaining technology adoption in education and identified essential tools such as grammar checkers, citation generators, and collaborative writing platforms. The study also emphasized the significance of digital literacy in maximizing the benefits of these tools while addressing potential drawbacks, such as overdependence on automation in writing.

With the rise of artificial intelligence (AI) in education, its role in academic writing has become a subject of interest. Urun (2023) investigated AI-powered writing tools like Grammarly and ChatGPT, highlighting their ability to enhance writing quality, research productivity, and proofreading. While the study acknowledges the efficiency and accessibility provided by AI, it also raises concerns about students' dependency on such tools, which may lead to a decline in originality and critical thinking. The study suggests the need for responsible AI integration in academic writing to maintain academic integrity and independent learning.

The increasing use of digital tools in education has also influenced how writing is taught in schools. Purcell, Buchanan, and Friedrich (2013) conducted a large-scale survey on Advanced Placement (AP) and National Writing Project (NWP) teachers regarding students' writing habits. The study found that 96% of teachers believe digital tools encourage students to engage more deeply in writing, promoting creativity and wider audience engagement. However, the research also highlights a downside—students often struggle to distinguish between formal and informal writing styles, affecting their ability to produce structured academic papers. To address this, educators stress the importance of balancing digital tool usage with traditional writing instruction.

Digital tools have become essential in STEM education, supporting not just writing but also research and problem-solving. Kovács and Tóth (2023) examined how digital tools impact creativity among STEM students, particularly in

the field of tribology. Their findings indicate that digital tools improve creativity, problem-solving skills, and collaboration while making documentation of research more effective. However, the study also discusses challenges such as digital distractions and over-reliance on technology, recommending a balanced approach to integrating digital tools into STEM curricula.

The review of related literature highlights the significant role of digital tools in enhancing research writing skills among senior high school STEM students. Both local and international studies highlight the benefits of digital note-taking, digital literacy, and writing assistance tools in enhancing organization, comprehension, and writing proficiency. However, challenges such as excessive dependence on technology, difficulties in structuring research papers, and the inability to distinguish formal from informal writing persist.

To fully harness the advantages of digital tools while promoting independent learning and academic integrity, a well-balanced and structured integration into the curriculum is necessary. Future research should focus on developing effective strategies for optimizing digital tool use in STEM education to further strengthen students' research writing capabilities.

2.2 Methodology

2.2.1 Research Design

The researchers used qualitative data collection as it is an effective method for achieving the study's objectives, which are to explore the impact of gadgets as academic tools on STEM students' research writing. With this method, the interpretation of the data gathered from the participants through interviews will provide meaningful insights that address the study's objectives.

2.2.2 Population Sampling

This study used purposive sampling to select fifteen (15) participants. Purposive sampling was a non-probability sampling method where participants were chosen based on specific criteria relevant to the research objectives. In this case, fifteen (15) Grade 12 STEM students who actively used digital devices for research writing were selected to ensure that the sample reflected the experiences and perspectives necessary to address the research questions. This method was appropriate for the study as it focused on individuals who could provide rich, detailed, and meaningful insights into the impact of digital device usage on research writing.

2.2.3 Research Instrument

The researchers used structured interviews to gather data for this study. Interviews allowed participants to share their experiences and insights on the research topic. A total of nine (9) standardized questions were prepared to ensure consistency across all participants, focusing on the benefits, challenges, and overall impact of gadget use on research writing among STEM students. This method ensured the collection of detailed and relevant information to address the study's objectives.

2.2.4 Data Gathering Procedure

This study utilized two (2) methods to collect data regarding the impact of gadgets as academic tools on STEM students' research writing. The researchers conducted an online and structured interviews with selected respondents. The interview form was distributed via digital platforms, allowing participants to

answer at their convenience, while the interviews were held virtually to gain deeper insights into their experiences. Before participation, informed consent was obtained to ensure ethical compliance. Researchers provided necessary instructions and clarified questions when needed. Confidentiality and anonymity of respondents were strictly maintained.

3. RESULTS AND DISCUSSION

To promote clarity and conciseness in presenting the collected information, the researchers utilized a tabular format to display the common themes and codes derived from participants' responses, along with their respective frequencies. Considering the diversity of responses, the nine (9) questions were organized into three (3) main sections.

Table 1. *How do gadgets such as laptops, tablets, and smartphones influence the quality of STEM students' research writing?*

Questions	Common Themes	Code Frequencies
1. Which gadgets do you use most frequently for academic tasks?	a. Smartphone b. Tablet c. Laptop	a. 12 b. 2 c. 7
2. How do you typically use gadgets for research and academic writing tasks?	a. For research b. For organizing academic tasks	a. 9 b. 6
3. Which writing-related tools or apps do you typically use, and how have they influenced your writing?	a. Google Docs b. Grammarly c. Quillbot d. Canva	a. 8 b. 7 c. 3 d. 1
4. Do you believe gadgets have made your research process more quality? Why or why not?	b. Improves research writing b. Quick access to credible sources	a. 9 b. 6

Table 1 presents various questions that explore how gadgets, such as laptops, tablets, and smartphones, influence the quality of STEM students' research writing.

Question 1 explores which gadgets students use most frequently for academic tasks. There were three (3) common themes: Smartphones with the highest frequency of twelve (12) mentions, followed by Tablets with two (2) mentions, and Laptops with seven (7) mentions.

Question 2 examines how students typically use gadgets for research and academic writing tasks. There were two (2) common themes: For research with nine (9) mentions and For organizing academic tasks with six (6) mentions.

Question 3 identifies the writing-related tools or apps students commonly use and their impact on writing. There were four (4) common themes: Google Docs with eight (8) mentions, Grammarly with seven (7) mentions, QuillBot with three (3) mention, and Canva with one (1) mention.

Question 4 explores whether students believe gadgets improve their research quality. There were two (2) common themes: Improves research writing with nine (9) mentions and Quick access to credible sources with six (6) mentions.

Table 2. *What do students see as the benefits and drawbacks of using these gadgets for academic tasks in research writing?*

Questions	Common Themes	Code Frequencies
5. How do you think using gadgets has affected the quality of your research writing in terms of grammar, structure, and coherence?	a. Grammar and sentence structure improvement b. More efficient writing process c. Assists in checking citations	a. 8 b. 7 c. 4
6. What are the primary benefits you experience when using gadgets for research writing and academic tasks?	a. Enhances writing and information accuracy b. More organized research process c. Helps reduces error	a. 7 b. 6 c. 5
7. Do you feel that using gadgets affects your critical thinking and problem-solving skills when conducting research or writing?	a. Over-reliance on gadgets weakens critical thinking b. Reduces independent thinking c. Fake and unreliable sources could be obtained	a. 8 b. 4 c. 3

Table 2 contains various questions that examine the benefits and drawbacks of using gadgets for academic tasks in research writing.

Question 5 investigates how gadgets have affected students' research writing quality in terms of grammar, structure, and coherence. Three (3) common themes emerged: Grammar and sentence structure improvement with eight (8) mentions, More efficient writing process with seven (7) mentions, and Assists in checking citations with four (4) mentions.

Question 6 explores the primary benefits of using gadgets for research writing and academic tasks. Three (3) common themes were identified: Enhances writing and information accuracy with seven (7) mentions, More organized research process with six (6) mentions, and Helps reduce errors with five (5) mentions.

Question 7 examines whether students feel that using gadgets affects their critical thinking and problem-solving skills when conducting research or writing. Three (3) common themes emerged: Over-reliance on gadgets weakens critical thinking with eight (8) mentions, Reduces independent thinking with four (4) mentions, and Fake and unreliable sources could be obtained with three (3) mentions.

Table 3. *What challenges do STEM students face when using gadgets for academic purposes?*

Questions	Common Themes	Code Frequencies
8. How often do you experience distractions when using gadgets for academic tasks? How do these distractions impact your writing?	b. Social media notifications b. Procastination due to excessive use of gadgets c. Cramming and rushed academic works	a. 10 b. 7 c. 6
9. What challenges or difficulties do you face when using gadgets for academic writing, such as distractions or reliance on automation?	a. Distractions lead to poorly written research b. Loss of focus while writing c. Excessive reliance on gadgets and AI	a. 6 b. 5 c. 5

Table 3 presents a variety of questions that investigate the challenges faced by STEM students when utilizing gadgets for academic purposes.

Question 8 delves into the frequency of distractions encountered by students while using gadgets for academic tasks and their effects on writing. Three prevalent themes emerged: Social media notifications, which were mentioned ten (10) times; procrastination attributed to excessive gadget use, noted seven (7) times; and the tendency to cram and produce rushed academic work, cited six (6) times.

Question 9 explores the specific difficulties students encounter when employing gadgets for academic writing, including issues like distractions and the reliance on automation. Three main themes were identified: distractions resulting in poorly crafted research, mentioned six (6) times; loss of focus while writing, mentioned five (5) times; and excessive dependence on gadgets and AI, also noted five (5) times.

4. CONCLUSIONS AND RECOMMENDATIONS

Conclusion

This study examined the influence of gadgets on STEM students' research writing, highlighting both the advantages and challenges associated with their use. The findings indicated that while digital tools enhance aspects such as grammar, structure, efficiency, and organization in research writing, they also pose challenges like distractions, diminished independent thinking, and excessive reliance on automation. Gadgets, including smartphones, tablets, and laptops, proved to be vital in facilitating academic tasks, allowing access to research materials, and improving the overall writing process. However, issues such as social media distractions, procrastination, and dependence on AI tools were identified as significant barriers to maintaining academic integrity and fostering independent learning.

To maximize the benefits while minimizing the drawbacks, students should adopt a balanced approach to gadget usage, incorporating critical thinking and self-discipline into their academic writing practices. Educators and institutions ought to consider implementing guidelines for responsible use of digital tools to promote academic integrity and enhance students' writing skills. Future research could further explore strategies to reduce digital distractions and optimize technology usage within academic settings.

Recommendations

The researchers advocate for further studies to understand the role of gadgets as academic tools and their impact on students' research writing skills. This should include assessing their benefits for productivity and exploring challenges from excessive usage. Such insights can help develop strategies to maximize technology's benefits while minimizing potential drawbacks on academic performance.

Students. The researchers of this study recommend that students leverage gadgets as essential academic tools while exercising discipline in their usage. It's important for them to establish clear boundaries to minimize distractions—such as social media—that could interfere with their research and writing tasks. Furthermore, students should cultivate digital literacy skills, including the ability to discern credible sources and accurately cite references, in order to enhance the quality of their academic work.

Educators. The researchers recommend that educators incorporate technological advancements into their teaching strategies to improve students' research writing skills. By offering guidance on the effective use of digital tools and emphasizing critical thinking and proper information evaluation, educators can help students create high-quality academic work. Additionally, it is essential to establish policies that encourage responsible use of devices in academic environments.

School Administrators. We recommend that school administrators implement policies and initiatives that promote responsible gadget usage among students. Conducting workshops and seminars focused on digital literacy, research writing, and time management can provide students with essential skills for effective technology use. Additionally,

investing in reliable digital resources, such as online libraries and academic software, can significantly enhance students' research capabilities.

Future Researchers. It is advisable to undertake further research on the long-term effects of gadget use on students' academic performance, with particular emphasis on research writing. Investigating various educational levels and disciplines could offer a more comprehensive understanding of technology's impact on learning. Furthermore, studies aimed at developing strategies to reduce distractions caused by gadgets may enhance students' focus and productivity in academic endeavors.

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"Gadgets as Academic Tools: Exploring the Effect on Grade 12 STEM Students' Research Writing at San Jose Academy"

Submitted by *Quincy Keith E. Baldueza, Andrew Galvez, John Abdiel S. Sese, Marrion Elise N. Tagle, and Kristan Paul Tuazon* in partial fulfillment for requirements for Practical Research 1 for 2024-2025.

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Enhancing Laboratory Safety: Examining Essential Safety Measures for Handling and Using Laboratory Equipment Among Grade 12 STEM Students at San Jose Academy

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Abstract: This study explores the safety measures for handling and using laboratory equipment among the Grade 12 STEM students. The primary objective of this study is to examine and enhance the safety awareness of STEM (Science, Technology, Engineering, and Mathematics) students, focusing on their knowledge, attitudes, and behavior regarding the safety protocols inside the laboratory setting. Considering the possible mishaps that stem from practical procedures in STEM, it is important to establish the students' safety understanding and awareness in order to mitigate accidents and improve safety measures. This study aims to gauge the comprehension of the safety instructions, the level of compliance with the use of PPE, the readiness or preparedness to deal with emergencies, and the ability to carry out risk assessment in practical work by the students. This study is participated in by nine (9) Grade 12 STEM students that met the researchers target respondents. The researchers used a qualitative approach utilizing semi-structured interviews with open-ended inquiry within the questionnaires for acquiring the study's objectives and used convenient sampling to ensure relevant experience with the laboratory equipment and hazards. The results have concluded with 6 out of 9 (66.6%) of students declaring themselves capable of following instructed protocols and 7 out of 9 students (77.78%) proclaiming their awareness regarding safety laboratory equipment handling. This conclusion illustrated a clear discrepancy between awareness and practices inside the laboratory. This is shown by the reports of mishaps and accidents contradicting the high percentage of students proclaiming their awareness in procedural safety.

Keywords: Safety awareness; safety hazards;

1. INTRODUCTION

The laboratory setting is essential to a student's learning environment. As an important component of the STEM strand, it fosters students with practical experience by applying science to real-world experiments. But experimentation comes with inherent risks; in particular, students who lack experience may fail to adhere to safety protocols and may lack awareness regarding laboratory apparatuses. This study examines the preparedness and safety awareness of Grade 12 STEM students at San Jose Academy in Navotas City. Specifically focusing on their ability to handle the laboratory with awareness and with adherence to safety procedures. Effective laboratory safety will not only lessen the casualties of accidents and injuries but also cultivate responsible STEM students for their future careers. This research investigates the capability of Grade 12 STEM students at San Jose Academy to identify laboratory hazards and risks, proper utilization and comprehension of personal protective equipment (PPE), proper knowledge in laboratory equipment handling, maintenance, and practices, and following existing safety protocols or procedures inside the laboratory setting. By understanding the level at which the STEM students perform, we can assess and identify gaps in existing safety protocols to raise awareness and improve student competency in the laboratory environment.

1.1 Background of the study

The laboratory environment is a crucial part in a student's learning and scientific explorations. Particularly, STEM students are presented with inherent risks when handling laboratory experiments.

This study seeks to analyze the preparedness and awareness of Grade 12 STEM students from San Jose Academy. Focusing on their ability to comprehend and follow safety precautionary measures and the condition to maintain laboratory equipment. The context within the background is an essential part of the study and therefore helps in shaping the student's experience correlating to their ability to follow safety protocols and the understanding of laboratory equipment for maximum usage efficiency. This comprehensive approach aims to identify potential gaps in currently existing safety protocols to improve awareness for safer laboratory experiences

This study seeks to measure student preparedness by answering questions such as "What is the capacity in which Grade 12 students are able to recognize laboratory risks and potential accidents?" and "Do they have sufficient background knowledge of laboratory equipment and proper usage of personal protective equipment such as lab gowns when required?" And even the adequate disposal of substances will be investigated. To even deepen our understanding, an interview of Charles Alison Rivera from the science department of San Jose Academy was conducted. Valuable insights with questions such as "Does the student have the capacity to recognize laboratory mishaps?". These contexts are essential to achieve our goal of raising awareness of safety precautionary measures with laboratory equipment.

The importance of this study lies in its analysis of the existing safety protocols, identifying the gaps and areas that need improvements, and raising awareness to create a safe laboratory experience and environment.

1.2 Statement of the Objectives

The objective of these questions is to assess the competencies of students in regards to proper handling of laboratory equipment and their awareness towards safety measures with risk assessment in mind.

1)What is the capacity in which Grade 12 students are able to recognize laboratory risks and potential accidents?
2) How aware are students of precautionary measures when dealing with laboratory equipment?
3) Do students follow safety measures when handling laboratory equipment?

1.3 Scope and Delimitations of the study

This study focuses on the safety measures of Grade 12 STEM students of San Jose Academy in terms of handling, use, and maintenance of laboratory equipment provided by the school. It examines protocols for safe equipment usage, proper storage, the importance of personal protective equipment (PPE), and emergency procedures. The research respondents are the students from Grade 12 STEM of S.Y. 2024-2025 with the total number of fifteen (15) participants.

This study aims to inform the students about the safety measures needed in the handling, use, and maintenance of the laboratory equipment. The participants will consist of students from sections St. Anselm, St. Agatha, St. Clare, and St. Peregrine.

1.4 Conceptual Framework

INPUT	PROCESS	OUTCOME
Socio-demographic profile of the respondents ● Name ● Section ● Students incompetence in laboratory equipment handling procedure	● Interview ● Audio recording ● Online meeting	● Enhance awareness of safety regulations. ● Improve student competency in the handling of laboratory equipment.

1. 5 Significance of the Study

This study is significant to bring awareness to safety protocols and student practices inside the laboratory, addressing potential risks and improving the learning environment at San Jose Academy. This study will be beneficial to the following :

Students — This study will help students gain enhanced safety awareness by understanding the proper use and handling of laboratory equipment that

will help them minimize the risk of accidents, be familiar with the use of equipment, and ensure a safe working environment for them.

Teachers — This study will serve as their guide on how to provide clearer, more detailed guidance on how to use laboratory tools correctly and safely, and by understanding and emphasizing the importance of safety in laboratory settings, the teacher can reduce the likelihood of accidents.

School Administrators — This study will guide them to enhance safety regulations and improve student competency in handling laboratory equipment, which will minimize the risk of accidents and create a safer learning environment for all.

Parents — This study will increase their awareness of safety regulations and improved student lab skills will give you peace of mind knowing your child is learning in a secure and well-equipped environment.

Future Researchers — This study will serve as a valuable resource and foundation for future research on laboratory safety, student preparedness, and effective safety interventions.

2. METHODOLOGY and RRL

2.1 Review of Related Literature

LOCAL LITERATURE

According to Bona et al. (2021), the results obtained were that the students had less knowledge about chemical hazards and symbols of warning. The attitude towards chemical safety by the students was also found to be poor. However, the safety practice by the students was fair. Faculty and staff, on the other hand, showed relatively better attitudes and practices. The authors of this study pointed out the requirement of more effective education and training programs for enhancing safety awareness and accurate handling of laboratory equipment. Considering that the goal of Bona et al.'s research is to understand whether STEM students adhere to safety protocols when carrying out laboratory procedures; the study supports the debate that a high number of students are ill-equipped and lack adherence to safety protocols. This also calls for the structured initiation of systematic safety training approaches and an emphasis on enforcing appropriate laboratory practices to avert risks and enforce safety at learning institutions.

According to Villanueva (2018), in assessing the safety practices of biology learners in laboratory setups in Cebu Doctors' University, a general summary concluded that, by far, their observance of personal protective equipment such as biosafety management is most of the time not implemented on a regular basis at other places, mostly concerning laboratory setup, workplace practice, and some equipment use during their performance within the laboratory area. This therefore implies that even though the students are aware of the laboratory safety, they do not implement certain critical safety practices, such as personal protection and overall safety management. The research recommended a tougher implementation of the laboratory safety laws by teachers, updating the biosafety manuals, and further studies to dissect further the attitudes of safety among students and their lecturers. These findings will have a resonance in the objective understanding of the capabilities of students studying in the laboratory for the purposes of STEM in safely handling and using the apparatus. By assessing whether the student is following or not the required safety procedures established, your research will be instrumental in developing further enhanced safety features, just as the intervention approach that Villanueva (2018) suggests.

According to Zubrick (2016), The Organic Chem Lab Survival Manual serves as a foundational guide for laboratory safety and the proper handling of laboratory equipment. The manual provides detailed instructions on the correct use of apparatus, interpretation of spectroscopy data, and adherence to essential safety practices. By emphasizing both fundamental and advanced laboratory techniques, the book aligns with the objective of improving students' knowledge and practice of laboratory safety. The comprehensive approach offered in this manual highlights the necessity of equipping students with hands-on skills and theoretical knowledge to ensure safe laboratory environments.

According to Love et al. (2020), a comparative study explored the integration of safety education in STEM curricula across various educational institutions. The researchers found that while many programs acknowledged the importance of safety, the actual implementation of safety training

varied significantly. The study concluded that a standardized approach to laboratory safety education is essential for fostering a safe learning environment. By promoting a consistent framework, institutions can better prepare students for the risks associated with scientific experimentation.

According to the Department of Education (2006), providing essential safety equipment and materials in STEM laboratories is crucial. The guidelines outlined the necessity for safety goggles, proper chemical storage, and the display of safety rules within laboratories to promote a culture of safety among students. Implementing these guidelines is vital for minimizing hazards and ensuring that students are aware of the potential risks associated with laboratory work.

FOREIGN LITERATURE

According to Geraldez et al. (2023), accreditations that are based on standards and evidence-based laboratory management are, as noted by Horvarth et al. (2005), "valuable tools for initiating improvement cycles by regularly challenging and evaluating current procedures." These accreditations help identify gaps in laboratory professionals' knowledge and skills, as well as ensure quality control in the tests conducted. The implementation of safety protocols in laboratories by medical professionals is influenced by sociodemographic factors, as shown in the study by Dereje et al. (2018), which found a strong connection between work experience, educational level, and adherence to safety measures. As emphasized by the National Research Council (US) Committee on Prudent Practices in the Laboratory, failure to follow basic safety protocols can lead to risks associated with chemical, flammable, reactive, and explosive substances, as well as hazards from nanomaterials, biohazards, and radioactivity. The National Research Council (US) Committee on Prudent Practices in the Laboratory tells us that a major aspect of planning experiments is estimating the hazards and potential risks of laboratory procedures and chemicals. It is essential to provide the basic principles for estimating the risk posed by toxic chemicals, management of explosive, reactive, and flammable chemicals, physical hazards, nanomaterials, biohazards, radioactive risks, and toxic effects of laboratory chemical exposure. This information allows researchers to estimate chemical hazard risks and select the appropriate measures of safety, all within laboratory hazard and risk assessment guidelines. Nevertheless, the risk-hazard relationship may vary with the work environment (Hughes et al., 2011). Typically, risk management involves the identification of the hazards, evaluation of the risks involved, modification of the situation until the risk is acceptable, and management for removal or reduction of residual risks.

According to Abdurakil et al. (2017), experiments that involve direct experience in hands-on activities ensure a deeper understanding of concepts but may put the students at risk, thereby undermining their involvement and performance. The proper training of students on equipment handling is an effective safety precaution against accidents while enhancing their confidence and efficiency in performing experiments. Integrating the safety protocols in laboratory work helps maximize learning within a safe and productive scientific exploration environment, hence, our study would be developed in line with this to give practical recommendations that should be enhanced.

From Mason et al. (2016), enhancing the safety of laboratory settings encompasses more than the adjustment of written procedures; it also features behavioral elements that add to compliance. The research highlights the fact that despite guidelines, accidents occur because of an absence of continuous compliance, and thus there is a necessity to introduce positive measures such as peer-to-peer discussion on safety, regular safety talks, and open communication on experiments conducted in order to reduce safety violations and accidents. Mason et al. (2016) are of the opinion that lab safety should not be reliant on isolated training activities but must regularly be reinforced using best practices with behavioral interventions of social reinforcement and prompt feedback in order to reinforce student compliance to safety protocols. This is helpful to our question of whether or not STEM students follow safety protocols when using lab equipment and how best to improve the safety measures, as the study provides concrete measures such as cyclic safety checks and peer responsibility to improve accountability by the students. Second, Mason et al. (2016) also reiterate real-time hazard identification and risk management, reminding us safety is a process in motion and not a stationary routine, hence fortifying our research purpose of examining conformity of students to safety

procedures and indicating improvements to safer laboratory practice.

In accordance with Artdei, R. (2012), the findings revealed that Thai undergraduate students had misconceptions regarding chemical hazards and safety signs. Most students found it difficult to correctly associate frequent laboratory chemicals, for example, sodium hydroxide, with their respective safety symbols. The study also revealed that students did not closely observe safety signs on chemical containers during experiments. The writers of this research pointed out that safety education must be enhanced in order to promote the awareness of proper chemical storage, handling, and disposal among students. In as much as the aim of this research was to determine the level of scientific comprehension of safety signs by students, the research buttresses the case that most students have insufficient knowledge regarding chemical danger. This highlights the need for formal safety training programs to enhance safety awareness and compliance with good laboratory practices

According to Alnaim, M. A., Alghamdi, M. A., & Alzahrani, M. A. (2021), laboratory safety consciousness is the foundation to a safe and effective learning process, especially among students and laboratory workers. Laboratory workers are equipped with safety consciousness, while students have no knowledge about emergency procedures and equipment handling and therefore might raise the likelihood of an accident and affect efficiency. Effective training in laboratory safety, for example, warning signs and emergency procedures awareness, enhances confidence and effectiveness in performing experiments. Safety practices during lab work provide a safe and effective scientific discovery setting. The current study hence seeks to present practical recommendations on enhancing safety training and laboratory safety consciousness.

2.2 Methodology

2.2.1 Research Design

Our study focuses on examining whether Grade 12 STEM students of San Jose Academy follow the safety protocols needed when using laboratory equipment. It aims to identify the common safety violations, their causes, and how aware the students are regarding the proper safety laboratory precautions. After knowing these, the study is expected to propose effective ways on how to improve the safety measures.

This study falls on a qualitative case study approach since it solely focuses on the safety awareness of Grade 12 STEM students who often use the laboratory for conducting an experiment. It allows an in-depth analysis on how students properly use and handle laboratory equipment and how they follow the safety protocols. Moreover, a case study helps to explore how aware the students are in terms of laboratory precautions and protocols.

The study will be conducted using semi-structured interviews as the data collection method with the utilization of open-ended questions to gain a better understanding of the knowledge of STEM students regarding laboratory safety protocols.

2.2.2 Locale of the Study

This study aims to look into the important safety measures in handling and using laboratory equipment among Grade 12 STEM students at San Jose Academy, a private school in Navotas City, an urban setting in the Philippines. The school's science laboratory provided the setting for this research. This setting was chosen to assess the laboratory safety awareness of STEM students, aiming to find gaps in equipment handling and propose strategies such as better precautionary protocols for a safer, more productive learning environment.

2.2.3 Population Sampling

The population consists of Grade 12 STEM students at San Jose Academy, with a sample size of fifteen (15) students. The participants were selected through the availability sampling method, focusing on students who were easily accessible and willing to participate. The study aimed to explore essential safety measures in handling and using laboratory equipment.

2.2.4 Data Gathering Procedure

The data-gathering procedure will involve semi-structured interviews with 15 Grade 12 STEM students voluntarily. The interview will involve open-ended questionnaires aimed at exploring student safety awareness in handling laboratory equipment. The results, therefore, will be organized thematically

and will be analyzed and interpreted to identify patterns related to the proper safety handling of laboratory equipment.

2.2.5 Research Instrument

The aim of the study is to analyze if students adhere to the safety rules while using lab equipment and propose ways for improving the safety of such equipment. The study aims to establish the salient causes of safety violations, the most difficult aspects of honoring safety measures by the students, and the reasons for students' compliance. Findings from this study will help in the formulation of recommendations that can enhance laboratory safety.

Interviewing will be the key method of collecting data. This method allows the interviewee to garner substantial in-depth opinions while offering structure in that every participant responds to the same questions. The interview will focus on such topics as the general knowledge of grade twelve students on laboratory safety, their pride in adherence to safety protocols, and personal insight and experiences.

The questions in the interview are consistent with the goals of the study, successfully measuring students' awareness, compliance, and issues with laboratory safety. The questions are sequentially logical, advancing from risk perception to safety information and compliance, allowing for a smooth flow of discourse. The questions elicit extensive answers without loss of clarity or interest to the respondents. They are phrased in neutral language, thus facilitating honest responses, and they are suitably designed to produce meaningful information on enhancing laboratory safety.

3. Results and Discussions

In order to present the information obtained briefly and effectively, the researchers used a tabular form to present the common themes and/or codes found in the participants' responses and the code frequencies or the number of times these themes were mentioned. Since there are eight (8) questions, these were separated into three (3) major sections that address the objectives of the study.

Table 1. Capacity of the students to recognize laboratory risks and hazards

Question	Common Themes	Code Frequencies
1. What laboratory equipment do you usually use?	a. Measuring equipments	a. 9
2. How proficient are you utilizing said equipment?	a. Capable b. Incompetent	a. 6 b. 3
3. Could you give me a description of the risks or accidents you have faced or observed while working inside the laboratory	a. Malpractice b. Chemical reaction	a. 6 b. 2

Table 1 shows the capacity of students to recognize the risks and hazards inside the laboratory.

For question 1, the researchers asked the students what laboratory equipment they usually use. The common theme found in their responses is the measuring equipment that has 9 mentions.

Question 2, which explores the proficiency of the students in using the laboratory equipment. There were 6 respondents that identified themselves as capable of using the laboratory equipment, while 3 of them stated that they are not proficient enough due to lack of laboratory use.

Question 3 asks about the laboratory accidents or hazards that they have experienced or observed inside the laboratory. There were 6 of them that experienced malpractices; 2 of them observed a chemical reaction.

Table 2. Awareness of students about the safety procedures and protocols

Question	Common Themes	Code Frequencies
4. How aware are you of the safety rules and guidelines when working in the laboratory?	a. Aware b. Unaware	a. 7 b. 2

5. From what you know, can you describe some standard safety procedures you should follow before starting any laboratory activity?	a. Proper laboratory dress code b. Preparation of equipments	a. 7 b. 2

Table 2 shows the awareness of students with the precautionary measures when using laboratory equipment

Question 4 asks about the awareness of students about the safety rules and guidelines while inside the laboratory. 7 of them state that they are well aware, whereas 2 of them are not.

Question 5 asks about the standard safety procedures that students should follow before conducting a laboratory activity. 7 of them stated that they prepared the necessary clothing needed, yet 2 students indicated the preparation of the laboratory equipment.

Table 3. Following the laboratory protocols

Questions	Common Themes	Code Frequencies
6. What are the safety procedures you partake in before handling laboratory equipment?	b. Apparatus maintenance c. Setting up equipment d. Laboratory orientation	b. 3 c. 3 d. 3
7. Have you ever neglected or overlooked safety procedures?	a. Yes b. No	a. 6 b. 3
8. How often do you follow the laboratory safety procedures to avoid hazards and risks?	a. Oftentimes b. Rarely	a. 7 b. 2

Table 3 shows the number of students following the laboratory protocols.

Question 6 asks about the safety procedures that students partake in before conducting an experiment. There were three (3) common themes mentioned: apparatus maintenance had 3 mentions, setting up the laboratory equipment had 3 mentions, and laboratory orientation had 3 mentions.

Question 7 asks about the students' negligence about the safety procedures. There were 6 students that admitted negligence, whereas 3 of them affirmed no.

Question 8 asks how often students follow the laboratory protocols to avoid the possible risks. There were 7 that oftentimes abided by the protocols; however, 3 seldom did.

4. Conclusion and Recommendation

4.1 Conclusion

This study aimed to assess the competencies of Grade 12 STEM students regarding their ability to recognize laboratory risks and hazards, their awareness of safety measures, and their adherence to precautionary protocols. The findings reveal that while students acknowledge the importance of laboratory safety, only a portion demonstrated proficiency in handling laboratory equipment. Specifically, 6 out of 9 students considered themselves capable, indicating a need for enhanced practical training. Furthermore, the awareness of safety rules was relatively high, with 7 students stating they are aware of safety guidelines. However, discrepancies in their actual practices were evident, as some students reported experiences of malpractice and accidents, such as equipment defects and improper handling.

The results indicate a gap between awareness and practice, particularly in the consistent use of personal protective equipment (PPE). This misalignment suggests that although students recognize safety protocols, there may be barriers to fully implementing these measures in practice. Therefore, structured interventions are necessary to bridge the gap between knowledge and practical application of safety protocols.

4.2 Recommendations

1. Enhancement of Laboratory Training Programs

To address the identified gaps in proficiency, it is recommended that the school implement comprehensive laboratory training programs. These sessions should prioritize hands-on experiences and practical applications of Standard Operating Procedures (SOPs) to enhance students' confidence and skills in using laboratory equipment effectively.

2. Mandatory Use of Personal Protective Equipment (PPE)

To mitigate risks associated with non-compliance, it is crucial to establish a strict policy enforcing the mandatory use of PPE. Teachers and laboratory personnel should actively monitor and remind students of the importance of PPE before entering the laboratory, reinforcing its role in accident prevention.

3. Implementation of a Laboratory Safety Monitoring System

To ensure ongoing compliance with safety protocols, a monitoring system should be established. This may involve appointing student safety officers, conducting regular safety audits, and requiring students to log adherence to safety procedures outlined in the SOPs before engaging in laboratory activities.

4. Regular Safety Awareness Assessments

To track progress in safety knowledge and practice, periodic assessments or quizzes on safety procedures should be introduced. This approach can reinforce the importance of safety measures and encourage continuous learning among students.

Recommendations for Future Research

Future researchers are encouraged to conduct similar studies in other academic institutions to determine whether laboratory safety challenges are consistent across different schools. Further research can explore the effectiveness of various safety interventions, such as virtual laboratory training. Investigating the role of teachers and laboratory personnel in reinforcing safety measures may also provide valuable insights for improving laboratory safety education.

Recommendations for Enrichment of the Study

Expanded Participant Pool: To enrich the research, consider including a larger and more diverse sample of students from different grades or academic backgrounds. This could help identify varying levels of safety awareness and practices across different demographics.

Follow-Up Studies: Conduct follow-up studies after implementing the recommended safety training programs to assess their impact over time. This could provide insights into long-term changes in students' competencies and attitudes toward laboratory safety.

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The Faculty of the Senior High School Department,

San Jose Academy accepts the Research Paper entitled:

“Enhancing Laboratory Safety: Examining Essential Safety Measures for Handling and Using Laboratory Equipment Among Grade 12 STEM Students at San Jose Academy”

Submitted by Ariahnne Reign S. Amodia, Dyze Railey T. Osuyos, Mary Ryzalyn C. Pablo, Einnor John A. Solis, and John Edward R. Sosa in partial fulfillment of the requirements for Practical Research 1 for School Year 2024-2025.

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Dependency on Generative AI-Powered Tools: Analyzing the Impact of Using ChatGPT on the Academic Writing of Grade 11 STEM Students at San Jose Academy

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Abstract: This study explores the impact of using ChatGPT on academic writing. Many students use ChatGPT as a convenient tool to quickly complete their schoolwork, but over-reliance on it can limit their use of original ideas and critical thinking, negatively affecting their creativity. While tools like ChatGPT, powered by artificial intelligence (AI), can assist with academic writing, it's important to maintain a balance. Students should still generate their own ideas to avoid over-reliance. ChatGPT offers several benefits, such as grammar checking, language support, and writing assistance. The study investigated student perceptions of using ChatGPT as a tool for academic writing, employing a qualitative case study approach. Data was collected through questionnaires and in-depth interviews with 15 participants. The findings revealed that students generally had a positive response to using ChatGPT to enhance the quality of their writing. Additionally, ChatGPT provided useful features for writing and language development. However, the study also highlighted a negative impact: some students became too dependent on ChatGPT, which hindered their ability to think critically and independently. This study suggests that AI technologies like ChatGPT play an important role in guiding students' academic writing, but students must strike a balance to avoid relying too heavily on them.

Key Words: Generative AI; ChatGPT; Academic Writing; Dependency; STEM Students

1. INTRODUCTION

1.1 BACKGROUND OF THE STUDY

The rise of AI technology is prominent and inevitable in this age. It's no longer surprising for us to benefit from its progress. Popenici and Kerr (2017) described this emerging technology as computing systems that can display behaviors and functions typically linked to the way the human brain works, including learning, adapting, integration, self-correction, and processing data to solve complex problems. The growth of AI technology has brought many positive effects for people, as it has made some tasks much easier.

When the pandemic hit, during the height of online classes, various AI-generated tools became popular among students, such as *ChatGPT* that help make students' tasks easier. However, excessive reliance and familiarity with these tools may lead to the loss of critical thinking skills among students. In the study "AI Tools in Society: Impacts on Cognitive

Offloading and the Future of Critical Thinking," published in *Societies*, lead author Michael Gerlich from SBS Swiss Business School discovered a strong correlation between cognitive offloading and the use of AI tools, which was found to negatively affect critical thinking.

Now that classes have returned to face-to-face learning, how have students adjusted to their accustomed use of AI in completing schoolwork? Take, for example, essays and other academic papers assigned by teachers, which AI-generated tools can easily complete in just a few seconds. A recent study conducted by Instructure (2024), a leader in educational technology, uncovered an interesting trend: more than 83% of Filipino students use AI tools in their academic pursuits. This percentage far exceeds the global average, showcasing the Philippines' potential to lead in AI-driven education.

Moreover, according to a survey by Instructure, an education technology company listed on the NYSE, Artificial Intelligence (AI) is gradually being adopted and integrated into the education sector in the Philippines. In the year 2023, the University of the Philippines unveiled the "University of the Philippines Principles for Responsible and Trustworthy Artificial Intelligence." It's a set of guidelines that UP is adopting "in order to provide guardrails and indicate the way forward on the development and use of AI in the University and the country." According to Lufkin (2023), after embracing the AI in the University, one biggest problem that they are facing is the students and educators not knowing exactly when it's acceptable to use AI or when not to. Students' ability to think independently and creatively is reduced when they become overly dependent on AI-driven solutions (Habib et al., 2023).

However, in the Philippines, there is a shortage of research that recognizes the dependence of students on AI tools in their learning. This study aims to understand the dependency of grade 11 STEM students at San Jose Academy on AI-generated tools like *ChatGPT* when it comes to their Academic Writing. It also seeks to determine the impact of using these tools on the development of their Academic Writing Skills.

1.2 STATEMENT OF THE PROBLEM

This study focused on Dependency on Generative AI-powered tools : Analyzing the impact of using *ChatGPT* to the Academic Writing of Grade 11 STEM Student at San Jose Academy. It seeks to address the following questions:

1. How do Grade 11 STEM students' academic writing performance change when they utilize *ChatGPT?*

2. What are the perceived effects of students' reliance on *ChatGPT* to their academic progress and performance?

3. What are the perceived benefits and disadvantage for students of adopting *ChatGPT* for academic tasks?

1.3 CONCEPTUAL FRAMEWORK

INPUT	**PROCESS**	**OUTPUT**
-Generative AI-powered tools -ChatGPT -Grade 11 STEM Students at San Jose Academy	-Application of AI Tools in Academic Writing -Analysis of data through informal interviews -Interpretation of Results	-Determine the level of dependency on AI Tools of Grade 11 STEM students and its impact on critical thinking and originality in writing

-Academic Writing Tasks -Student Background (academic capabilities, familiarity with AI tools)		

1.4 SIGNIFICANCE OF THE STUDY

This study focuses on "Dependency on Generative AI-powered Tools: The Impact of using *ChatGPT* on the Academic Writing of Grade 11 STEM Students at San Jose Academy" it explores the effects of AI-powered tools technology such as *ChatGPT* on the skills of the students' academic writing. It will be useful to the following:

Students - This study will help students not rely on generative AI tools such as *ChatGPT* in academic writing and be responsible in using these tools as they develop critical thinking, creativity, and independent writing skill development.

Administrator - for administrators it is important to create policies and guidelines regarding the use of *ChatGPT* in academic writing. This study will help determine what AI tools can do to students within the assignments, and have a program about AI to maintain academic integrity and develop skills in writing
.

Teacher - Teachers should understand the negative impact of *ChatGPT* on students' writing skills so that they do not rely on AI and develop homework that encourages students to create and be independent in writing skills for they learn to do their own homework to balance the use of AI and emphasize the development of critical thinking and creativity in doing homework**.**

Future Researchers - This study will serve as for future research into the long-term impacts of AI reliance such as *ChatGPT* in academic writing. It'll provide usable data that can be built on to examine the role of AI in other educational to include problem-solving, research skills and ethical issues regarding technology use.

1.5 SCOPE AND DELIMITATION OF THE STUDY

The scope of this study focuses on examining the dependency of Grade 11 STEM students at San Jose Academy on generative AI-powered tools, such as *ChatGPT*, in their academic writing. It aims to assess how this tool influence students' writing skills, creativity, and critical thinking. The research is limited to students enrolled in the Grade 11 STEM strand during the school year 2024-2025 and evaluates various aspects, including the frequency of tool usage, students' perceptions of their effectiveness, and the overall impact on writing proficiency, particularly in grammar, coherence, and originality. The study uses a mixed-method approach, combining surveys and interviews. The sampling method used by the researchers is purposive sampling, as only those students who have had experience using *ChatGPT* are being interviewed.

2. METHODOLOGY AND RRL

2.1 Review of Related Literature

LOCAL

According to the study conducted by Raheem et al. (2023) AI has the potential to

transform the writing process by making it easier to produce high-quality content with less effort. It can enhance the accuracy and flow of writing while reducing the time students and researchers spend on editing and proofreading. However, there are some risks linked to using AI in academic writing. For instance, students might become overly dependent on AI tools, hindering the development of their writing skills. If not used responsibly, AI could diminish creativity and critical thinking. Furthermore, AI tools may struggle to capture the nuances of academic writing, leading to errors that could result in plagiarism or other forms of academic misconduct.

This context aligns directly with the study on the impact of generative AI tools like *ChatGPT* on the academic writing of Grade 11 STEM students. The potential for students to develop a dependency on these tools as it could impact their ability to develop essential writing skills, critical thinking, and creativity is the key concern of the study.

Generative AI-powered tools offer significant benefits in education, creativity, and workplace productivity. However, over-reliance on these tools poses risks, including diminished critical thinking, misinformation, and job displacement. Future research should focus on creating frameworks that ensure responsible AI use while maintaining human creativity and expertise. (Zhai, X. 2023)

While generative AI is a powerful resource that can enhance creativity and efficiency, excessive dependence on it may lead to workforce challenges, misinformation, and a decline in original thinking. Future research should focus on creating frameworks that encourage a balanced use of AI, ensuring it supports human creativity and knowledge instead of substituting for them.

According to Yuan et al., (2024) They found that EFL learners use *ChatGPT* for their academic English writing as it is convenient and caters to their needs. It also assists them since it scaffolds literacy in terms of writing fluency, content, and knowledge.

The study investigates how *ChatGPT* influences English as a Foreign Language (EFL) learners' academic writing. The study explores learners' motivations for choosing *ChatGPT* as a tool for academic writing. It examines the impact of *ChatGPT* on learners' writing fluency, content, and knowledge.The study identifies both the benefits and difficulties that EFL learners encounter when using *ChatGPT.*

The rapid development of generative artificial intelligence (GenAI), including large language models (LLM), has merged to support students in their academic writing process. Students expected AI to serve multiple roles, including multi-tasking writing assistant, virtual tutor, and digital peer to support multifaceted writing processes and performance (Kim et a., 2024)

This is related to the study as it highlights the students' perceptions of AI tools such as *ChatGPT*, which is why many of them become dependent on it.

Today, emerging technologies are crucial in enhancing the teaching and learning experience. Education is not merely a product; rather, it is a process where learning transcends the basic acquisition of knowledge. In this context, artificial intelligence (AI) presents itself as an innovative technology with substantial promise within the educational realm, as AI-driven systems could facilitate personalized learning by adjusting to the specific needs and interests of each individual student.

FOREIGN

The impact of *ChatGPT* on scholarly work is both positive and potentially negative, as it can lead to plagiarism of others' work. A report released by the U.S. Department of Education's Office of Educational Technology in May 2023 emphasizes the need to share knowledge and develop AI policies. The report defines AI as automation based on data associations and expert knowledge, which leads to two key shifts in AI. It questions whether AI limits students' activities to tasks like procedural math problems or if it supports diverse educational methods outlined in the National Educational Technology Plan (NETP), such as personalized learning, project-based learning, and learning through simulations and experiences in various settings. In response, *ChatGPT* suggested that to enhance the positive effects and reduce the potential negatives, academic institutions should create clear guidelines and ethical standards for the responsible use of AI tools in research and teaching (Piedad, 2025).

This study gives importance to learn the proper use of AI by students because excessive dependence on it can lead to harm. Plagiarism, which is a violation of the law, can occur if students depend too much on AI, as sometimes the sources it uses are not shown and lack proper credits.

According to the study conducted by Acena (2025), the analysis showed that as students gain more experience with *ChatGPT*, their views evolve, understanding both its value and its limitations. They recognize *ChatGPT's* potential in shaping the future of education but warn against overdependence and the risk of missing out on crucial learning experiences.

This is related to the research because it investigates how the knowledge of students evolves after they start using or become dependent on *ChatGPT*. It looks at the shifts in their understanding and how their interactions with the tool influence their learning and perspective

Hernandez (2022), in her research The Dangers of Overreliance on AI-Powered Tools: Impacts on Student Creativity and Critical Thinking, explored how excessive use of AI tools negatively impacts students' creativity and problem-solving skills. She argued that dependency on AI in writing tasks could weaken students' ability to perform without technological support, potentially harming their academic development.

This study is to examine the negative effects are the overdependency of students using AI tools the effective application of such could suppress creativity as well as deplete critical thinking since students end up relying more on AI while doing their work. This leaves them incapable of independent thinking while trying to achieve assignments without some form of dependence on technology as they should just trust the competency of the task force to know something in school activities.

Perez (2021) studied Bridging Language Barriers: The Use of AI Tools in Academic Writing Among High School Students, focusing on how AI tools assist senior high school students, particularly those struggling with language barriers, in improving their writing. His research showed that these tools serve as a helpful scaffold, allowing students to overcome technical writing challenges, but he also raised concerns about plagiarism and reduced learning retention.

This study does not only focus on the negative effects of using AI in academic writing tasks. It also shows the positive effects but also highlights the negative consequences if abused. Just like this study, it can contribute to this research as it demonstrates that AI has beneficial outcomes, but as most people say, too much of anything is bad.

According to Sarker et al., (2023) the main challenges of using *ChatGPT* in higher education include limited access to technology, an overdependence on AI, inaccuracies in subject knowledge, and educators struggling to adjust their teaching methods. Despite these challenges, *ChatGPT* also offers several opportunities, such as improving learning efficiency, enabling personalized learning, assisting educators, and providing chances for skill development.

The impact of using *ChatGPT* can vary, not only for young people but also for educators. While it brings positive effects in terms of making tasks easier, it's undeniable that some still struggle with its use, which could potentially lead to misuse.

Today, emerging technologies are crucial in enhancing the teaching and learning experience. Education is not merely a product; rather, it is a process where learning transcends the basic acquisition of knowledge. In this context, artificial intelligence (AI) presents itself as an innovative technology with substantial promise within the educational realm, as AI-driven systems could facilitate personalized learning by adjusting to the specific needs and interests of each individual student (Montenegro-Rueda et al., 2023)

It is connected to this study because it shows the effects of Artificial intelligence on students which can reduce their critical thinking, lack of deep learning, and also plagiarism. But there are also positive effects by using AI tools such as *ChatGPT* by having instant access to information.

2.2 Methodology

2.2.1 Research Design

The researchers utilized a qualitative research method to investigate the dependency on *ChatGPT* and its impact on academic writing among Grade 11 STEM students in San Jose Academy. Concentrating on their individual experiences by using chatgpt. Seven (7) sets of questions will be asked in the interviews, giving the researchers a thorough understanding of how students utilized *ChatGPT* to succeed academically will be the main technique of gathering data. This approach ensures that the interpretations of the data collected from participants during the data-gathering process are the primary focus of the results, which will address the research questions posed at the start of the study.

2.2.2 Population Sampling

There were fifteen (15) participants involved
in the study. The participants were selected through
the purposive sampling method to interview for experience in using AI tools, which would offer information on their specific use. This method is appropriate for students who actively use tools such as *ChatGPT*. The researcher can obtain specific insight into how the tools are utilized in their writing processes and their effect on students' writing competence.

2.2.3 Research Instruments

The researchers have prepared a set of seven (7) interview questions that were used during face-to-face interviews and through Google Meet. The interview questions explored the respondent's Dependency on Generative AI-powered tools such as *ChatGPT* and the outcomes it produced with regard to their class performance. Before conducting interviews, the research questions were validated by Ms. Camille M. Perez.

2.2.4 Data Gathering Procedure

The researchers utilized two primary procedures in order to obtain the needed amount of responses with the limited time given to the researchers during the time of the data gathering process. The first method involved conducting face-to-face surveys and interviews with selected students during their class dismissal. This allowed the researchers to gather direct insights into students' experiences, perspectives, and challenges regarding AI-assisted writing while the other is conducting an interview to the participants through Google Meet. To maintain ethical standards, all participants were informed about the study's objectives and were asked for their consent before participating. They were also briefed on data privacy policies to ensure the confidentiality of their responses. The data-gathering process took place from February 17 allowing the researchers to collect sufficient information to analyze the impact of *ChatGPT* dependency on students' academic writing skills.

3. RESULTS AND DISCUSSION

To present the gathered information clearly and concisely, the researchers used a tabular format to present the common themes and/or codes from the participants' responses, along with the frequency of each theme. Given the variety of responses, only the themes mentioned three or more times were included. Since there are seven (7) questions, these were divided into three (3) major sections.

Table 1: How do Grade 11 STEM students' academic writing performance change when they utilize Chatgpt?

Question	Common Themes	Code Frequencies
1. Have you used *ChatGPT* in your academic task?	a. Yes, more than once b. For assistance c. To check grammar	a. 15 b. 3 c. 3
2. How would you describe the changes in your academic writing process after using *ChatGPT*?	a. Improves writing b. Nothing has changed c. Expanded vocabulary	a. 6 b. 4 c. 3
3. Do you think chatgpt helped you develop better writing habits or strategies?	a. It develop writing habits b. Improves grammar c. Expands vocabulary d. Gives an idea e. No, it won't help	a. 14 b. 4 c. 3 d. 3 e. 3

Table 1 presents information on how students academic writing performance changes when they utilize ChatGPT..

Question 1, it is to find out if the students interviewed have had any experience using *ChatGPT*, or if they have ever used it for their academic tasks. There were three (3) common themes: Yes, more than once had the highest frequency as it had 15 mentions, for assistance and to check grammar both had 3 mentions.

Question 2 asks how students would describe the changes in their academic writing after using *ChatGPT*. There were three (3) common themes mentioned: improves writing being the highest frequency as it had 6 mentions, nothing has changed had 4 mentions, and expanded vocabulary had 3 mentions.

Question 3 seeks to determine whether using ChatGPT has helped students develop their writing skills and if it has contributed to better and more effective writing habits. For question 3, there were four (4) common themes mentioned in the responses: It develop writing habits had 14 mentions, the highest frequency among improves grammar which had 4 mentions, expands vocabulary, gives an idea, and no, it won't help all had 3 mentions.

Table 2: What are the perceived effects of student's reliance on *ChatGPT* to their academic progress and performance?

Question	Common Themes	Code Frequency
4.) Do you think that *ChatGPT* made it harder for you to think critically or express your own ideas?	a. It gives good suggestions b. No, it guides me	a. 8 b. 7
5.) Do you believe that *ChatGPT* have made you more efficient in completing academic assignments? why or why not?	a. Becomes more efficient b. Provide supporting details c.Sometimes	a. 8 b. 5 c. 3

Table 2 presents information on what are the perceived effects of *ChatGPT* usage on students.

Question 4 is asking if using *ChatGPT* made it harder for students to think critically or express their own ideas. There are two (2) common themes: It gives good suggestions and has 8 mentions while no, it guides me and has 7 mentions.

Question 5 is asking if students' believe that *ChatGPT* has made it more efficient for them in completing academic assignments. There are three (3) common themes mentioned: students says that it becomes more efficient had 8 mentions, provide supporting details had 5 mentions, while sometimes had 3 mentions.

Table 3: What are the perceived benefits and disadvantage for students of adopting *ChatGPT* for academic tasks?

Question	Common Themes	Code Frequency
6.) Have you noticed any issues with over-reliance on *ChatGPT*(e.g., lack of personal input,reduced creativity)? If yes, can you provide an example?	a. Information without sources b. Plagiarism c. Last school year research sources	a. 4 b. 3 c. 3
Do you think the use of *ChatGPT* enhances or diminishes your understanding of	a.Enhances understanding b.Diminishes understanding	a. 7 b. 7

academic concepts?		

Finally, table 3 shows the students' responses regarding whether their use of ChatGPT in academic tasks brings benefits or disadvantages in developing their academic writing.

Question 6 asks about whether the respondents have encountered issues with over-reliance on AI. Three (3) common themes are mentioned: information without sources had the highest frequency with 4 mentions, plagiarism, and last school year research sources both had 3 mentions.

Meanwhile, question 7 examines whether the use of ChatGPT by students enhances their academic writing or diminishes their creativity and originality. There are two (2) common themes mentioned: enhances understanding and diminishes both had 7 mentions.

4. CONCLUSION AND RECOMMENDATION

4.1 Conclusion

The primary objective of this study is to determine dependency on generative AI-powered tools such as Chatgpt and its impact on the academic writing of Grade 11 STEM students at San Jose Academy. This study also explores the changes in students' academic writing performance after they become accustomed to using ChatGPT.

The researchers discovered that the effect of ChatGPT on students is mixed. Some students view it as a helpful tool to broaden their knowledge, offering detailed information and new terms they can use. Others admit they rely on ChatGPT as a reference for creating well-organized academic outputs. However, some students still prefer to use their own creativity and traditional writing methods but sometimes consult ChatGPT for better ways to structure their work. Some of the interviewees also mentioned that using ChatGPT hasn't changed their academic writing because, after using it, they still rely on their own creativity. They treat ChatGPT more as a source of ideas and still proofread the responses it provides.

When it comes to the issue of over-reliance on ChatGPT, the researchers found that most problems occurred in the previous school year. This year, students feel more confident in their abilities, using ChatGPT more responsibly and within limits, especially with newer AI tools that can identify whether content is written by a human or generated by AI.

However, there is still a negative impact on students' reliance on ChatGPT. Some students who remain dependent, even for simple instructions, still ask for ChatGPT's help. They miss the opportunity to use their critical thinking skills because they feel confident that ChatGPT is always available to help.

According to research, one of the positive effects of ChatGPT on students is that it helps broaden their knowledge, especially when it comes to expanding their vocabulary and learning new terms. However, overreliance on it may hinder their ability to produce original work, as they become too dependent on its assistance.

4.2 Recommendation

It's good to know that most students understand the responsible use of ChatGPT for their academic tasks. For those who are still overly dependent on it, they need to learn how to enhance their knowledge using ChatGPT so they can use that knowledge as a foundation for creating their own work. Students should set boundaries when using AI, ensuring it's only a

guide and not a tool to complete entire tasks. Over-relying on it can hinder their creativity and originality. In order to attain this, listed here are some specific ways:

- Use Chatgpt as a helpful tool for brainstorming ideas, clarifying concepts, or refining writing, rather than writing entire sections or papers.
- Improve students' own writing skills by regularly writing without relying on AI tools such as Chatgpt. This allows them to develop their own style and discover their abilities.
- Students can also spend time reading academic papers, books, and articles in their field to improve their vocabulary, comprehension, and writing style, while also gaining a better understanding of the structure and format of quality academic work.

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Dependency on Generative AI-Powered Tools: Analyzing the Impact of Using ChatGPT on the Academic Writing of Grade 11 STEM Students at San Jose Academy

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Assessing the Impact of Gamification on Enhancing Student's Motivation Among Grade 11 STEM Students at San Jose Academy

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Abstract: This study explores the "Assessing the Impact of Gamification on Enhancing Student's Motivation Among Grade 11 STEM Students at San Jose Academy" assessing the benefit of gamification instruments in class, shown to enhance student motivation and learning. The study was participated by fifteen (15) Grade 11 STEM students who met the researcher's target respondents. The goal of the study was to determine how gamification strategies affect students' general academic engagement and willingness to participate.The researchers used a qualitative approach to acquire the study's objectives and used purposive sampling to ensure relevant experience with gamified learning environments. The results revealed that gamification has proved to be highly effective in improving academic performance through the active engagement of students. Besides increasing the motivation of students, it highly improved their satisfaction with the learning process. Additionally, it made students feel like they had accomplished something and promoted group projects, which made the classroom more engaging. With the incorporation of game-like elements, students were more involved in learning, leading to improved retention, active participation, and an improved educational experience overall, making learning fun and productive for the learners. The findings suggest that integrating gamification into educational methods can create a more engaging and student-centered approach to learning. This approach has helped to create a more enjoyable, interesting, and successful way for students to learn, while also ensuring that they have a positive attitude towards academic difficulties. Besides helping students boost their learning motivation, games encourage critical thinking, creativity, and teamwork, all of which are important in the STEM fields. Students can engage in knowledge sharing and cooperative learning in a more collaborative way in the classroom.

Key Words: Gamification; Learning Strategy; Enhancement; Motivation

1. INTRODUCTION

1.1 Background of the Study

Studying can often seem overwhelming, particularly when one's motivation is lacking. However, it is essential and critical for academic performance, personal development, and progress, it is important to build and harness the drive to study (Prior, 2024). According to (Cherry, 2023), The biological, emotional, social, and cognitive factors that activate human behavior are included in motivation. It also involves factors that guide and sustain goal-directed behavior.

Motivation is also the driving force that states a student's level of perseverance and effort in their studies. Whether it is curiosity-driven, external rewards, or a desire for achievement (Lane, 2022). (Baah, 2023) states that, in today's world, where many students find themselves fully involved in various digital technologies and platforms outside of their formal educational environments, engaging students in the learning process is often a complex and challenging task. The prevalence of technology can lead to distractions, which makes it increasingly difficult for educators to get and maintain students' attention during class. Studies have consistently shown that students are more actively involved in their educational experiences the longer they are driven to learn. Therefore, there has been an increase in interest that can inspire students to learn. One given technique is gamification.

Gamification is a strategy that uses ludic activities to engage individuals in tasks and boost interracial and extrinsic motivation (Mazano-Leon et. al, 2021). From the study by Kurt (2020), some evidence proves gamification techniques might result in better learning as the educational landscape changes. There has been a considerable rise in studies examining the use of gamification in academic settings, ranging from primary and secondary schools to higher education institutions. The increase in interest demonstrates the possible advantages of these teaching techniques, which can improve knowledge retention and critical thinking abilities and increase student engagement. More empirical data must be gathered as researchers investigate the effectiveness of gamified learning environments to comprehend how these tactics may be specialized for various educational settings.

The main goal of this study is to gather and examine the essential data that will demonstrate the effectiveness of gamification as a teaching strategy for Grade 11 STEM students. Through examining aspects of student engagement and motivation, this study seeks to provide comprehensive evidence supporting the integration of gamified elements into the learning environment.

This research will analyze different gamification techniques, including point systems, leaderboards, and interactive challenges, to assess their impact on student performance. It will also examine how these strategies affect students' critical thinking, problem-solving skills, and overall academic achievement. By exploring both qualitative and quantitative data, this study aims to provide valuable insights into the potential long-term benefits of gamification in education.

1.2 Statement of the Objectives

This research investigates the impact of utilizing gamification in the Grade 11 Science, Technology, Engineering, and Mathematics (STEM) strand, as well as the learning type technique on students' motivation. This study aims to learn about students' perceptions of gamification as a learning strategy. Also, this study focuses on the characteristics that contribute to the motivation of grade 11 STEM students who utilize gamification as a learning strategy. Lastly, the impact of gamification learning on their critical- thinking and problem-solving skills.

1.3 Significance of the Study

The findings of this research will benefit several key in the education community:

Students. The study aims to demonstrate how making learning more interactive and enjoyable can enhance students' motivation and participation in STEM classes, leading to improved grades and a deeper understanding of the subject matter.

Parents. The study aims to help parents understand how gamification enhances their child's learning experience, motivation, and performance in STEM subjects. It equips them to better support their child's education and advocate for innovative teaching methods that foster engagement and academic success.

Teachers and Educators. This research will provide valuable insights for educators on effectively incorporating gamification into their teaching methodologies. By implementing these innovative strategies, teachers can create more engaging classrooms that foster better learning outcomes.

Educational Intitutions. Schools, particularly San Jose Academy, could leverage the findings from this study to refine their teaching approaches. These insights will contribute to developing a more dynamic and student-centered learning environment.

Future Researchers. The research will serve as a crucial reference for those looking to study gamification in education in the future. It can guide researchers in further enhancing teaching methodologies and improving student learning experiences.

2. METHODOLOGY and RRL

2.1 Review of Related Literature

In class, most students are focused on something else or something they enjoy, they would rather pay attention to it than listen to the teacher's lesson. According to Macale et al. (2021), Teachers have always faced the issue of getting students involved in the learning process. Game elements can redirect the attention of the students who love and want to play; it will help them because they will have something new that can increase their knowledge while playing. Incorporating game-based elements, such as challenges, rewards, and interactive assignments, can create an engaging and dynamic learning environment for those students who struggle to stay focused in conventional lecture-based classrooms. Students will not only have fun but also strengthen their knowledge and skills when they actively participate in their lessons through gamification.

Teachers and students need communication to have a good relationship in the Classroom. According to Coronel (2022), "Communication is the way we share who we are and what we know with others. It's how we understand, exchange ideas, explain ourselves, and work together to reach common goals". The Classroom's goal is to encourage achievement, growth, and good behavior, and to accomplish that, they need communication. Teachers need to communicate with the students to know if their way of teaching is effective, and the students need the teacher to learn and increase their knowledge. Game elements help to develop the students' collaboration and communication skills. This study explores how gamification can strengthen communication and collaboration between educators and learners. Game elements, such as team-based challenges, interactive discussions, and reward systems, encourage students to communicate more openly, share ideas, and work together toward shared academic goals. By integrating gamification into the classroom, students become more engaged, not just in their individual learning but also in collaborative tasks, where communication plays a vital role.

According to Duterte (2024), the use of gamification in education has shown significant improvements in student engagement, motivation, and academic performance in the Philippines. This aligns with the present study, Assessing the Impact of Gamification on Enhancing Student's Motivation Among Grade 11 STEM Students at San Jose Academy, as it explores how similar strategies can be applied to senior high school students. This study relates and expands on these results by focusing on the use of gamification strategies in a senior high school environment. The research intends to examine how game-based learning approaches can be effectively employed to cultivate a more engaging and interactive classroom environment by concentrating on Grade 11 STEM students.

According to Dela Peña (2021), the concept of flipped classrooms and ubiquitous learning emphasizes the crucial role of technology in modern education, especially in adapting to the challenges brought by the pandemic. Training programs like Project SAFE aim to equip educators with the necessary skills for flexible and adaptive teaching methods. This approach reflects the continuous efforts of local institutions to innovate and enhance learning experiences in the new normal. This study mirrors the research since both examine the use of technology to increase student engagement. Gamification uses game-like elements to engage students and improve the learning process, In many ways flipped classrooms and ubiquitous learning encourage interactive and student-centered education. This study looks into how gamification might help STEM students learn in a more dynamic and engaging environment by utilizing technology-based tactics.

One of the benefits of gamification teaching to students is that it encourages them to be motivated to learn. Liwanag (2021) stated, "Most education psychologists would agree that a more motivated student learns better than a less motivated one." Motivation gives a reason for the student to provide more effort to learn and participate, and putting effort is connected to the student's motivation; gamification learning will significantly contribute to motivation and student performance. This study aims to investigate how gamified learning techniques can improve students' academic performance and level of involvement. This research seeks to ascertain whether incorporating game-based learning components into the classroom can sustain motivation and promote active engagement among STEM students by examining the effects of

gamification. In conclusion, the study emphasizes how gamification can be a powerful teaching strategy that transforms the conventional learning process into one that is more engaging and centered on students' needs.

Dominguez (2021) claims that the flipped classroom approach is becoming more and more popular over time, in part because of how widely available and widely used technology is in the classroom. However, there is ongoing debate regarding this methodology's efficacy. Dominguez (2021) emphasizes the growing importance of the flipped classroom approach, which is attributed to the regular use, accessibility, and availability of technology learning materials. The effectiveness of the spreading trial is still up for dispute. Because some gamification scenarios are implemented in the classroom and advocate for using new teaching approaches to improve learning outcomes and engagement, gamification, and flipped classrooms are connected. The flipped classroom and gamification share similar goals of raising student engagement and enhancing learning outcomes, which makes them highly relevant to our topic: "Assessing the Impact of Gamification on Enhancing Student's Motivation Among Grade 11 STEM Students at San Jose Academy" Both strategies aim to create more interactive and student-centered learning environments. Flipped classrooms allow students to engage with the content outside of class, typically through movies or online resources, which frees up class time for problem-solving, group projects, and interactive discussions. This shift in the traditional classroom dynamic encourages students to take greater ownership of their education, which fosters independence and a deeper comprehension of the subject matter.

Teaching strategies are techniques, a teacher's own way of teaching, to promote the teaching in ways that keep students engaged and help them learn different skill sets, according to Cooper and Ozansoy (2022). Teaching strategies and methods are related because the method is the process used to accomplish the teaching strategy's objective. The way a teacher teaches has a big influence on how well their pupils comprehend and absorb the material. Student performance will improve with an improved teaching strategy. This study pertains to the topic in the context of the Assessing the Impact of Gamification on Enhancing Student's Motivation Among Grade 11 STEM Students at San Jose Academy, by integrating gamification into their lesson plans, teachers can use interactive and game-based elements to make learning more engaging and enjoyable for students. By means of competition, rewards, and challenges, the gamified approach as a method creates an atmosphere in which students actively engage in the learning process, hence boosting motivation. This method not only makes learning more dynamic and engaging for pupils, but it also helps them remember the content better.

Gamification teaching includes giving rewards, and according to Chen (2023), "When students get bad grades, they feel disappointed and do not know how to improve their grades. The teacher offers suggestions for improving grades and gives rewards after students are doing better, students' performance is enhanced". Giving rewards to acknowledge a student's effort will help the students to feel motivated to participate and attend classes. This connected article shows how gamification can be a successful educational method, which fits nicely with San Jose Academy's focus on Grade 11 STEM students. Educators may greatly increase student engagement and motivation by offering prizes in classroom activities, resulting in a more dynamic and participatory learning experience. This technique not only fosters active participation among students but also improves their academic achievement.

According to Lister (2015), gamification is the act of adopting computer game components such as badges, leaderboards, and points to non-gaming contexts in order to capitalize on the motivation offered by a gaming environment. Despite evidence suggesting they promote student engagement and learning, computer games are becoming more common in the daily lives of Canadian students of all ages. However, integrating them into the classroom may be difficult. Students are likely to feel more motivated and invested in their education if game mechanics like challenges, prizes, and progress tracking are incorporated into the learning environment. Gamification may be a powerful technique to boost the enthusiasm and active involvement of STEM students; it connects to our topic, "Assessing the Impact of Gamification on Enhancing Student's Motivation Among Grade 11 STEM Students at San Jose Academy".

Gamification is a technique used to improve the learning process in educational environments, and its use is growing, according to Lopez et. al. (2023). This strategy seeks to introduce characteristics of games into settings that aren't often considered playful, like classrooms. In contrast to traditional games, where the main goal is enjoyment, gamification can help pupils develop a sense of autonomy and control. Students must therefore do well on gamified assignments since they can only overcome obstacles and receive rewards by applying their talents. The article titled "Investigating the Impact of Gamification on Student Motivation, Engagement, and Performance" illustrates how gamification boosts student motivation, engagement, and performance, which aligns with the goal of our research to employ gamified strategies to enhance motivation and participation among Grade 11 STEM

students in San Jose Academy. Both studies show the power of gamification in promoting active involvement and enhancing learning results, especially in areas such as STEM.

2.2 Methodology

2.2.1. Research Design

The researchers used qualitative data collection as it is a highly qualified method for acquiring the study's objectives, which are to establish the effectiveness of gamification in motivation. With this method of study, the interpretation of the data gathered from the participants will be the result that will address the objectives of the study.

2.2.2 Population Sampling

The study involved fifteen (15) participants selected through purposive sampling to ensure relevant experience with gamified learning environments. Participants had engaged with gamification-based educational tools and activities, allowing for insights into its effectiveness. The selection criteria included students from various academic backgrounds to capture diverse perspectives on gamification's impact on motivation, engagement, and academic performance. This method provided participants with firsthand experience, enabling a deeper exploration of gamification's benefits and challenges. The goal was to gather meaningful qualitative data on how gamification influences student learning. Ultimately, the study aimed to enhance understanding of gamification's role in improving educational experiences.

2.2.3. Research Instrument

The researchers conducted face-to-face interviews and online sessions with the questionnaire that would be used consisting of six (6) open-ended questions. These research instruments have been developed to gather qualitative data from fifteen (15) participants and offer valuable insights about their perspectives and experiences. The prepared questionnaires observe the topic on specific experiences and provide information about each participant's personal experience using the gamification item that was integrated into the learning materials. Before conducting this study, Ms. Camille Perez, a practical research 1 teacher at San Jose Academy, examined the research questions.

2.2.4 Data Gathering Procedure

This study used two (2) approaches to collect the necessary responses. The researchers did two procedures: face-to-face interviews with chosen respondents during their break time while other respondents chose virtual sessions after classes. This was conducted with the consent of respondents before answering the questions. The researchers provided guidance and instructions as the interview questions were answered. It ensured that the privacy of the participants would be anonymous and confidential for the research study only. The whole data-gathering stage lasted from Feb 17-19, 2025.

3. RESULTS AND DISCUSSION

To present the information acquired concisely and efficiently, the researchers utilized a tabular form to present the common themes or codes identified in the participants' responses, as well as the code frequencies or number of times these themes appeared. Since there are six (6) questions, these were separated into three (3) major sections that address the objectives of the study.

Table 1. Effectiveness of using gamification in the Grade 11 Science, Technology, Engineering, and Mathematics (STEM) strand and the impact of this learning type technique on students' motivation.

Question	Common Themes	Code Frequencies
1. In your opinion, how does gamification impact your interest and motivation in STEM subjects?	a. Advance Reading/Studying b. Better understanding of subjects c. Interesting	a. 2 b. 2 c. 7
2. How can you see the difference between using gamification in our school and engaging in normal activities or discussions?	a. Fun b. Engaging	a. 8 b. 3

Table 1 shows the efficacy of gamification in the grade 11 science, technology, engineering, and mathematics STEM strand, as well as the impact of this learning strategy on student motivation.

For question 1, which explores the impact of gamification on enhancing the motivation of students learning, there were 7 the highest that found it interesting, 2 through advanced reading and studying and 2 had better understanding.

Question 2 asks how students perceive the difference between using gamification and traditional activities or discussions There were 8 mentions that gamification is entertaining, and 3 that it is engaging

Table 2. Students' perceptions of gamification as a learning strategy

Question	Common Themes	Code Frequencies
3. In what ways does gamification enhance your motivation to learn?	a. Points/rewards b. Competitiveness c. Engagement d. Fun	a. 5 b. 3 c. 2 d. 2
4. How can gamification support/motivate you to actively participate in your education?	a. Active b. Fun/Enjoy c. Exciting	a. 2 b. 6 c. 2

Table 2 shows students' perceptions of gamification as a learning approach.

Question 3 is on how gamification improves student motivation in their learning. 5 were improved by receiving points/rewards, 3 by increasing their competitiveness, 2 by increasing their engagement and fun, and 1 by improving their stimulation, obtaining more energy, and finding it efficient.

Question 4 examines how gamification encourages students to actively participate in class. There were 6 supported by fun and 2 by active and entertaining.

Table 3. The impact of gamification on learning and on their critical- thinking and problem-solving skills.

Question	Common Themes	Code Frequencies
5. In what way does gamification impact your development of problem-solving and critical-thinking skills?	a. Think faster b. Analyzation c. Boosts brain d. Brainstorming e. Strategies	a. 2 b. 2 c. 2 d. 3 e. 2
6. How effective does gamification contribute to your performance in school?	a. Increased in Grades b. Increased performance	a. 3 b. 8

Finally, table 3 shows how gamification affects learning, as well as critical thinking and problem-solving skills.

Question 5 asks how gamification affects their ability to solve problems and think critically. There were three that affected their brainstorming, 2 regarding their quick thinking.

Question 6 examines how effective the learning strategy is in improving their performance. There were 8 who raised their performance, and 3 in their grades.

4. CONCLUSION AND RECOMMENDATION

4.1 Conclusion

This research examines the impact of motivation on student performance and engagement within the educational setting. It underscores the challenges posed by digital distractions that students face today, emphasizing the necessity for effective strategies to enhance focus. One promising method explored is gamification, which has the potential to enhance both motivation and learning outcomes. The study specifically investigates the effects of gamification on Grade 11 STEM students, aiming to improve their engagement and motivation levels.

Data collected during the study indicates that gamification has a favorable influence on student motivation and academic performance. A majority of students reported finding gamified elements both enjoyable and engaging, noting that they facilitated a better understanding of the material while also reducing stress levels. Participants regarded gamified learning as more entertaining and interactive compared to traditional instructional approaches.

The effectiveness of gamification was evident through the provision of rewards and the encouragement of friendly competition, which contributed to a more enjoyable learning experience. This approach fostered active participation and improved communication among students. Furthermore,

many participants observed advancements in their problem-solving and critical-thinking abilities.

In summary, gamification has proven to be instrumental in enhancing academic performance and increasing the enjoyment of the learning process for students. These findings suggest that the incorporation of gamified elements in educational practices can significantly boost motivation and support student success.

4.2 Recommendation

According to the result of the study, there are multiple positive effects of utilizing gamification as a learning technique for enhancing student engagement, including having better understanding, increased concentration, increased goal orientation, competitiveness, reduced stress, and fun challenges. However, regardless of the positive effects that gamification provides on the academic performance of students, further study is needed on this research topic. For future researchers, it is recommended that they broaden their research investigation of the development and execution of gamification benefits into education, as well as give themselves a thorough understanding of how they will integrate these aspects into the educational setting. These offer several new possibilities for future study into gamification's effectiveness in enhancing learners' active participation and motivation levels. Moreover, a comparative investigation into gamified and non-gamified educational settings within the educational environment might help expand the study's results. As a result, the effectiveness of gamification in the academic performance of grade 11 STEM students has been proven through this research; educators should integrate gamification into their educational settings to sustain a high-quality learning experience for students and encourage them to actively engage in class.

5. ACKNOWLEDGMENTS

The Faculty of the Senior High School Department, San Jose Academy accepts the Research Paper Entitled:

'Assessing the Impact of Gamification on Enhancing Student's Motivation Among Grade 11 STEM Students at San Jose Academy"

Submitted by Vivien Leigh R. Bautista, Sabrina C. Che, John Christian T. Conde, King Christian Noah F. Osin, and Zhaira Nicole S. Portugal in partial fulfillment of the requirements of Practical Research 1 for School Year 2024-2025.

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Online Synergy: Evaluating the Impact of Social Media Platforms on the Learning of Grade 11 Students of San Jose Academy

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Abstract: This study explores the impact of social media platforms on students' academic performance in San Jose Academy. It focuses on students' views, utilization and challenges of using Social Media as a learning tool. The researchers then used a qualitative approach and conducted interviews with the help of provided questionnaires given to the respondents. Through cluster sampling, students were first categorized based on their strand and for each strand, five (5) students were chosen to be interviewed. The findings suggested that students view social media as a haven for multiple sources of Information. The demand for Social Media has increased, which also helped students utilize it more. The findings suggested that Social Media does indeed impact students' success in different aspects and further enhances their abilities, which would help them succeed and thrive as students. However, it poses multiple risks that can harm the lives of those who use Social Media. The study then concludes that Social Media benefits those who use it as an academic tool.

Key Words: Social Media; Impact; Success; ABM; HUMSS; STEM

1. INTRODUCTION

1.1 Background of the Study

During the pandemic, many students had to rely on social media applications in order to communicate with others, like their classmates and teachers. Through social media, students can keep up with some schoolwork as Teachers upload some of the tasks online and it was one of the ways students could learn in the comfort of their homes. It opened a new opportunity for some Social Media applications to focus themselves to cater to the needs of those needing applications to enhance communication and collaboration.

Pre-pandemic, social media platforms like Facebook were mainly used for social purposes only (Smith, Salaway & Caruso, 2009). These platforms intensely grew as years went on, especially Facebook, who in 2012-2014, maintained its popularity as many of its users were active in comparison to some other social media platforms that were also on the rise during those years (Duggan, Ellison, Lampe, Lenhart & Madden, 2015). Those who used different platforms such as Twitter, now known as X, Instagram, used Facebook more (Duggan, Ellison, Lampe, Lenhart & Madden, 2015).

As social media platforms continued to rise, it proved how essential it is for others, like those professionals who may use it to their advantage (Rao & Kalyani, 2022). Through social media, users can network efficiently (Rao & Kalyani, 2022) with other users also, proving how useful it is pre–pandemic. It proved to be much more of a help during the pandemic and the next years to come, as students and teachers, mainly in the education field, had to rely on keeping communication alive.

As the pandemic worsened, schools around the world closed down to prevent the spread among students, but it posed a significant risk as students could not access the learning they once had, so schools had to improvise a way. Social Media platforms became the way teachers contacted their students to make sure they did some of their work in the comfort of their homes. As schools transitioned to online learning, many students found ways to make digital school life better.

The need for platforms that were student-friendly grew during the past years as it proved to be essential. Platforms that let students collaborate with their devices were the "new trend" as digital platforms like Canva were accessible for a lot of students to make different kinds of multimedia. In the comfort of their homes, students can collaborate online with the help of these platforms.

The essentiality of these platforms really matters as students nowadays make digital projects. Though it depends if it may be relevant or how effective it can be in different strands. It aims to understand how useful it is in different fields and how students use them in their academic life.

1.2 Statement of Objectives

This study aims to investigate the Impact of Social Media Platforms to Grade 11 students from different strands to participate in an interview with the following questions:

1. How do students view Social Media as a tool for learning?
2. How do students utilize Social Media for Learning?
3. What are the challenges students face when using Social Media for learning?

1.3 Scope and Limitations

This study aims to understand the Impact of Social Media on Students' Performance. The respondents of this research are only limited to Grade 11 students of the S.Y. 2024-2025. Fifteen (15) students from different strands are selected.

Students were first categorized based on their strands. Five (5) students per strand were selected to participate in an interview. Six (6) questions were handed out to participants and they were asked for consent for recording purposes.

This study is focused on evaluating the impact of Social Media on students and what challenges they may face. Through cluster sampling, students from different strands were able to voice their opinion. Only Grade 11 students were interviewed for this study; no other grade levels were invited to participate in this study.

1.4 Significance of the Study

The use of platforms like this is essential for many, as social media has proved its

flexibility, academically or professional-wise. This study aims to show how important it is in different aspects:

For Students. Many students rely on social media; may it be for entertainment or education, social media remains relevant among student bodies. It also gives opportunities for students to socialize outside their peer groups and maintain their lives outside school. Social Media can also be the way for students to remain updated on different trends that are on the rise.

For Teachers. If it is beneficial for students, it is also beneficial for teachers, as they are now relying on digital-based multimedia to teach students. Back when teachers used markers or chalk for teaching, now they use PowerPoints to teach for the convenience and accessibility.

For School Administrations. They are the ones who facilitate and operate in the background on school campuses. They can implement projects that can revolve around the students practicing their collaborative thinking and, at the same time, create projects that do not need to be printed but can be submitted digitally.

For Online Content Platforms. They are the ones who create websites for all people to use. Some developers can create websites that are student-friendly, where students can collaborate with others easily and digitally.

By giving its importance to some aspects, this study hopes to give the readers a better understanding of how these platforms can be beneficial outside of social factors.

2. METHODOLOGY AND RRL

2.1 Review of Related Literature

LOCAL

According to Yambao & Serrano (2015), social media use has become different; unlike in the past years when it was mainly used for social interactions, it has now become a haven for collaboration among students and professional workplaces. Social media's use varies so much (Kietzmann, 2011), from becoming a communicational/entertainment form of media, it has become a place where students can collaborate and learn at the same time. According to Tus, Conquilla, Espiritu, Paras, Garcia, Rodriguez, Gado, Escoto, Ma & De Jesus, Cruz & Perante (2021), social media platforms have changed how students function.

Other platforms like Facebook are now considered to be a place where students can collaborate (Serrano & Yambao, 2015). Collaborative learning is known as where two (2) people work or learn together (Ilagan, Uy, Kho & Olpoc. 2021) and is not only effective among students but also in other aspects. But this study is limited to only focusing on the views of students towards learning through social media.

FOREIGN

The impact that social media has now on education benefits students who rely on online when creating digital works. According to Sanderson (2019), social media benefits the users by allowing them to share and gain knowledge with the help of other users online. Though collaborating online can be challenging, with the help of different educators, they can create a more progressive, lively and interesting learning

environment for students (Khovrak, Chernenko & Khovrak, 2022).

Due to the pandemic, students at the comfort of their homes took advantage of collaborative learning when it came to their education. The effect the pandemic had on education is somewhat beneficial now, as many students found ways to make academics fun and lively. The sudden rise in the use of ICT led to more use of social media platforms, which furthermore exposed students to using digital sites (Ansari & Khan, 2020).

It is important that social media is used for gaining more knowledge towards something (Pitafi & Ren, 2021) as it is important that some can learn through social media, which back then was not known for its educational aspect. According to Sivakumar, Jayasingh & Pradesh (2023), the prevalence of social media has become a tool for students, which is considered to be educational after contents linked to academics rose, it has impacted others to use social media not just for entertainment but also for educational aspects. Its link to being just for communication and entertainment became linked to also being educational as others relate it to being useful for academics.

2.2 Methodology

2.2.1 Research Design

For this particular study, the researchers used a Qualitative approach because it correlates with the Experiences of students when using Social Media for learning. Furthermore, they are provided with questions that they can answer freely with their own thoughts or personal basis. This method then can answer the questions provided by the researchers, as they can compare and analyze the answers given by the respondents.

2.2.2 Population Sampling

The study obtained fifteen (15) students from each strand from the Grade 11 year. Students from ABM (Accounting and Business Management), HUMSS (Humanities and Social Sciences), and STEM (Science, Technology, Engineering, and Mathematics). The researchers computed and were tasked to gather five (5) students from each strand.

The students gathered were from ABM - St. Jude Thaddeus and St. Matthew the Apostle, HUMSS - St. Francis De Sales and St. Isidore of Seville, and STEM - Blessed Carlo Acutis, St. Francis of Assisi, St. Luke the Evangelist, and St. Patrick of Ireland.

The sampling technique utilized was Cluster Sampling. The respondents were first categorized based on their Year Level and Strand they are based on. By selecting students from each cluster, the representation of each strand is equal and were made to understand how various students from different strands utilize Social Media as means of collaboration across different tasks. This also allowed the researchers to gather and find the right participants for the study.

2.2.3 Research Instruments

A personal interview was conducted to obtain a response from the students of San Jose Academy. Furthermore, students who were not able to participate personally were given the time to participate virtually. The online platforms like Messenger, Google Meet, Google Forms and Zoom were used. The questionnaires

were given to the respondents beforehand and contained Six (6) questions for them to answer.

2.2.4 Data Gathering Procedure

In our research , "Online Synergy: The Effectiveness of Social Media Applications on Grade 11 Students' Collaboration", the researchers gathered the insights of students across different strands, including ABM, HUMSS, and STEM. This study investigates how Effective social media is on Grade 11 Students in San Jose Academy. Before the collection of any data, the researchers made sure to follow a process before conducting the interviews across different strands. First, the researchers distributed consent forms to 5 students from the Grade 11 ABM, HUMSS, and STEM strands, with a total of five (5) students from each strand. The target respondents for this research were those students who are currently in grade 11 and studying at San Jose Academy. A total of 15 students are needed for the interview segment, so a total of five (5) students from the ABM, HUMSS, and STEM strands.

The Questionnaires prepared for the interviewees were created beforehand and validated by the Researchers' Adviser to ensure proper and formal interview questions. The questions prepared contained questions about:

- Students' perception of Social Media's impact
- Preferred platforms used by the students
- Problems of Social Media

After the finalization of the questions, the researchers were then allowed to conduct their interviews at San Jose Academy, if time permits them to do so. If not, researchers are made aware to conduct online interviews if time becomes restricted for the interviewees.

Before the initial interview, students were made sure to read the consent forms and were made aware that any information stated was to be confidential and only used for academic purposes, in this case, *Practical Research 1*. Once consent was obtained, the students were interviewed with the help of provided questionnaires that were given out beforehand, online forms, and voice memos from the respondents, who were also made aware that any information stated remains confidential. During the interview, students were allowed to use any form of medium and were encouraged to answer to express their own ideas freely.

We conducted interviews face-to-face and also online interviews for those students who have limited time. Additionally, we also distributed forms containing questionnaires for other students also. To add a more personal touch, we also asked some participants to send voice messages through Social Media platforms like Messenger and Instagram, allowing them to share their thoughts more freely.

After gathering all answers, the data was analyzed carefully and sorted depending on the students' strand and common answers from the respondents. Following this, the researchers created possible conclusions and what they then can recommend for usage for students in different Grade levels.

3. RESULTS AND DISCUSSION

After the conducted interview with the respondents, the researchers then analyzed and categorized the response of the students. During the interview, the ages mentioned by the students were 16, 17 and 18. The researchers also concluded that students do in fact use Social Media daily or everyday. To analyze it more carefully, the questions are then categorized into

three (3) sections, each section contains two (2) sub-questions which then address the section above it.

Table 1. How do students view Social Media as a tool for learning?

Question	Common Themes	Code Frequencies
1. As a student, how useful has Social Media been for you?	a. Expanded knowledge b. Communication purposes c. Entertainment purposes d. Obtain information easily e. Accessible for everyone f. Keeps me updated on news g. Sharing of information h. Access to research materials	a. 4 b. 6 c. 2 d. 7 e. 4 f. 3 g. 2 h. 2
2. How has Social Media impacted your strand?	a. Greatly influenced understanding b. Access to valuable information c. Easy communication d. Made me knowledgeable e. Informed about the latest news	a. 4 b. 4 c. 4 d. 2 e. 4

Table 1 shows the views of the students when they think of Social Media as a tool for academics.

For Question No. 1, which asks how useful social media has been for students. Seven (7) said that they obtained information easily, six (6) said they used it for communication purposes, four (4) said it expanded their knowledge and is accessible for everyone, three (3) said it keeps them updated on the latest news, while two (2) are for entertainment purposes, sharing of information and access to research materials.

For Question No. 2, which asks how social media impacted their strand, there were four (4) that said it influenced their understanding, provided access to valuable information, promoted communication and informed them about the latest news, while two (2) said it made them knowledgeable.

Table 2. How do students utilize Social Media for learning?

Question	Common Themes	Code Frequencies
3. What Social Media do you use?	a. Messenger b. Instagram c. Facebook d. Tiktok	a. 14 b. 6 c. 8 d. 5
4. How often do you use Social Media?	a. Everyday/Regularly/ Often	a. 15

Table 2 shows the utilization of social media by students.

For Question No. 3, which asks what platforms they use, there were fourteen (14) who said they used Messenger, eight (8) who used Facebook six (6) said Instagram, and five (5) that said TikTok.

For Question No. 4, which asks how often they use social media, all students said they use it on an everyday or regular basis, amounting to fifteen (15).

Table 3. What are the challenges students face when using Social Media for learning?

Question	Common Themes	Code Frequencies
5. What are the common challenges you experience when using Social Media?	a. Weak internet b. Privacy risk c. Distractions d. Miscommunication e. Misinformation f. Cyberbullying	a. 3 b. 2 c. 3 d. 5 e. 3 f. 2
6. Do those challenges hinder the capabilities of the students?	a. Yes b. No	a. 11 b. 4

Table 3 shows the challenges commonly faced by the students when using social media.

For Question No. 5, which asks what common challenges they face, there were five (5) who said miscommunication happens often, three (3) said weak internet, distractions, and misinformation while two (2) said privacy risks and cyberbullying.

For Question no. 6, which asks if it hinders their capabilities, there were eleven (11) that said yes explaining that it limits their potential and abilities while four (4) said no, saying that it does not hinder capabilities; rather the communication between the students.

4. CONCLUSION AND RECOMMENDATION

The study concluded that students perceived Social Media as an Academic tool that is beneficial to the lives of students in the Grade 11 year. With social media, information has been relatively easy to gather and obtain to be able to use for academic papers or works. It made communication between students easy and made academics fun to do.

With the use of different platforms, students are able to gather information from different sites and use it. Platforms like Facebook and Messenger are commonly used by students to research and communicate with others on the platform. The results also concluded that students regularly use social media, may it be for academics or entertainment.

Though it has positive sides, there are risks that come with the use of social media. With lack of care, you are prone to invasion of privacy or your information being leaked. Without proper use, it can cause miscommunication and further spread misinformation among its users.

RECOMMENDATIONS

The results of the study showed that using social media as an academic tool enhances the lives of students in different aspects; it also helps them in terms of being updated on different news or expanding their knowledge. However, it poses risks of being exposed to multiple media that can harm the users or the students. For future researchers, it is recommended that they focus on its impact on students' lives, as it may differ from now due to it maybe becoming more advanced in the near future. Future studies may further enhance this study and analyze its impact on the lives of students' now compared to those of the future students who use Social Media. The outcome of this study proves that Social Media does impact Students' Success in different aspects.

5. ACKNOWLEDGMENTS

The Faculty of the Senior High School Department, San Jose Academy accept the research paper title:

"Online Synergy: Evaluating the Impact of Social Media Platforms on

the Student's Learning of Grade 11 Students of San Jose Academy"

Submitted by Giann A. Areglo, Aaron John C. Alcala, Elijah Gerivo V. Faustino, Mikhaela Jenina M. Arulfo, and Kheanna Kenchi R. Del Mundo in partial fulfillment of the requirements for Practical Research 1 for SY 2024-2025.

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The Role of Social Media in Influencing Body Confidence Among Grade 11 STEM students in San Jose Academy

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Abstract: This study explores the role of social media in influencing the body confidence of Grade 11 STEM students at San Jose Academy. It focuses on how different types of content, such as fitness, beauty, lifestyle, and influencer posts, affect students' self-perception and whether social media has a positive or negative impact on their body image. The researchers used a qualitative approach and conducted interviews with students selected through convenience sampling, which allowed for easy access to participants who actively use social media. The findings show that social media has both positive and negative effects on body confidence. Some students feel inspired by fitness and lifestyle content, leading them to adopt healthier habits. However, others feel insecure due to comparisons with idealized images online. Peer influence and social media trends also play a role, with some students feeling pressured while others developing self-acceptance. Body positivity content was found to boost confidence for some students, but its impact varies depending on personal perspectives. The study concludes that social media's effect on body confidence depends on how students engage with and interpret the content they see. Raising awareness and promoting healthy social media habits may help reduce negative effects on self-perception.

Key Words: Body Confidence: STEM: Social Media: Effects: Influence

1. INTRODUCTION

1.1 Background of the Study

In the Generation we live in today, most of us especially those who were born in the early 2000s and late 1960s, where social media has become an essential part of every individual's daily lives, influencing their ways how individuals interact and understand the world which revolves around them. Through different popular social platforms like Instagram, Facebook, and TikTok and many more, individuals can connect with others and see every difference they have with someone else's lives. This social media exposure can lead to differences in personal perspectives, seeing different personal figures and often

wanting to be one of them or to be who they are rather than being who they really are.

The way people feel about their appearance or body is how they perceive themselves and accept the way they look. From an article by (*Body Image and Self-Esteem (for Teens)*, n.d.), they believe that body confidence aids people to be worry free and enjoy the ways they look. It boosts their self esteem and this leads to good connections with others, engage in more activities and overall just be who they are. On the other hand, low body confidence gives people a struggle to be confident about who they are, they see themselves lower than others and lose the sense of self-respect that may lead them to be confused or want to be someone else.

The purpose of this study is to examine the positive and negative effects of social media on body confidence. It explores different activities and contents on the platforms and how it affects the respondents or the Grade 11 STEM students in the age intervals of 16-18 years old involved in this study. By analyzing some factors such as online interactions, content display, and comparison habits, the researchers are determined to seek and to provide an understanding of how social media builds an individual's confidence in their body and overall self-image of the students.

This scenario happens most especially among adolescents and teenagers since this age setting deals with how individuals in this time are starting to discover themselves. According to a study by Pedersen (2023), Social Media can give both Good and Bad Effects to the Body Image of an Individual. Where it can be a platform for both body positivity and body dissatisfaction.

From a study by Krzymowski (2025) Social Media influences adolescents in shaping how teenagers perceive themselves, their role models , and what idea it is to have for a good and happy life .With the continuous rise of idealized beauty standards and fancy lifestyles on social media, these influences can deeply affect their body confidence and image possibly leading them to discover different effects of social media to their body image.

1.2 Statement of Objectives

This study aims to identify the effects of social media on the body confidence of Grade 11 STEM Students of San Jose Academy by exploring both its positive and negative influences. Specifically, it seeks to address the following objectives:

1. What factors influence body confidence through social media?

2. In what ways does social media impact an individual's perception of their body?

3. How does social media promote or interact with body positivity?

1.3 Scope and Delimitation

This research study is limited to Grade 11 students from the Science, Technology, Engineering, and Mathematics (STEM) strand at San Jose Academy, specifically from four sections: St. Patrick, St. Carlo, St. Luke, and St. Francis. The research will focus on the influence of social media on body confidence, including the emotional and social aspects

related to how students perceive themselves and interact with others based on their body image. The study will not address the broader psychological impacts or other social media-related issues outside the scope of body confidence, such as mental health or academic performance.

Information will be gathered through interviews with a total of fifteen participants after using the convenience sampling to get the participants readily available for this study, with any gender to further determine differences and similarities in their answers. This study does not include students from other strands, grade levels, or schools, and it does not examine the influence of traditional media or other external factors on body confidence.

1.4 Significance of the study

This study is designed to find out the impact of social media in the body confidence of Senior High School Grade 11 STEM students of San Jose Academy. Findings from this research will be beneficial to the following parties:

Students. This study will raise the awareness of students regarding the impact of social media towards their perception of self image and body confidence. This can help them have a better perspective of themselves and become better critical thinkers when processing information online.

Parents and Guardians. The research findings aim to equip parents and guardians with knowledge about social media relevance in order to help build their children up to fighting body confidence.

Teachers. The study can be used to initiate programs or interventions pointed towards achieving digital literacy and/or self-acceptance or mental well-being among students.

School Administrators. The result of this study can support school administrators to have policies or activities to create a healthy and supportive environment for students, since this environment can direct the social media effects on body image positively.

2. METHODOLOGY AND RRL

2.1 Review of Related Literature

Local

As stated in the study by Gamboa et al., (2023) social media addiction does not directly lead to negative body image, it increases the likelihood of social comparison, which can influence body perception. Being overweight is consistently associated with a negative body image, emphasizing the impact of societal beauty standards and body shape distortion. Additionally, the study found no significant link between income and body image, suggesting that other factors contribute to this relationship.

The literature review by Carballo (2024) examines the self-esteem levels of senior high school students in Davao City across personal, social, and appearance domains, revealing consistently high scores that indicate overall confidence and well-being. Using person correlation, the study analyzed the relationship between social media use and perceived body image, finding significant correlations in the areas of academic, socialization, and informativeness,

while entertainment showed no significant impact. Regression analysis further demonstrated that socialization and informativeness on social media significantly predicted both perceived body image and self-esteem. These findings highlight the role of positive social interactions and informative content in shaping adolescents' body perception and self-esteem, emphasizing the need for mindful social media engagement to support their development.

Dalimeg et al. (2022) found that social perception significantly influences body shaming among Filipino men. Despite the popularity of social media, body shaming is more common in real-life settings. Filipino men, particularly those aged 21 to 23, are conscious of their appearance and aware of others' gaze, even if they have a normal body size. Although body shaming has minimal impact on their confidence or abilities, Filipino men are sensitive to comments about their appearance and may feel upset. The study also highlights that body shaming is not limited to any specific body type and that social perception plays a key role in how Filipino men react to such experiences

Canonigo et al. (2024) found that students primarily use social media for communication, education, information sharing, staying informed on current events, entertainment, stress relief, and collaborative learning. However, excessive use of these platforms can lead to anxiety, disrupted daily responsibilities, and negative self-perception. For example, relying on social media for news consumption increases paranoia, while using it for entertainment and stress relief interferes with daily tasks. In terms of body image, students are highly focused on grooming and appearance, but this preoccupation can lead to extreme dieting or cosmetic alterations, negatively affecting self-esteem and fostering unhealthy comparisons. Psychological well-being assessments also show a moderate need for improvement in areas such as independence, adaptability, personal growth, relationships, purpose, and self-acceptance, indicating a lack of self-awareness and the need for introspection and personal development.

Argonia et al. (2022) found that Instagram and the beauty standards promoted on the platform can be toxic, pressuring individuals to conform to unrealistic ideals. While the beauty industry on Instagram has become more inclusive and diverse, it still exerts a significant influence on users. The study highlights the online and offline experiences of Instagram beauty influencers, who face pressure to maintain a curated image. This pressure often leads to the creation of a false front, despite prioritizing transparency with their audience. Though some safe beauty communities exist, the platform is still considered toxic due to the pervasive beauty standards. Influencers' offline lives are similarly affected by these ideals, with their daily routines and events influenced by expectations. Despite the pressures, influencers recognize the importance of self-love and appreciation for maintaining self-worth and preventing burnout. The study emphasizes that Instagram beauty influencers, with their extensive exposure to beauty standards, possess valuable insights into their impact. This research focuses on their perspective, offering a deeper understanding of how these beauty standards affect their lives both online and offline.

Foreign

From a study by In-Mind (In-Mind, n.d.) one

of their references from 2015 defines that Body Confidence is the way people feel about their appearance or body. Emphasizing that body confidence is not just about how one looks, but also about how they feel about themselves. This means accepting and appreciating one's own body as it is, without constantly comparing it to others or feeling pressured by societal standards of beauty. In other words, body confidence is about having a positive and accepting attitude toward one's physical appearance, which contributes to a healthy self-esteem and emotional well-being.

The article Body Image and Self-Esteem (for Teens) (n.d.) gives different strategies for helping individuals, particularly teenagers, to accept and love their bodies. It emphasizes understanding of an individual's body image. How they perceive and feel about their physical appearance is the key to building a positive self-image. By learning to appreciate their unique body shape and appearance, teens can face challenges like the negative influences, such as unrealistic beauty standards or social comparisons, that often lead to body dissatisfaction. This article suggests that promoting self-acceptance and healthier perspectives on body image can improve a person's well being and self-esteem.

According to a study by McLean et al., (2019) The study findings indicate that, although adolescents or teenagers frequently take selfies and photos of themselves, they tend to post them online less often. The review points out that some selfie behaviors may negatively affect well-being and body confidence, particularly when adolescents view selfies on social media. This negative impact is exacerbated by their desire for validation from feedback, leading to unhealthy social comparisons that can harm self-image. This study by McLean et al., states that teenagers being those who are the ones who frequently take photos of themselves, inevitably posts online because of the need of validation, wherein this study can be of a clue on what adolescents or teenagers get from Social Media in connection to Body Confidence.

The study by Krzymowski (2025) shows that social media affects body image, with 40% of teenagers and 20% of adults reporting issues. It also found that young females are more likely to experience body dissatisfaction. While social media can negatively impact body confidence, the study suggests there are also potential outcomes to explore, highlighting the need for further research on this topic.

The study by Pedersen (2023) proves that Positive and Negative outcomes are possible when it comes to the effects of Social Media. Whereas the positive side of it can lead to Body positivity which promotes confidence and self-esteem to one's own body to embrace all its features without hesitation. Although it also includes Negative outcomes such as body dissatisfaction and comparison to those they see online, with this in mind, multiple issues may come to arise and harm the body confidence of a person. In this study, the researchers are determined to seek which of these are often experienced by the respondents.

2.2 THE METHODOLOGY

2.2.1 Research Design

The researchers utilized a qualitative method for the study because this method is suitable for the researchers to obtain the objectives and answers for this study, which is

to determine how Social Media influences a student's body confidence. Using this method, the information obtained during the data gathering procedure of this study will result in the answers for the questions connected to this research.

2.2.2 Population Sampling

The population for this study contains fifteen (15) students from the Grade 11 STEM (Science, Technology, Engineering, and Mathematics) strand. The students were selected from four given sections: St. Carlo, St. Francis, St. Luke, and St. Patrick. We have computed to gather four (4) students from St. Carlo, St Francis and St. Patrick and three (3) from St Luke in each of the four sections that are available in our study.

The researchers chose to use the convenience sampling technique in order to choose or pick who among the students of the Grade 11 STEM strand are willing to get interviewed about the certain topic, without any force and through this, those who have no time to do an interview will not overlap another task. And to our benefit, the researchers will be able to find readily available and the right participants for this study.

2.2.3 Research Instruments

An Interview or a Focus Group Discussion will be used to obtain comprehensive responses from participants, allowing the researchers to explore their personal experiences and perceptions related to body confidence and social media influence. The researchers have prepared a set of ten (10) interview questions to be used during face-to-face interviews and online interviews either individual or in groups for the participants to feel more secure rather than just being alone. Before conducting interviews, the research interview questions were validated by Ms. Camille Perez, a Practical Research 1 Teacher in San Jose Academy and the Research Adviser of the Researchers of this study.

2.2.4 Data Gathering Procedure

This study investigates the influence of social media on body confidence among Grade 11 STEM students at San Jose Academy. To ensure the accuracy and reliability of the data collected, the researchers followed a systematic process in conducting the study. Firstly, a consent letter was prepared and distributed to the selected Grade 11 STEM students of San Jose Academy. The target population for this study is all Grade 11 - STEM students at San Jose Academy. A total of 15 students, specifically from four (4) sections: St. Patrick, St. Carlo, St. Luke, and St. Francis, will participate in this research.

The specific number of participants will be determined based on the point of data saturation, ensuring that all of their perspectives are captured. This letter outlined the purpose of the study, assured respondents of the confidentiality of their responses, and emphasized that participation was voluntary. Following this, the researchers developed a questionnaire checklist designed to identify the influence of social media on body confidence. The questionnaire included structured questions that sought to answer the respondents' experiences, perceptions, and attitudes regarding social media's influence on their self-image. Once the questionnaire was finalized, the study was conducted at San Jose Academy, where selected Grade 11 STEM students participated as respondents. The researchers utilized convenience sampling, a method that allowed them to

specifically select individuals who were available to fit the study's criteria. During the data collection process, the respondents were given clear instructions and were encouraged to answer the questionnaire as honestly as possible. The interview happened for 3 days starting February 19 to 21 2025.

After gathering all the completed questionnaires, the data was carefully reviewed and analyzed to identify trends, patterns, and significant findings related to the research topic. Finally, based on the analysis of the collected data, the researchers formulated a conclusion and provided recommendations.

3. RESULTS AND DISCUSSIONS

In order to present the gathered data and answers clearly and concisely, the researchers used a tabular format to present the common themes and codes from the participants' responses, along with the frequency of how much the respondents answered the questions in each theme. Given the variety of responses, only the themes mentioned three or more times were included. The questions were divided according to the Statement of Objectives. The three (3) main questions are given three to four (3-4) questions to answer the main questions

The researchers have collected various answers from the fifteen (15) participants for this study age from 16, 17, 18 and 20 years old. During the interview, the researchers found out which among the common social media platforms are used the most. The answers say that Tiktok, Facebook, Instagram are mostly used by our respondents and are mainly used for entertainment and education.

TABLE 1 - What factors influence body confidence through social media?

QUESTIONS	Themes	Respondent Code
Q1: What types of content on social media just like fitness, beauty, lifestyle and influencer posts have the most impact on how you perceive your body?	a.Fitness - Body shaping and body building and slimming b.Tutorials (Beauty, Fashion and activities) c. Academic Purposes d. Exposure to beauty and fitness influencers.	a. 5 b. 2 c. 2 d. 6
Q2: When you see trends or actions on social media, such as beauty trends or celebrity behaviors, do you ever feel like you should try them? Why or why not?	a. Yes to trying. (Fitting in and Persuasion) b. No.(Suitability and Budget) c. Sometimes/ Depends	a. 8 b. 2 c. 5

	(Appeal to style and Preference)	
Q3: Does the way your peers portray themselves affect you and your perspective about your body?	a. Yes. (Pressure, Insecurity and Necessity to Fit in) b. No. (Self Acceptance and Values)	a. 9 b. 6

Table 1 contains various questions which will answer which among the factors influence Body Confidence.

Question 1 explores what content on social media has the most impact on the respondents. There were four (4) common themes; Influencers with the highest frequency of six (6) mentions, followed by fitness with five (5) mentions and both Tutorials and Academic Purposes with two (2) mentions.

Question 2 asks about how trends on social media can influence a person into doing them. Eight 8 mentions were given to Yes, to trying trends. Mainly for fitting in and persuasion. Next was Depends/Sometimes, with five (5) mentions in reason of appeal. And lastly No due to suitability and Budget with two (2) mentions.

Lastly, Question 3 focuses on how Peer Portrayal can affect the perspective of the students about their body. Nine (9) mentions were given to Yes, as they affect them through Pressure and Insecurity. And six (6) for No, because some consider Self Acceptance and Values.

TABLE 2 - How does social media affect a person's body confidence?

Questions	Themes	Respondent Code
Q4: When you scroll through social media, do you usually feel more confident, less confident, or the same about your body? Can you share an example of when you felt this way?	a. Less Confident - Comparison and Insecurity b. More confident - Motivation and Inspiration	a. 6 b. 9
Q5: Have you ever come across a negative feeling about yourself during that	a. Comparisons b.Ignored online	a. 10 b. 2 c. 3

one time you went into social media? Would you like to share?	c. Body Acceptance	
Q6: Have you ever compared yourself to those you see online? How did it make you feel?	a. Yes (Comparison is active in social media) b. No (Sees self as unique)	a. 11 b. 4
Q7: How do these contents you see online affect the way you see yourself or your body confidence?	a. Insecurities affected (Reasons: Comparisons) and Pressure is weighed down b.Motivated and uses this as advice	a. 6 b. 9

Table 2 focuses on how Social media affects a person's Body Confidence.

Question 4 focuses on the Confidence Level students feel upon visiting social media platforms. Nine (9) Mentions were given to the More Confident due to Motivation and Inspirations. Meanwhile six (6) mentions were given to the Less Confident for Comparison and Insecurity.

Question 5 Focuses on the Negative side Social Media may give, ten (10) mentions were given to the Comparison Effects of Social Media. With three (3) mentions indicating to Being ignored online and two (2) for not minding the Negative sides of Social Media

Question 6 on the other hand, asks about the comparisons that may happen in Social Media. Eleven (11) mentions were given to Comparisons are Active and/or Comparisons are experienced in Social Media. Meanwhile, four (4) answers in No for a reasons as seeing themselves as "unique"

Lastly, Question 7 asks how social media contents affect the perspective of a person's body confidence. Six (6) has mentioned having Insecurities and Pressure and Nine (9) having used social media as a source of motivation and advice.

TABLE 3 How does social media engage with body positivity?

Questions	Themes	Respondent Code
Q8 Have you ever come across some posts that	a. Yes, plenty of Posts and Groups	a. 8 b. 2 c. 5

promote body positivity? Do you think or have you felt a boost in your body confidence because of this?	promote Body positivity to promote and enlighten Body Confidence b. Giving assurance and advice c. Embracing Natural Beauty and Self Love	
Q9: In your opinion, do you think social media can help you feel more body confident or feel more self love?	a. Yes, Responsible posting b. Encouraging posts c. Negative posts	a. 5 b. 6 c. 4
Q10: Do you think celebrities increase the impact of body positivity for body confidence?	a. Provides self-care and beauty advice b. No, excessive makeup and Plastic surgery	a. 11 b. 4

And for the last table, Table 3 presents how Social media can be a bridge for Body Positivity to promote Body Confidence

Question 8 asks about being able to come across Body Positivity posts. Although all of the answers state yes. Promotion of Body Confidence has the most mentions of eight (8), followed by posts that embrace natural beauty and self love with five (5) mentions and two (2) mentions for assurance and advice that boosts body confidence.

Question 9 asks about can social media help an individual feel body confident or self love. Results say Yes due to Encouraging posts with six (6) mentions followed by responsible posting with five (5) mentions and an answer that disagrees due to negative post with four (4) mentions.

And Question 10 asks about how celebrities can increase the impact of Body confidence in social media. Eleven mentions were given to Yes, because they promote self-care, give beauty advice and four (4) mentions for No, because of Excessive makeup and Plastic surgery.

4. CONCLUSIONS AND RECOMMENDATION

Conclusion

The primary objective of this study was to explore the role of social media in influencing the body confidence of Grade 11 STEM students at San Jose Academy. It aimed to understand how different types of content, such as fitness, beauty, lifestyle, and influencer posts, impact students' self-perception and whether social media serves as a positive or negative factor in shaping their body image.

The researchers conclude that social media has a dual impact on students' body confidence. While

some students feel motivated and entertained by fitness, tutorial and influencer content, leading them to adopt healthier habits and to have further inspirations to do activities that may bring growth to their personalities and themselves. The others experience insecurities due to comparisons with idealized online images. Peer portrayal and social media trends also influence body perception. with some students feeling pressured and the others embrace self-acceptance. Additionally, body positivity content was recognized as a factor in boosting confidence, though its impact varied depending on individual perspectives and the content the respondents come across in social media. Importantly, the influence of social media on body confidence is shaped by how students engage with and interpret the content they consume.

Recommendations

The researchers of this study recommend that further research and analysis of the topic is needed in order to further see the impact of Social Media Platforms to the Body Confidence of not only students but also people who are living with the digital society. With this, future researchers and the community may come up with mechanisms and ways to cope with the given negative effects of Social Media regarding Body Confidence.

For the Students. The researchers advise you to become aware of the different impacts of Social Media to a person's Body Confidence in order to determine and avoid the negative effects that were stated in this study.
Parents and Guardians. The Researchers suggest you give guidance and support to the children because Body Confidence is important to build up a child's confidence and self-esteem.
For the Teachers. We recommend that teaching a topic about Body Confidence would be essential to further educate a student's intellect, in order for them to become aware about how Social Media can be a bridge for realizing how important taking care of their body confidence is.

For the School Administrators. We suggest that creating an activity regarding the support of a healthy body confidence is essential for everyone to have better confidence about themselves and self-esteem

According to the results gathered after conducting this research. The researchers suggest to do these following activities in order to enhance Body Positivity and promote Body Confidence

- Share ways on how to enhance body positivity
- Becoming aware of valuing self-love and self-acceptance.
- Encourage healthy habits rather than perfection
- Educating the society about Media Literacy for further information.
- Advocate Positivity in Social Media

And lastly, for Future researchers. It is recommended to conduct further research about this study for knowing more about this can bring the society more self-love and self-acceptance to one’s body confidence. Low Body Confidence can be root to Mental Health problems. Conducting more studies on other strands and grade levels other than STEM is suggested in order to determine further answers to get more information.

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The Faculty of the Senior High School Department, San Jose Academy accepts the Research Paper entitled:

The Role of Social Media in Influencing Body Confidence Among Grade 11 STEM students in San Jose Academy

Submitted by Josh Apolinario, Alkimi Comia, Santhino Ruiz Gutierrez, Franchesca Claire Pandiño and Marie Celestine Rola in partial fulfillment for requirements for Practical Research 1 for School Year 2024-2025.

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Potable Water Access in Flood-Prone Navotas West: An Assessment of Household Filtration Methods and Practices

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Abstract: Access to clean and safe drinking water is a critical issue in flood-prone areas such as Navotas West, where water contamination is an ongoing issue. This study investigates the water filtration methods employed by residents to ensure potable water, examining their effectiveness, accessibility, and sustainability. Using a descriptive phenomenological research design, data were gathered through interviews with 15 randomly selected residents. The findings reveal that the majority of respondents rely on commercially available mineral water due to concerns about tap water contamination, convenience, and perceived safety. Other commonly used filtration methods include boiling, household filtration systems, and traditional filtering techniques such as straining water through cloth. The study identifies key factors influencing residents' choice of filtration methods, including concerns about water safety, economic considerations, and ease of access. While many residents perceive their filtration methods as effective in improving water quality, some challenges were noted, such as the nature of boiling and the potential for filters to accumulate impurities if not maintained properly. Flooding exacerbates these challenges by increasing the risk of water contamination, disrupting water deliveries, and limiting residents' ability to access clean water. Results also indicate that while water filtration and mineral water consumption are considered viable long-term solutions, some residents view these methods as temporary fixes rather than sustainable options. Recommendations from participants highlight the importance of maintaining filtration systems, considering alternative purification techniques, and ensuring proper storage of potable water.

Key Words: Flood-prone areas; Potable Water; Water Filtration; Sustainability

1. INTRODUCTION

1.1. Background of the Study

According to UN and UNICEF data, 53% of families in the Philippines lack access to a securely regulated water supply, and 39% of households lack proper sanitation. In schools, the situation is considerably worse, with 55% lacking access to a safely managed water source and 26% lacking adequate sanitary facilities. These circumstances emphasize how urgently accessible and efficient water filtering techniques are needed, especially in flood-prone locations where water

contamination is an ongoing issue. Filtration is a fundamental process used to remove solid particles from a liquid or gaseous fluid through a filter medium, allowing the fluid to pass while retaining the unwanted particles. This process can involve physical barriers, chemical treatments, or biological mechanisms to ensure the effective separation of contaminants. The filtration process occurs through various mechanisms, including straining, flocculation, sedimentation, and surface capture.

Navotas City, a flood-prone coastal area, faces ongoing issues guaranteeing access to drinkable water, especially during severe weather conditions. Being a tidal flat, the region is extremely vulnerable to flooding, which is made worse by storm surges and tidal oscillations. Typhoon Nesat (Pedring) in 2011 is a noteworthy example, as it had a significant impact on the city and forced residents to flee to congested school buildings with insufficient basic amenities and water supply. This study focuses on the strategies employed by Navotas West locals to guarantee access to drinkable water in a region that frequently floods. By considering how floods affect their supplies of drinking water and the filtration techniques they employ to ensure water safety is the key emphasis. In particular, this study focuses on the kinds of water filtration methods used, such as filter machines, boiling, or buying gallons of water.

According to Alsulaili et al. (2020) people often rely on household filtration systems due to concerns about physical, chemical, and biological contaminants in municipal water. The study found that while filters significantly improve water quality, there were no notable differences between various filter types for most water properties. However, it was noted that filters could become reservoirs for impurities if not adequately cleaned and maintained. Furthermore, residents may rely on household filtration methods to ensure safe drinking water. Given the risks of contamination during floods, understanding the effectiveness and maintenance of these filtration systems is crucial. If filters are not properly maintained, they could pose additional health risks rather than serving as reliable solutions for clean water access.

This study aims to investigate the water filtration methods where residents are having access to clean and drinkable water. Specifically, it aims to identify the various filtration methods used, analyze how well they remove contaminants, and determine whether they are sustainable and accessible. This study aims to provide insights into potential improvements in water filtration practices, contributing to safer and more reliable drinking water solutions for the community.

1.2. Statement of Objectives

The primary objective of this research is to evaluate the accessibility and safety of potable water, with the use of different filtration methods and practices of households in the flood-prone area of Navotas West. This study aims to identify the effectiveness of the various filtration techniques that are being used by the residents. In a region that is vulnerable to contamination, this study ought to help in offering practical techniques to improve water quality and reduce health risks. Specifically, the study aims to answer the following questions:

1. What factors influence the choice of water filtration methods among residents in this flood-prone area?
2. How do residents of Navotas West determine whether to use household water

filtration practices or consume water from other sources?

3. What are the benefits and limitations of various water filtration practices among residents of Navotas West?

1.3. Significance of the Study

The significance of this study also extends to the broader context of climate change and urbanization. Flooding events are predicted to grow more regular and severe as climate patterns continue to change, raising the dangers to water safety in already susceptible places like Navotas West. This study can offer crucial information for enhancing community resilience by evaluating household filtration techniques, which are frequently disregarded in more comprehensive infrastructure development.

For Local Government, the study can guide the local government in making well informed decisions and can support the local government in formulating effective policies and strategies to ensure consistent access to safe drinking water, especially during flood events. More effectively target interventions and distribute resources to enhance public water infrastructure, disaster preparedness, and community resilience in flood-prone areas by having a better understanding of the community's present water filtering methods.

For Non-Governmental Organizations or NGOs focused on water access sanitation, and disaster relief, they can use this study to design more effective programs. By understanding the specific needs of households in flood-prone areas, they can offer more specialized assistance, like water filtration devices, community education on safe water practices, or clean water during emergencies. Their capacity to have a noticeable influence on the community will be improved as a result.

For Schools, results of the study can be incorporated into instructional initiatives at Navotas West to educate students and their families on the value of water safety, filtration, and cleanliness practices. Additionally, the study can help school administrators prepare for floods by making sure that staff and kids have access to clean water during emergencies, reducing the chance of contracting waterborne illnesses.

For Health Officers, this study can help the region's health officers better grasp the link between contaminated water and the prevalence of waterborne illnesses, particularly during floods. The project will supply vital information for tracking public health trends, creating early warning systems, and making sure that appropriate medical interventions are in place to deal with possible disease epidemics brought on by contaminated water.

For Navotas Residents, specifically residents of Navotas West, they would benefit directly from the study by increasing their understanding of efficient filtration techniques and the dangers of drinking untreated water, particularly during floods. Residents will be more capable of defending themselves and their family from waterborne illnesses as a result of this empowerment, which may result in better health outcomes. Furthermore, by promoting community-driven solutions, the study can raise awareness of shared accountability and involvement in enhancing water safety and access.

For Policymakers and Future Researchers, addressing sanitation and water access concerns in flood-prone areas can also benefit from the useful data this study can provide. In the Philippines and other

flood-affected areas across the world, it can help guide larger-scale research on sustainable water solutions by detecting gaps in household filtration techniques and water quality management.

1.4. Scope and Delimitation

This study focuses on assessing potable water access in Navotas West's flood-prone area, with a particular focus on households water filtration practices. The study aims to understand how residents in a flood-prone area ensure access to clean drinking water. It explores the various filtration methods used, the factors influencing their choices, and the challenges they face in maintaining clean water quality. The study conducted interviews and observations to learn about residents' water filtration practices and experiences.

This study will be limited only to households residing in Navotas West and will not cover other areas or communities outside of Navotas West. It concentrates only on water for residential use filtration practices limiting large scale or industrial water filtration systems. Primarily, it will focus only on residents' experiences and decisions.

2. METHODOLOGY and RRL

2.1. Review of Related Literature

A. Education and Awareness

Hossain et al. (2021) investigated the impact of floods on drinking water quality and sanitation in flood-prone areas of Bangladesh. Their study found that water sources, particularly from rivers and flooded tubewells, were highly contaminated with turbidity (128 NTU), total coliform (1800/100 ml), and fecal coliform (80/100 ml), posing significant health risks. Based on their methodology, they conducted water quality tests comparing raw and filtered water samples against WHO guidelines and Bangladesh's drinking water standards. Their study recommends the use of fabricated biosand filters, which significantly reduce turbidity and microbial contamination, as well as the adoption of alternative sanitation solutions, such as raised or floating latrines, to maintain hygiene during floods.

Schunka (2020) examined the historical dimensions of freshwater scarcity in South Asian port cities during the seventeenth and eighteenth centuries, as observed by European travelers. Using travelogues from Germany, England, and France, the study revealed how water distribution was often unequal, with access controlled by power structures within these coastal communities. European visitors noted that water scarcity frequently led to conflicts, requiring cooperation between different social groups to manage and distribute this essential resource. While these accounts were shaped by the travelers' biases, they offer early documentation of water management practices and the socio-political struggles associated with freshwater access. This study highlights that water scarcity is not a modern issue but a long-standing challenge that has shaped human settlements and survival strategies over time.

B. Ensuring Drinking Water

Tufail et al. (2024) explored the impact of climate change on access to potable water, particularly in flood-affected areas of District Nowshera, Pakistan. Their study emphasized how climate-induced hazards—such as erratic rainfall patterns, droughts, and floods—severely disrupt water supply systems. Floods, in particular,

damage water infrastructure, cause interruptions in supply, and introduce contaminants that compromise water safety. The researchers highlighted that these disruptions pose a significant threat to public health, as exposure to contaminated water increases the risk of waterborne diseases. They also underscored the importance of conducting regular assessments of potable water access following natural disasters to ensure sustainable water management. Their methodology, which involves evaluating drinking water sources after flooding events, serves as a relevant framework for the current study in Navotas West. Since the community experiences frequent flooding, assessing the effectiveness of household filtration methods is crucial to understanding how residents mitigate contamination risks and ensure a safe water supply.

C. Household Hygiene and Sanitation

Birhan et al. (2023) investigated household drinking water quality in flood-prone communities of Northwest Ethiopia. The study found that frequent flooding significantly contributed to water contamination, making it difficult for residents to access clean drinking water. The researchers identified several factors that worsened the issue, including poor sanitation practices, a lack of proper toilet facilities, and improper water storage methods. Their findings revealed that in many cases, floodwaters introduced fecal contamination into household water sources, increasing the likelihood of waterborne diseases such as diarrhea and cholera. To address these concerns, the study recommended regular water treatment, public education on safe water handling practices, and the construction of improved sanitation infrastructure.

D. Sustainable Water Management

Pedro et al. (2020) highlighted how the natural environment, particularly in flood-prone areas, significantly impacts access to clean water for thousands of people each year. The study noted that while various technological sanitation alternatives exist to mitigate these challenges, there is a lack of research evaluating their effectiveness in regions that frequently experience flooding. This gap in literature limits efforts to improve sanitation infrastructure and water quality management in vulnerable areas, underscoring the need for further studies on sustainable solutions for communities regularly affected by natural disasters.

Gaillard et al. (2008) emphasized that the capacity of flood-affected people to cope with increasing hazards is rooted in their ability to adjust their everyday lifestyles rather than relying on extraordinary measures. Their study found that the strength of livelihoods and social networks plays a crucial role in ensuring financial stability and securing basic needs during floods. Based on their methodology, the researchers conducted extensive fieldwork, including interviews with key informants, a questionnaire-based survey, informal group discussions, passive and stationary observations, photographic documentation, and the collection of secondary written documents. Their study recommends the implementation of livelihood diversification programs, the strengthening of social networks, and the development of sustainable flood adaptation strategies, such as elevated housing, improved drainage systems, and community-based disaster preparedness initiatives.

E. Economic Benefits

Porio et al. (2011) investigated the vulnerability, adaptation, and resilience of urban poor households in three flood-prone areas in Metro Manila: the Pasig-Marikina River Basin, West Mangahan, and the KAMANAVA area (Kalookan, Malabon, Navotas, Valenzuela). Their study, based on a survey of 300 households across 14 communities, found that low-lying flood-prone areas face heightened environmental and social vulnerabilities. Climate-related risks, such as rising sea levels, intensified typhoons, and stronger monsoon rains, further exacerbate the struggles of residents. One of the key adaptive strategies observed in these communities is the use of household filtration methods to address the persistent problem of water contamination caused by flooding. While these filtration practices serve as an immediate response to waterborne risks, the study underscores the need for long-term solutions to enhance community resilience and ensure sustainable access to safe drinking water.

F. Public Health and Disease Prevention

Pacheco et al. (2025) focused on the recurring problem of limited access to clean and potable water in Barangay Payatas, Quezon City. The study emphasized that residents, particularly vulnerable groups such as children, frequently suffer from waterborne diseases due to their reliance on contaminated water sources. While community-driven initiatives aim to provide sustainable solutions, the study highlighted the need for a combination of education, infrastructure improvements, and household water treatment practices to ensure long-term water security. This research reinforces the importance of localized efforts in mitigating the risks associated with unsafe drinking water in flood-prone areas.

Barlaan et al. (2015) explored the microbiological risks associated with household water filtration systems by analyzing bacterial presence in portable water filters and tap water in Metro Manila. Using DNA testing, the researchers found that most bacteria were concentrated inside the filters, with fewer bacteria present in filtered water and even fewer in unfiltered tap water. While many of the detected bacteria were common in drinking water, some potentially harmful strains were also identified, posing risks to immunocompromised individuals. Additionally, the study suggested that certain bacterial species found in the filters may have been previously undocumented, raising concerns about the long-term safety of filtration systems if not properly maintained. These findings highlight the dual role of household filtration—while it can improve water quality, improper upkeep can lead to bacterial buildup.

2.1.1. Synthesis

Access to clean drinking water is a big issue in flood-prone areas like Navotas West, particularly during and after storms. In order to guarantee that individuals have access to drinkable water, this study investigates the filtering techniques used in households. Common techniques include boiling water, utilizing commercial water filters, and making improvised filtration devices out of sand or linen. Although these techniques are popular, their efficacy is frequently hampered by a lack of funding, inadequate upkeep, and irregular access to supplies of clean water. A substantial knowledge gap about appropriate water filtration and sanitation is also identified by the study.

2.2. Methodology

2.2.1. Research Design

This study employed a descriptive phenomenological research design to explore how residents of flood-prone Navotas West experience and manage access to potable water, particularly through household filtration methods. A qualitative approach is used because it focuses on understanding people's real-life experiences, challenges, and coping strategies rather than relying on numerical data. Data was collected through interviews, enabling participants to share their firsthand experiences, perceptions of water safety, and strategies for ensuring potable water. The use of open-ended questions ensures that participants can provide detailed responses, offering a more comprehensive view of their experiences.

To ensure that the study gathers meaningful insights, simple random sampling was applied to select participants, giving everyone an equal chance to be included. The interviews will be recorded, transcribed, and analyzed to maintain accuracy and reliability. Ethical considerations, such as obtaining informed consent and ensuring confidentiality, will be strictly followed to protect participants' rights and privacy. For data analysis, thematic analysis will be conducted to identify common patterns, themes, and insights from the interviews. By documenting these lived experiences, the research aims to contribute to the broader discussion on water security in flood-prone communities, providing insights that can help local government units (LGUs), policymakers, and organizations develop more effective water management strategies.

2.2.2. Population Sampling

This study used simple random sampling to select participants from the residents of Navotas West, to ensure that every household has an equal chance of being included. By using this method, the research aims to gather a wide range of perspectives on household water access and filtration practices. Random selection allows for unbiased information of how residents obtain clean drinking water, the methods they use, and the challenges they encounter. This sampling will contribute to understanding of the effectiveness of different filtration methods within the community.

2.2.3. Research Instrument

This study utilized interviews as a core qualitative method to gather, measure, and analyze data related to household water filtration practices in flood-prone areas of Navotas West. Through these interviews, the researchers aim to explore in detail the different filtration methods employed by residents, their perceived effectiveness, and any challenges they encounter in maintaining access to safe drinking water during flood events. Interview questions will focus on topics such as the types of filtration systems used (e.g., filters, boiling, chemical treatments), frequency of filtration, the impact of flooding on water availability and quality, and the community's knowledge of waterborne diseases and water purification techniques.

The interviews will provide an opportunity for residents to share personal experiences, beliefs, and concerns about water access, helping researchers understand not only the technical aspects of filtration but also the social, economic, and cultural factors that influence water practices. By capturing a variety of perspectives, this method will offer rich, nuanced insights into how households adapt to challenges related to potable

water access in flood-prone areas. The data gathered will inform recommendations for improving water safety, enhancing community resilience, and developing more effective interventions to ensure sustainable access to clean water in these vulnerable communities.

2.2.4. Data Gathering Procedure

To conduct this study on household water filtration practices in flood-prone areas of Navotas West, the researchers will follow a systematic data collection process.

Before initiating the study, the researchers will seek permission from local authorities and community leaders in Navotas West. This step ensures ethical compliance and fosters cooperation from the residents.

An interview guide will be prepared to explore key issues, including: household water filtration practices, perceived effectiveness of filtration methods and challenges faced during flood events.

Upon receiving approval, the researchers will select households in flood-prone areas for participation. Prior to conducting interviews, a consent form will be presented to each participant. The outline will be clear with regards to the study objectives. Measures would ensure that the identities and answers of all participants are treated with best confidentiality. Participants' rights will include voluntary participation and withdrawal from the study whenever possible.

The interviews will seek qualitative information on water filtration methods adopted by households. Will also try to find how frequently they perform the filtration exercise and any maintenance done in the process, for consequent evaluation of effectiveness. Further, flooding impacts on water quality accessibility will also be part of the study and finally, study participants will be asked about their knowledge of water-associated diseases and health risks entailed.

To ensure the worthiness of data, the researchers would take detailed notes during interviews so that they could retrieve essential information. Furthermore, they would also make recordings, but with the permission of the participants to transcribe it at a later date and analyze it.

The researchers will systematically analyze the recorded responses by identifying recurring themes and patterns. This qualitative approach will provide deeper insights into the community's water filtration practices and challenges.

3. RESULTS AND DISCUSSION

This presents the findings on potable water access and household filtration methods in flood-prone Navotas West. It explores residents' experiences, choices, and challenges in securing clean drinking water in their daily lives. The discussion highlights the factors that influence their choice of filtration methods, their effectiveness, and their practicality for long-term use. Through this analysis, the study provides insights into household water management and possible ways to improve access to clean and safe drinking water in the community.

Table 1. Residents' Demographic Data

A. How long have you lived in Navotas West?

How Long	Frequency	Percentage
36-50 Years	5	33.33%
15-20 Years	4	26.67%
21-35 Years	3	20%
Since Birth	3	20%

B. How often do you experience flooding?

How Often	Frequency	Percentage
Yearly	13	86.67%
Seasonal	2	13.33%

C. How many people live in your household?

How Many	Frequency	Percentage
4-5 People	7	46.67%
6-8 People	6	40%
3 Family	2	13.33%

Table 1 presents the residents' demographic data.

Fifteen (15) residents of Navotas West were chosen as respondents. As for their length of residence, the majority have lived in the area for 36-50 years. To ensure a broad range of perspectives on household water access and flooding, a simple random sampling technique was applied, allowing for an unbiased selection of participants. When it comes to flooding, all 15 respondents reported being affected, with the majority 13 respondents experiencing it yearly, while 2 respondents experience it seasonally. Household size also varied among respondents; with 7 respondents living in homes with 3-5 people, another 6 respondents in households with 6-8 people, and 2 respondents reporting that their home accommodates three families.

Table 2. Effects of Flooding in Residents' Access to Clean Drinking Water.

Question	Common Themes	Code Frequency
1. As a resident in Navotas West, how does flooding affect your access to clean drinking water?	a. No Impact (Reliance on Mineral Water)	a. 8
	b. Contamination of Tap Water	b. 4
	c. Financial and Accessibility Challenges	c. 2
	d. Use of Water Purification Systems	d. 1

Table 2 shows the effects of flooding in residents' access to clean drinking water.

The results indicate that the majority of the respondents' reliance on mineral water during flooding had no impact on their ability to obtain clean drinking water. Many of the respondents claimed that they feel safe from concerns about water contamination because they buy mineral water in bottles or have it delivered. However, a significant number of respondents mentioned tap water contamination, raising worries that flooding exposes pipes to debris, garbage, and other contaminants, occasionally resulting in unsafe or contaminated tap water. Financial and Accessibility Challenges were mentioned by fewer respondents, who said that flooding keeps them from going outside to get mineral water or that it is expensive to buy it every day. A water purification system, on the other hand, was cited by one responder as a way to keep access to clean water in the event of flooding.

Table 3. Residents' Water Filtration Methods.

Question	Common Themes	Code Frequency

2. What water filtration methods are you using in your household?	a. Reliance on Mineral Water b. Use of Water Filtration Systems c. Boiling Tap Water d. Traditional Filtration Methods e. No Additional Water Treatment	a. 7 b. 3 c. 3 d. 2 e. 2

Table 3 shows the residents' water filtration methods.

The majority of respondents buy their safe drinking water from water stations and use mineral water as their main source, indicating a strong trust in commercially purified water over other treatment methods. Some respondents also reported using water filtration systems, either directly connected to their faucets or in in addition to mineral water, indicating the initiative to water safety; boiling tap water was another common method, especially when mineral water was not available, reflecting a traditional and economical strategy for water purification; and only a few of participants used traditional filtration methods, such as straining water through a lampein cloth, which suggests an effort to remove visible impurities despite limited access to more sophisticated filtration systems.

Table 4. Factors that Influence Residents' Choice of Filtration Methods.

Question	Common Themes	Code Frequency
3. What factors influence you to choose your choice of filtration method?	a. Preference for Mineral Water (Perceived Cleanliness & Safety) b. Concerns About Tap Water Safety c. Economic Considerations d. Convenience & Availability e. Taste Preference	a. 5 b. 4 c. 2 d. 2 e. 1

Table 4 shows the factors that influence residents' choice of filtration methods.

The majority of the respondents base their choice of drinking water source on safety concerns, with mineral water being the most popular choice because of its perceived dependability and cleanliness. A number of respondents stated mistrust in tap water, pointing to problems like discoloration, bacterial contamination from floods, and insufficient filtration. Others noted that drinking mineral water gives them health-related peace of mind. Economic considerations also play a role in decision-making; for example, some households purchase filtered water to prevent potential medical expenses associated with drinking water contamination, while others rely on tap water because they cannot afford mineral water. Another factor is availability and convenience; some people choose mineral water because it is dependable and simple to obtain.

Table 5. Past Water Filtration Practices and Reasons for Switching.

Question	Common Themes	Code Frequency
4. Have you tried different filtration methods in the past? If so, what made you switch?	a. Reliance on Mineral Water b. Filtering and Boiling c. Health Concerns d. Economic Factors e. Taste Preferences	a. 5 b. 3 c. 3 d. 2 e. 2

Table 5 shows the past water filtration practices and reasons for switching.

The results show that the majority of respondents use a combination of boiling and filtering as their main water treatment techniques, frequently out of convenience or safety concerns. Boiling water and using cloth filters, according to some respondents, are easy yet efficient ways to ensure that water is clean before drinking. However, a lot of locals prefer mineral water, either because they don't trust their tap water or because they think it's safer. The trade-off between cost and convenience was reflected in the economic reasons raised by people who choose to utilize filtration techniques rather than buy bottled water. A number of participants expressed difficulty to drink, indicating that health concerns were a significant influence in their decisions regarding water treatment.

Table 6. Effectiveness of Current Filtration Method.

Question	Common Themes	Code Frequency
5. How effective do you think this water filtration method is?	a. Perceived Effectiveness and Cleanliness	a. 9
	b. Cost-Effectiveness	b. 3
	c. Convenience	c. 2
	d. Issues with Neglect or Inefficiency	d. 2

Table 6 shows the effectiveness of current filtration method.

The findings indicate that the majority of respondents believe that their water treatment methods are clean and effective, and many of them are satisfied with the water's taste and cleanliness. Filtration and boiling methods have particular significance for giving people access to safe, clean drinking water, and the cost-effectiveness of these solutions was also often mentioned, with some pointing out that they save money when compared to buying bottled water. Additionally, many participants emphasized the convenience of using methods that are easy to incorporate into daily life, like boiling water or using filtration systems. However, some respondents noted that when neglected or improperly maintained, water treatment methods like filters can become less effective, which could result in health risks or extra expenses.

Table 7. Challenges in Using Water Filtration Methods.

Question	Common Themes	Code Frequency
6. What are the challenges you encountered while using your filtration method?	a. Time and Labor Constraints	a. 4
	b. Minimal or No Problems	b. 3
	c. Delivery and Accessibility Issues	c. 2
	d. Water Contamination	d. 2

Table 7 shows the challenges in using water methods.

The majority of the respondents raised concerns about labor constraints when utilizing water filtration techniques, especially when it came to heating water or continuing the filtration process, which many characterized as labor-intensive and time-consuming. According to the respondents, these approaches call for perseverance and work, which could deter some people from regularly following the procedure. Another major issue that surfaced was water contamination from floods or blocked filters, especially during weather events when tap water quality declines. A few respondents also reported problems with accessibility and delivery, particularly with delivery firms' delays in delivering bottled water. However, a number of respondents stated that they had little to no trouble

with their filtration techniques, particularly if they were buying bottled water or utilizing a dependable system**.**

Table 8. Water Quality Before and After Filtration.

Question	Common Themes	Code Frequency
7. How would you describe the water quality before and after using your filtration method?	a. Improved Cleanliness and Clarity	a. 7
	b. Safety and Health Benefits	b. 6
	c. Taste and Aesthetic Changes	c. 4
	d. Perceived Minimal Change	d. 2

Table 8 shows the water quality before and after filtration.

The responses indicate a strong perception of improvement in water quality after using filtration methods, especially in terms of Cleanliness and Clarity. Many respondents reported that their water became visibly cleaner and clearer after filtration, with some describing it as previously dirty or having an unpleasant taste. The Safety and Health Benefits were also a key theme, as participants highlighted how filtration reduced the risk of illness, with one respondent noting that their child no longer suffered from diarrhea after switching to filtered water. Taste and Aesthetic Changes were frequently mentioned, with some noting that the water became more refreshing and pleasant to drink after filtration, in contrast to the previous taste and appearance of tap water. However, a few respondents felt that the improvement was Minimal, particularly those who rely on bottled water and don't use filtration systems.

Table 9. Sustainability and Practicality of Water Filtration Methods.

Question	Common Themes	Code Frequency
8. Do you think your chosen water filtration method is sustainable or practical for long term use? Why?	a. Perceived Safety & Quality Improvement	a. 7
	b. Economic Advantages	b. 6
	c. Temporary/Stopgap Solution	c. 1
	d. Neutral/Indifference	d. 1

Table 9 shows the sustainability and practicality of water filtration methods.

The findings indicate that most respondents view water filtration and mineral water as effective solutions for water supply challenges, with Perceived Safety & Quality Improvement being the most common theme. Many respondents emphasized that filtered or mineral water is clean, safe, and reliable, citing improvements in water taste and health benefits, such as reduced illness. Economic Advantages was another key theme, with participants highlighting that filtration is a cost-effective alternative to regularly purchasing mineral water, though some preferred the convenience of a water station if financially feasible. A smaller number of respondents saw filtration as only a Temporary/Stopgap Solution, suggesting that they use it due to a lack of better options. Additionally, one respondent expressed Neutral/Indifferent views, indicating little concern over water type.

Table 10. Tips on Water Filtration for Fellow Households.

Question	Common Themes	Code Frequency
9. Do you have any tips for fellow	a. Use of Water Filtration Systems	a. 5
	b. Alternative Water	

households regarding water filtration? What are these?	Safety Methods c. Preference for Mineral Water d. Maintenance and Proper Usage e. Indifference	b. 3 c. 3 d. 3 e. 1

Table 10 shows The findings suggest that many respondents advocate for the Use of Water Filtration Systems as an effective way to ensure clean and safe drinking water. Several participants recommended purchasing a filtration machine or installing a water filtration system, emphasizing its long-term benefits. Others highlighted the importance of Alternative Water Safety Methods, such as boiling water before drinking to eliminate bacteria, especially for those who cannot afford filtration devices. Additionally, some respondents expressed a Preference for Mineral Water, stating that buying from a mineral water station is a safer and more convenient option, particularly given concerns about rusty or dirty tap water. Another notable theme was Maintenance and Proper Usage, with participants stressing the need to clean and replace filters regularly to ensure their effectiveness and prevent contamination. Lastly, one respondent expressed Indifference, stating that they had no advice to offer and saw no need to concern themselves with other households' water choices. Overall, the results reflect a mix of proactive strategies for ensuring clean water, with a strong emphasis on filtration, alternative purification methods, and regular maintenance.

4. CONCLUSION AND RECOMMENDATIONS

The interviewees' responses reveal a strong connection to Navotas, with many having been born and raised in the area, indicating a deep sense of community and familiarity with the challenges residents face, particularly flooding. Frequent exposure to floods has made the residents highly aware of the risks of water contamination, prompting them to be cautious about water cleanliness. Most people prefer bottled mineral water because they believe it is safer, while others use boiling and filtration as cheaper alternatives. They decide how to get their drinking water based on cost, availability, and trust in the water source. Some families struggle to maintain water filtration practices due to expenses and lack of access to proper filtration systems. While boiling and filtering water are useful methods, they require time and effort, making them hard to do regularly. While these methods demonstrate a proactive approach to safeguarding health, they may not always be fully effective or sustainable due to financial constraints, lack of awareness, and inconsistent access to resources. Some households struggle to maintain these practices regularly, especially when dealing with the economic burden of purchasing clean drinking water or filtration systems. This highlights the need for affordable and accessible water treatment solutions to help residents maintain a safe drinking water supply.

Based on the findings of this study, the following recommendations are proposed to improve access to clean drinking water and enhance flood preparedness among residents of Navotas West:

1. **For Parents** – Parents should acquire essential knowledge and skills on water safety and emergency preparedness. They must regularly monitor weather forecasts and flood alerts from reliable sources to anticipate potential risks. Households should invest in water filtration systems or

store sufficient amounts of clean water to ensure safe consumption during flooding.

2. **For Students** – Students should actively raise awareness about flood preparedness and water safety within their communities. Schools and local organizations should integrate disaster preparedness education into their programs to equip students with practical knowledge on water filtration, boiling, and safe storage methods.

3. **For Local Health Authorities** – Health agencies should implement regular community education programs on water safety, emphasizing the dangers of consuming contaminated water during floods. Routine water quality testing should also be conducted to ensure that potable water sources remain safe.

4. **For NGOs** – Non-governmental organizations should collaborate with local government units to provide access to affordable water filtration systems, distribute emergency water supplies, and conduct training sessions on proper water sanitation practices. Emergency response initiatives should also include free or subsidized mineral water distribution for vulnerable households.

5. **For Local Government Units (LGUs)** – The LGU should strengthen flood preparedness efforts by improving drainage systems and ensuring access to clean water for all residents. Policies promoting the installation of public water filtration systems and accessible mineral water stations in flood-prone communities should be prioritized

6. **For Future Researchers -** Future studies could focus on the long-term effectiveness of different water filtration methods and their sustainability for low-income households. Comparative research on various filtration technologies, including cost-effectiveness, efficiency, and community acceptance, would be valuable in identifying the most practical solutions.

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An Analysis of the Knowledge and Awareness of Bioplastics among Grade 12 Students of San Jose Academy

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Abstract: This research examines the knowledge, awareness, and perceptions of Grade 12 STEM students at San Jose Academy regarding bioplastics, focusing on their understanding of its composition, environmental impact, and potential as a sustainable alternative to traditional plastics. Utilizing a qualitative research approach, data was collected from 30 randomly selected students and voluntered students through an open-ended survey questionnaire. The findings indicate that while most students are generally aware of bioplastics, significant knowledge gaps persist, particularly in understanding the materials used in their production and their specific environmental benefits. Students primarily acquire knowledge through online platforms, school-based learning, and peer discussions, but a considerable number remain unfamiliar with bioplastics, emphasizing the need for stronger educational initiatives. Many students recognize the eco-friendly nature of bioplastics, associating them with biodegradability, reduced pollution, and sustainability. Although, concerns regarding cost, accessibility, and durability emerge as major barriers to widespread adoption. Despite these challenges, a strong willingness to use bioplastic products is observed among students, suggesting a shift toward more sustainable consumption habits. Further, factors such as social media, advocacy campaigns, and formal education significantly influence students' awareness and attitudes toward bioplastics. The study highlights the importance of incorporating sustainability topics into school curricula to bridge knowledge gaps and encourage informed decision-making regarding eco-friendly alternatives. Furthermore, increasing public awareness through media, industry collaboration, and policy support is essential to fostering a greater acceptance of bioplastics. By addressing these challenges and promoting educational and advocacy efforts, bioplastics can become a viable solution to reducing plastic waste and environmental degradation.

Key Words: *Knowledge, Awareness, Bioplastics, Alternative, Perception*

1. INTRODUCTION

1.1 Background of the Study

Plastic pollution is an increasing environmental concern that poses significant threats to ecosystems and human health around the globe. Traditional plastics, which are made from petroleum-based resources, are non-biodegradable and take hundreds of years to decompose. This has led to the accumulation of plastic waste in landfills, oceans, and other natural habitats, endangering wildlife, aquatic life, and the overall environment. In recent years, bioplastics have emerged as a promising alternative to conventional plastics due to their biodegradability and their derivation from renewable resources such as plants and microorganisms (Lopez et al., 2021).

Bioplastics encompass a wide variety of materials, including biodegradable plastics, bio-based plastics, and combinations of both. The environmental benefits of bioplastics are significant; they reduce reliance on fossil fuels, lower carbon emissions, and have the potential to help mitigate plastic pollution. When disposed of properly, bioplastics break down more easily than traditional plastics and do not remain in the environment for centuries. However, despite these advantages, the adoption of bioplastics faces several challenges. These include limited public awareness, misconceptions about their environmental impact, cost considerations, and insufficient infrastructure for production and disposal.

Educating the younger generation about sustainable alternatives, such as bioplastics, is crucial. As future consumers, educators, and policymakers, students will play a vital role in shaping the future of environmental sustainability. Thus, understanding their awareness and perceptions of bioplastics is essential for fostering a broader cultural shift towards more eco-friendly practices.

This study focuses on Grade 12 STEM students at San Jose Academy and aims to explore their level of awareness, understanding, and perceptions of bioplastics. STEM students are chosen because they are more likely to engage in scientific discussions and be receptive to new concepts related to sustainability. The research will examine how these students view bioplastics in terms of environmental impact, affordability, and practicality compared to conventional plastics. By gathering insights into their perspectives on bioplastics, the study will contribute to efforts to promote greater awareness and encourage the adoption of sustainable practices among the younger generation.

In addition to exploring the students' awareness, this study will investigate barriers to the widespread adoption of bioplastics, such as availability, cost, and misconceptions about the effectiveness of bioplastics. Through qualitative analysis, the study aims to uncover the subtle factors that influence students' perceptions of bioplastics and identify potential gaps in their knowledge. The research will be guided by key principles, including the need to raise environmental awareness among students and explore

sustainable alternatives to plastic waste, as discussed in various literature sources (Demir & Yılmaz, 2021; Bilgen, 2015).

By examining students' knowledge of bioplastics, this study aims to inform future educational initiatives and policy efforts that can promote a more sustainable and eco-conscious society.

1.2 Statement of Objectives

The objectives of this study are to explore the knowledge and awareness of bioplastics among Grade 12 STEM students of San Jose Academy.

The study will guide the researchers in addressing the following key research questions:

1. What are the perceived benefits of Grade 12 STEM students regarding bioplastics in the environment?

2. How do Grade 12 STEM students describe their understanding of bioplastics in comparison to traditional plastics?
3. What are the factors that affect the awareness of Grade 12 STEM students regarding bioplastics?

1.3 Significance of the Study

This study seeks to understand the level of knowledge, awareness, the factors influencing their adoption, and any barriers to their use, such as availability, practicality, and acceptance of bioplastics among selected twelfth-grade students at San Jose Academy. It examines students' views on the practicality, affordability, and environmental benefits of bioplastics, as well as factors influencing their adoption and any barriers like availability.

Throughout its completion, this study may benefit the following:

Students: This research aims to determine the depth of knowledge, awareness and acceptability of bioplastics among the students. They may be also aware of the benefits of bioplastics. They may also gain a deeper understanding of bioplastics, their environmental benefits, and practical applications.

Teachers: They may use the findings to enrich environmental education and promote sustainability in the curriculum.
Parents: This study will help them be more informed about bioplastics and adopting sustainable practices in their households and community.

School Administrators: This research is thought to be beneficial, particularly to San Jose Academy, as it provides insights and data that can be used to inform school policy and sustainability programs. They may also utilize this research to help promote environmental education.

Municipal Authorities: This study is considered as beneficial to the city, notably by Navotas City's officials, who will gain benefit from this research by using the findings to develop policies promoting bioplastic use, inform public awareness campaigns, and

assist local sustainability initiatives. The research can guide resource allocation for bioplastic adoption, help overcome barriers like cost and availability, and foster collaboration with local stakeholders, including schools, businesses, and environmental groups, to encourage community-wide sustainable practices.

Local Community: The local community, specifically Navotas City, this research will help them increased awareness and understanding of bioplastics, leading to more sustainable consumption and waste management practices. The findings can encourage the adoption of eco-friendly alternatives, reducing plastic pollution and its environmental impact.

Future Researchers: This study helps the future researchers as they further explain and enrich their current research study.

1.4 Scope and Delimitation

This study aims to explore the knowledge and awareness of bioplastics among grade 12 STEM students of San Jose Academy. the main objective is to examine the understanding of grade 12 STEM students among bioplastics and their potential impact on the environment, the research aims to highlight the role of education in promoting sustainable practices. This study emphasizes the importance of bioplastics as an alternative to traditional plastics, addressing the environmental issues caused by plastic waste.

The scope of the study is limited for Grade 12 students of San Jose Academy, this study is likely to influence their awareness and understanding of environmental issues, including the potential benefits of bioplastics. The study will gather insights to gain a deeper understanding of their knowledge regarding bioplastics, and their environmental implications. While this study will provide valuable insights into the level of awareness and knowledge among Grade 12 STEM students at San Jose Academy, it is important to acknowledge the limitations of the research. The study is confined to the students of San Jose Academy, meaning the results may not be generalized to other schools. Additionally, the research will not extend beyond the Grade 12 level, and other students in lower grade levels will not be included in the study, limiting the scope of the findings to this specific grade group. The focus is on assessing the students' understanding and perceptions of bioplastics, without examining the possibility or economic implications of large-scale adoption. The research will not attempt to compare the specific environmental benefits of different types of bioplastics or analyze the broader scientific or technical aspects of bioplastic production and development. Instead, it will center on how students perceive the environmental impact of bioplastics in relation to traditional plastics, in an educational context.

2. METHODOLOGY and RRL

2.1 Review of Related Literature

The increasing reliance on fossil-based

plastics has led to significant environmental challenges, particularly in waste management and pollution. As plastic consumption continues to rise, researchers have explored sustainable alternatives such as bioplastics, which offer biodegradable and renewable options. This review of related literature examines global and local studies on plastic consumption, public awareness of bioplastics, educational approaches to sustainability, the development of alternative bioplastics, and policies addressing plastic waste management. By analyzing these studies, this chapter aims to provide insights into the current landscape of plastic use, bioplastics adoption, and strategies for promoting more sustainable plastic consumption and disposal practices.

A. Public Awareness and Perception of Traditional Plastics and Bioplastics

Filho et al. (2021) found that plastic packaging is the most widely used plastic, and the majority of participants are aware of the environmental and health dangers associated with plastic waste. The study was conducted by surveying participants across Europe to analyze their opinions regarding plastics and bioplastics, with a particular emphasis on plastic packaging. They recommended increasing public awareness through education campaigns, improving the accessibility of bioplastics, and developing government policies to support sustainable alternatives. They also emphasize the need for better recycling infrastructure and collaboration between consumers, the industry, and policymakers to foster responsible plastic use and reduce environmental harm.

Skouloudis et al. (2024) found that many consumers and stakeholders in Greece have limited awareness of bioplastics, particularly regarding their functional properties and environmental benefits. The study was conducted through analysis, the growing popularity of bioplastics derived from renewable biomass sources has prompted interest in stakeholder views, particularly regarding their circularity and sustainability. However, public receptiveness and support remain underexplored, especially in different national contexts. The study recommends several actions to improve the adoption and understanding of bioplastics in Greece. It also recommends launching awareness campaigns to educate the public about the functional features, benefits, terminology, and proper disposal of bioplastics.

Dilkes-Hoffman et al. (2019)found that the Australian public had low knowledge of bioplastics, with many respondents unsure about their environmental impacts. The study was conducted through an online survey to collect data from 2,518 nationally representative Australians to assess their knowledge, perceptions, and attitudes towards bioplastics. They recommended that educational campaigns be developed to improve public understanding of bioplastics, particularly targeting younger populations like students. Schools could add lessons about bioplastics in their curriculum, focusing on their environmental benefits, proper disposal methods, and the differences between bioplastics and conventional plastics. Additionally, governments and local councils should work on improving labeling standards and waste management infrastructure to ensure bioplastics are disposed of correctly.

According to Filho et al. (2022), conducted a survey designed to assess consumer perceptions of bioplastics across 42

countries. Data were collected through a self-administered online questionnaire available for five months, from October 2020 to February 2021. They found that a majority of respondents possessed a good understanding of bioplastics, with 79.2% correctly identifying bio-based products and 82.6% accurately defining biodegradable plastics. Despite this knowledge, only 9.9% reported regular use of bioplastic products, while 45.8% used them occasionally. The authors recommended enhancing the adoption of bioplastics, the study recommends increasing their market availability and reducing costs to make them more competitive with conventional plastics. Educational initiatives should be implemented to raise consumer awareness about the benefits and applications of bioplastics. Policymakers are encouraged to support investments in the large-scale production and distribution of bioplastics, fostering a transition toward more sustainable consumption patterns.

B. Educational Approach to Environmental Issues

Torreggiani et al. (2023) found that the combination of theoretical lessons, hands-on experiments, and communication activities proved to be an effective strategy for fostering deeper comprehension and engagement. The study highlights how interactive and experiential learning methods can improve students' understanding of complex environmental issues, encouraging them to think critically and apply their knowledge in real-world contexts. The study was conducted through the use of an educational intervention method with a three-phase modular approach to enhance students' understanding of plastics and bioplastics. They recommended integrating similar modular educational pathways into high school curricula to address environmental topics more effectively. By combining theoretical instruction with hands-on experimentation and communication-based outreach, educators can create a more engaging and impactful learning experience for students.

C. Alternative Bioplastic Materials

John (2024), highlights the potential of seaweed-based bioplastics as a sustainable alternative in the artistic community. He found that by combining seaweed with ingredients like corn starch and glycerine, flexible and durable materials were created, resulting in products such as foldable water containers and artistic palettes. The study was conducted through a survey to gather the insights of 30 artists on their experience with traditional plastics, their willingness to use bioplastics, and opinions on portability, biodegradability, and environmental impact. They recommended that further research be conducted to optimize the production process of seaweed-based bioplastics, particularly in improving their durability and cost-efficiency.

The study conducted by Caraig et al. (2022) explores the use of hen eggshells and water hyacinth (Eichhornia crassipes) as materials for creating biodegradable plastic. They found that biodegradable plastic created from hen eggshells and water hyacinths displayed properties suitable for alternative applications to conventional plastics. These materials were shown to be environmentally friendly, offering a promising biodegradable option with faster degradation rates when compared to standard plastic. The authors recommended further research into optimizing the ratio of eggshell and water hyacinth to improve the mechanical strength and flexibility of the biodegradable plastic.

Cataquis et al. (n.d.) found that plastic is one of the major toxic pollutants threatening the environment. This study examines the use of indigenous plants such as potato tuber, cassava tuber, and gabi tuber as sources of biodegradable plastic. A statistical treatment method was used to determine whether there is a significant difference in the tensile strength of the bioplastic. The researchers recommended identifying the best operating conditions for producing bioplastic from cassava starch, taro starch, and potato starch to improve product quality and eliminate the presence of bubbles and the formation of visible layers in some finished products.

D. Environmental and Policy-Related Studies on Platic Waste

According to Del Rosario (2019), Plastic waste has greatly contributed to water and land pollution worldwide and marine plastic waste has caused havoc on numerous biological species. Most plastics are fossil-based and cannot be fully degraded by microorganisms. The study was conducted through the substitution of fossil-based plastics with bio-based polymers generally leads to lower non-renewable energy use and reduced greenhouse gas emission. They recommended the present problems regarding the limited biodegradability of most commercial plastics and dim prospects for easy solutions to these problems.

According to Dayrit (2019), plastic waste is a big problem in the Philippines, and the COVID-19 pandemic made it worse by increasing the use of single-use plastics like face masks. The study looked at different types of plastics, how they are used, and how the country manages plastic waste. The study found that the 3Rs (Reduce, Reuse, Recycle) don't work well because many plastics, especially single-use ones are hard to recycle. The Philippines also lacks proper recycling technology and relies too much on landfills. Even though the law RA 9003 was made to manage waste, it does not focus enough on plastic waste. The study suggests switching to a circular economy where plastics are easier to recycle. Companies should take more responsibility through Extended Producer Responsibility or EPR, and RA 9003 should be updated to focus more on plastic waste. Local governments need better recycling systems, and companies should be given incentives to recycle and make eco-friendly products. Also educating people and working together with the government, industries, and communities can help solve the plastic waste problem.

2.1.1. Synthesis

The reviewed literature highlights the urgent need to address plastic waste through increased awareness, education, innovation, and policy reforms. Studies on public perception reveal that while many individuals recognize the environmental hazards of plastic waste, knowledge and adoption of bioplastics remain limited, highlighting the need for awareness campaigns and improved accessibility. Educational research emphasizes the effectiveness of interactive learning in fostering a deeper understanding of

sustainability and bioplastics among students. Meanwhile, studies on alternative bioplastic materials explore the potential of seaweed, eggshells, and plant-based sources as viable substitutes for traditional plastics. However, challenges such as durability and cost-efficiency persist. Policy-related research stresses the importance of stronger waste management systems, regulatory support, and the adoption of a circular economy to promote sustainable plastic alternatives. These findings highlight the necessity of a comprehensive approach that integrates education, material innovation, and policy reforms to increase the adoption of bioplastics and mitigate plastic pollution.

2.2. Methodology

This chapter discusses the methodology to be used by the researchers in order to address the research questions. This includes the research design, hypothesis, population sampling, research instrument, and data-gathering procedure.

2.2.1. Research Design

This study focuses on Exploring the Knowledge and Awareness of Bioplastics Among Grade 12 STEM Students of San Jose Academy. This study utilized qualitative research design to explore the knowledge and awareness of bioplastics among Grade 12 STEM students at San Jose Academy. This approach was chosen to gain a deeper understanding of students' perceptions, attitudes, and sources of information regarding bioplastics. By employing primary data collection methods, specifically an open-ended survey questionnaire, the study aimed to gather detailed responses that reflect students' awareness, misconceptions, and willingness to adopt bioplastics as a sustainable alternative to traditional plastics.

Researchers used a combination of simple random sampling and voluntary sampling methods to select participants. Initially, simple random sampling ensured that all Grade 12 STEM students had an equal chance of being chosen, which reduced selection bias and improved the representativeness of the sample. Additionally, voluntary sampling allowed students who were genuinely interested in the topic to participate, promoting thoughtful and engaged responses. By combining these methods, the study effectively gathered diverse perspectives while maintaining fairness in participant selection.

2.2.2. Population Sampling

The researchers selected Grade 12 students at San Jose Academy. The chosen respondents are Grade 12 STEM students because the researchers believed that these students, who are in their final year of high school and heading off to college, possess significant experience and knowledge in the environment and view plastics as something that can have an alternative like bioplastics. The researchers hope that, because of their advanced academic status and learning, these students will provide valuable insights into

the awareness and knowledge about their environment and bioplastics as an alternative to traditional plastics. The researchers surveyed a total of 30 respondents, utilizing simple random sampling as their technique. This approach was chosen because the researchers aimed to know if the students have knowledge and awareness of bioplastics as an alternative to traditional plastics.

2.2.3. Research Instrument

The research instrument used in this study is an open-ended survey designed to assess individuals' knowledge, perceptions, and attitudes toward bioplastics. The survey consisted of 15 questions divided into four main sections: Knowledge and Awareness of Bioplastics, Perceived Environmental Impact of Bioplastics, Attitudes and Perceptions Toward Bioplastics, and Factors Influencing Awareness and Adoption. This qualitative approach allows respondents to provide detailed and nuanced answers, offering a deeper understanding of their awareness and perspectives.

The first section, Knowledge and Awareness of Bioplastics, aims to evaluate respondents' familiarity with bioplastics, including their own definitions and awareness of the materials used in bioplastic production. It also explores whether they perceive bioplastics as more environmentally friendly than traditional plastics.

The second section, Perceived Environmental Impact of Bioplastics, investigates respondents' opinions on whether bioplastics can contribute to reducing waste pollution, their decomposition rates compared to traditional plastics, and their effects on marine ecosystems.

The third section, Attitudes and Perceptions Toward Bioplastics, examines respondents' preferences between traditional plastics and bioplastics, their willingness to incorporate bioplastics into their daily lives, and any prior experiences they may have had with bioplastic products. This section helps identify the practicality and acceptability of bioplastics from the respondents' perspectives.

Finally, the section on Factors Influencing Awareness and Adoption explores the sources of information that contribute to respondents' knowledge about bioplastics, their views on the role of education in promoting sustainable alternatives, and the challenges that may hinder the widespread adoption of bioplastics. It also seeks suggestions on strategies to enhance awareness and encourage the use of bioplastics within communities.

By using open-ended questions, this research instrument allows for in-depth responses that capture a wide range of perspectives on bioplastics. The data collected will provide valuable insights into the factors affecting public awareness, environmental concerns, and the potential for increased adoption of bioplastics as a sustainable alternative to traditional plastics.

2.2.4. Data Gathering Procedure

The researchers began the data gathering process by obtaining permission and consulting with their research adviser. They reviewed the survey questionnaire to ensure that the questions were clear, relevant, and aligned with the study's objectives. After this consultation, they collaborated to refine and finalize the questions, making sure they were simple, easy to understand, and effective in assessing the knowledge and awareness of bioplastics among Grade 12 STEM students at San Jose Academy. Once the questions were finalized, the researchers submitted the questionnaire for approval and awaited feedback before proceeding.

After receiving approval, they printed 30 copies of the survey questionnaire along with a consent form outlining the study's purpose and the type of information being collected. The surveys and consent forms were then distributed to the Grade 12 STEM students, who were given 15 to 20 minutes to carefully consider their responses. Once all the responses were collected, the data collection process was deemed complete. The final step involved systematically analyzing the students' answers to evaluate their level of knowledge and awareness regarding bioplastics.

3. RESULTS AND DISCUSSION

This chapter presents the findings of the study on the knowledge, awareness, and perceptions of Grade 12 STEM students at San Jose Academy regarding bioplastics. The discussion explores how students acquire information about bioplastics, their understanding of its environmental impact, and their attitudes toward adopting bioplastic products.

A. Knowledge and Awareness about Bioplastics

Table 1. Source of Knowledge and Awareness

Questions	Common Themes	Code Frequencies
1. Have you heard of bioplastics? If yes, where or how did you learn about them?	a. Lack of Knowledge and Awareness	15
	b. School and Academic Research	7
	c. Online and Media Source	5
	d. Peer and Social Influence	2
	e. Everyday Encounters	1
	f. Advocacy	1

Table 1 reveals that 15 students lack awareness of bioplastics, highlighting a significant knowledge gap among Grade 12 STEM students at San Jose Academy. In contrast, 7 students reported gaining knowledge from school and academic research, underscoring the importance of formal education in introducing sustainability concepts. Additionally, 5 students became aware of bioplastics through online and media

sources, such as science-related articles and social media, demonstrating the influence of digital platforms. Meanwhile, 2 students cited peer and social influences as their sources of knowledge, and 1 student learned about bioplastics through everyday encounters, such as seeing products in stores. Another student attributed their awareness to advocacy efforts from environmental organizations. However, the number of students lacking knowledge about bioplastics indicates that not all are familiar with this topic, underscoring the need for a stronger emphasis on sustainability topics in education and advocacy efforts. This could help bridge the knowledge gap and promote sustainable practices among students.

Table 2. Define Bioplastic

Questions	Common Themes	Code Frequencies
2. How would you define bioplastics in your own words?	a. Eco-friendly and Sustainable Option	9
	b. Biodegradable or Compostable Plastics	6
	c. Alternative for Regular Plastics	5
	d. Natural or Renewable Material	5
	e.Unclear or Uncertain Understanding	3
	f. Innovation	1
	g. Everyday Consumer Products	1

As indicated in Table 2, Grade 12 STEM students at San Jose Academy define bioplastics in various ways. Nine (9) students emphasized the eco-friendly and sustainable nature of bioplastics, while six (6) students associated them with biodegradable or compostable properties, recognizing their role in reducing plastic waste. Additionally, five (5) students viewed bioplastics as an alternative to conventional plastics, and another five described them as derived from natural or renewable materials, demonstrating an awareness of their organic origins. One (1) student defined bioplastics based on their practical applications and technological innovations. However, three students expressed uncertainty or a lack of clear understanding, highlighting gaps in their knowledge.

Table 3. Bioplastics in Comparison with Traditional Plastics

Questions	Common Themes	Code Frequencies
3. In what ways do you think bioplastics are different from traditional plastics?	a. Eco-friendly and Sustainable Alternative	16
	b. Natural Materials or Biomaterials	6
	c. Biodegradable and Compostable	4
	d. Unclear or Uncertain Understanding	3
	e. Innovation	2
	f. No Answer	2

Table 3 illustrates the key differences between bioplastics and traditional plastics as perceived by the students. The findings indicate that Grade 12 STEM students at San Jose Academy predominantly view bioplastics

as an eco-friendly and sustainable alternative to traditional plastics. Specifically, 16 students acknowledged that bioplastics have the potential to reduce pollution and waste. Additionally, 6 students associated bioplastics with natural or biomaterials, clearly distinguishing them from petroleum-based plastics. Furthermore, 4 students emphasized the biodegradable and compostable properties of bioplastics, noting their ability to break down more quickly. A couple of students viewed bioplastics as an innovative development, recognizing their role in advancing sustainable materials. Meanwhile, 3 students expressed uncertainty about the differences between the two types of plastics, and 2 students did not provide any response.

Table 4. Bioplastic Materials

Questions	Common Themes	Code Frequencies
4. Are you aware of the materials used in producing bioplastics? If yes, can you name some?	a. Lack of Awareness	22
	b. Plant-based Sources	4
	c. Marine-based Sources	3
	d. Mineral-based components	1

Table 4 presents varying levels of awareness among Grade 12 STEM students at San Jose Academy regarding the materials used in bioplastic production. Four (4) students demonstrated knowledge of plant-based sources, including seaweed, cornstarch, potato starch, vegetable peels, and fruit peels, highlighting the significance of renewable and biodegradable resources in the creation of bioplastics. Additionally, three (3) students mentioned mineral-based components such as calcium carbonate, as well as marine-based sources like algae and chitosan, indicating a broader understanding of alternative raw materials. Furthermore, one (1) student specifically recognized calcium carbonate as a material used in bioplastics. However, a significant lack of awareness among 22 students suggests that they are unfamiliar with the specific materials involved in bioplastic production.

Table 5. Bioplastics: Environmentally friendly

Questions	Common Themes	Code Frequencies
5. Do you believe bioplastics are more environmentally friendly than traditional plastics? Why or why not?	a. Source of Materials	13
	b. Waste Management and Sustainability	7
	c. Decomposition and Biodegradable	5
	d. Unclear or Uncertain Understanding	5

In Table 5, the findings indicate that all Grade 12 STEM students at San Jose Academy believe that bioplastics are more environmentally friendly than traditional plastics, although their reasoning varies. The most common justification, provided by 13 students, is based on the source of materials, as they recognize that bioplastics are made from natural and renewable resources. Additionally, 7 students pointed out the role bioplastics play in waste management and sustainability, noting that they help reduce

plastic pollution. Five (5) students emphasized the biodegradability and decomposition of bioplastics, stating that they break down more easily compared to traditional plastics. However, another 5 students expressed uncertainty.

B. Perceived Environmental Impact of Bioplastics

Table 6. Bioplastic for Waste Pollution Reduction

Questions	Common Themes	Code Frequencies
1. Do you think the use of bioplastics can reduce waste pollution? Yes or no? Please explain your answer.	a. Yes, due to environmental benefits	11
	b. Yes, due to source and composition of Bioplastics	8
	c. Yes, due to Sustainability and Waste Management	8
	d. Unclear Answer	5
	e.Yes, due to Decomposition and Biodegradability	4

Table 6 indicates that Grade 12 STEM students at San Jose Academy generally perceive bioplastics as being more environmentally friendly than traditional plastics. They believe bioplastics can help reduce waste pollution, with various reasons supporting their views. 11 students emphasized the environmental benefits, recognizing bioplastics as a sustainable alternative to traditional plastics. 8 students highlighted the source and composition of bioplastics, noting that they are made from natural, renewable materials. Additionally, another 8 students discussed sustainability and waste management, suggesting that bioplastics contribute to better disposal practices and pollution control. 4 students pointed out the biodegradability and decomposition of bioplastics, stating that they break down faster than conventional plastics, thus reducing long-term environmental harm. However, 5 students provided vague answers, indicating potential gaps in knowledge or misconceptions about bioplastics.

Table 7. Bioplastic and Traditional Plastic: Decomposition

Questions	Common Themes	Code Frequencies
2. Do you think bioplastics decompose faster than traditional plastics? Why or why not?	a. Yes, Biodegradable and Eco-friendly	13
	b. Lack of Knowledge	7
	c. Yes, Source and Composition of Bioplastic	5
	d. Comparison to Traditional Plastics	4
	e.Yes, due to Biodegradability and Decomposition	3

In Table 7, the results show a general agreement among Grade 12 STEM students at San Jose Academy regarding the decomposition rates of bioplastics compared to traditional plastics. 13 students noted that bioplastics decompose faster due to their biodegradable and eco-friendly nature. 5 students highlighted the source and

composition of bioplastics, recognizing that their natural, organic, and renewable materials facilitate easier breakdown in the environment. 3 students specifically mentioned biodegradability and the decomposition process. Additionally, 4 students drew comparisons between bioplastics and traditional plastics, emphasizing the harmful chemicals and non-biodegradable properties of conventional plastics, thus presenting bioplastics as a more sustainable alternative. However, students exhibited a lack of understanding, indicating gaps in their knowledge about the decomposition process and the varying breakdown rates of different types of bioplastics under specific environmental conditions.

Table 8. Impact of Bioplastic to Marine life and Ecosystem

Questions	Common Themes	Code Frequencies
3. How do you think bioplastics impact marine life and ecosystems compared to traditional plastics?	a. Less harmful	22
	b. Decompose faster	9
	c. Unrelated Answer	7
	d. Eco-friendly Alternative	6
	e. Reduce Plastic Waste	3

Table 8 shows the impact of bioplastic to marine life and ecosystem. Findings show that students generally perceive bioplastics as less harmful to marine life and ecosystems compared to traditional plastics. 22 students believe bioplastics pose lower risks to marine organisms due to their ability to decompose faster, preventing long-term pollution and reducing entanglement or ingestion hazards for aquatic species. 6 students recognize bioplastics as an eco-friendly alternative, emphasizing their natural composition and recyclability, which make them a more sustainable choice. Nevertheless, the presence of 7 unrelated responses suggests that some students lack sufficient understanding of bioplastics' environmental impact, underscoring the need for stronger education and awareness campaigns on their benefits and limitations.

C. Attitudes and Perceptions towards Bioplastics

Table 9. Traditional Plastic or Bioplastic

Questions	Common Themes	Code Frequencies
1. Which do you think is more efficient and practical to use: traditional plastics or bioplastic? Why?	a. Traditional: Practicality and Accessibility	13
	b. Bioplastic: Environmentally Friendly	10
	c. Lack of Awareness	7
	d. Bioplastic: Efficient	3
	e. Traditional: Reusable	2

Table 9 shows a divided perspective among Grade 12 STEM students regarding the efficiency and practicality of bioplastics versus traditional plastics. While 10 students

favor bioplastics for their environmentally friendly benefits, including biodegradability and reduced environmental harm, 13 students argue that traditional plastics remain more practical and accessible due to their widespread availability, lower cost, and ease of production. Additionally, 2 students highlight the reusability of traditional plastics, reinforcing their perceived durability and long-term use. Meanwhile, 3 students consider bioplastics to be efficient, likely recognizing their potential as a sustainable alternative. However, the presence of 7 students with a lack of awareness indicates uncertainty or insufficient knowledge about the efficiency of bioplastics.

Table 10. Bioplastics in Daily Life

Questions	Common Themes	Code Frequencies
2. Would you consider using bioplastics in your daily life? Why or why not?	a. Yes, solution to environmental problems	10
	b. Yes, similar to traditional plastics	8
	c. No Answer	7
	d. yes, more useful and often to be used	3
	e. Yes, if proven more effective	2
	f. Yes, when its on the market	1

In Table 10, the study shows that most Grade 12 STEM students are open to incorporating bioplastics into their daily lives, with 10 students recognizing them as a solution to environmental problems and 8 students acknowledging their similarity to traditional plastics, making them a feasible alternative. However, practical considerations remain significant, as 3 students perceive bioplastics as more useful and frequently used, while 2 students would adopt them only if proven more effective, and 1 student would consider them when widely available in the market. The presence of 7 students who did not provide an answer suggests uncertainty or lack of knowledge about bioplastics' potential applications.

Table 11. Bioplastic Encounter

Questions	Common Themes	Code Frequencies
3. Have you encountered products made from bioplastics? If yes, what were they, and what was your opinion of them	a. No Encounter	22
	b. More usable	4
	c. Harder than Traditional Plastic	2
	d. Same purpose with Traditional Plastic	2

Table 11 indicted that 22 respondents from Grade 12 STEM have not yet encountered bioplastic products, indicating low market presence and accessibility of these alternatives. However, a few students have come across bioplastic items, such as edible seaweed bioplastic straws, and observed that while these products serve the same purpose as traditional plastics, some are harder and more durable. Additionally, 4 respondents found bioplastics to be more usable, suggesting potential benefits in functionality.

D. Factors Influencing Awareness and Adoption

Table 12. Factors of Awareness towards Bioplastic

Questions	Common Themes	Code Frequencies
1. What are some factors that influence your awareness of bioplastics? (e.g., school, media, social media, personal experiences)	a. Social Media and Media	14
	b. School	14
	c. Survey	3
	d. Peers	2
	e. Personal Experience	2
	f. Advocacy	1

Table 12 indicates the Factors of Awareness towards Bioplastic. The study observed that social media and traditional media with 14 responses and school (with 14 responses) as the primary source of awareness about bioplastics. 3 students mentioned that taking the survey itself was their first encounter with bioplastics, highlighting the need for more structured educational efforts. Additionally, 2 students gained awareness through peers (2 respondents), personal experiences (2 respondents), and advocacy groups (1 respondent).

Table 13. Bioplastics and Sustainable Alternative in Education

Questions	Common Themes	Code Frequencies
2. Do you think schools should educate students more about bioplastics and sustainable alternative? Why or why not?	a. Yes, to change attitudes towards the environemnt	9
	b. Unrelated Answer	9
	c. Yes, for knowledge and awareness	7
	d. Yes, to influence others	5
	e. Yes, to produce products and innovation	4
	f. yes, helps in waste pollution reduction	3

Table 13 shows the importance of educating students about bioplastics and sustainable alternatives in schools. 9 respondents believe that integrating these topics into the curriculum can help change students' attitudes toward the environment, fostering a sense of responsibility for sustainability. 7 students also emphasize the role of education in increasing knowledge and awareness, allowing students to make informed decisions about eco-friendly alternatives. 5 respondents see it as a way to influence peers and promote innovation in developing sustainable products. Additionally, 3 respondents recognize that learning about bioplastics can contribute to waste pollution reduction by encouraging environmentally friendly practices. However, the presence of 9 unrelated answers suggests that some students may not have a clear understanding of the topic.

Table 14. Impact of Bioplastic to Marine life and Ecosystem

Questions	Common Themes	Code Frequencies
3. How do you think bioplastics impact marine life and ecosystems compared to traditional plastics?	a. Less harmful	22
	b. Decompose faster	9
	c. Unrelated Answer	7
	d. Eco-friendly Alternative	6
	e. Reduce Plastic Waste	3

Table 14 examines the perceived impact of bioplastics on marine life and ecosystems compared to traditional plastics. A significant number of respondents (22) believe that bioplastics are less harmful to marine organisms, as they do not persist in the environment as long as traditional plastics. 9 students highlighted the faster decomposition rate of bioplastics, emphasizing their potential to reduce long-term pollution in oceans. 6 respondents identified bioplastics as an eco-friendly alternative, further reinforcing their role in sustainability efforts. Additionally, 3 students recognized that bioplastics contribute to reducing plastic waste, which directly benefits marine ecosystems. However, 7 unrelated responses suggests that some students lack a clear understanding of bioplastics' environmental impact

Table 15. Initiatives

Questions	Common Themes	Code Frequencies
4. In your opinion, what could be done to increase awareness and encourage the use of bioplastics in your community?	a. Spread Awareness and Educate Peopl	9
	b. Unclear Answers	9
	c. Engagement in Social Media	7
	d. Promotion and Advertisement	3
	e. Advocacies and Campaigns	3
	f. Establish in Companies	2
	g. Cheaper Production of Bioplastic	1

Table 15 shows that 9 respondents emphasized the importance of spreading awareness and educating people, while 7 highlighted the role of social media in promoting bioplastics. Additionally, 3 respondents suggested advertisements and promotional efforts, and another 3 supported advocacy campaigns to reinforce sustainable alternatives. 2 students also pointed out the need for companies to integrate bioplastics into their products, while 1 respondent mentioned the importance of making bioplastics more affordable. However, 9 respondents provided unclear answers, indicating gaps in knowledge about bioplastics.

4. CONCLUSION AND RECOMMENDATION

4.1. Conclusion

The study aimed to explore the

knowledge and awareness of bioplastics among Grade 12 STEM students of San Jose Academy. The study was conducted during the academic year and involved a total of 30 respondents selected through simple random sampling and voluntary sampling. A qualitative research method was employed, utilizing an open-ended survey questionnaire as the primary research instrument. The gathered data provided insights into students' understanding, perceptions, and attitudes toward bioplastics, as well as the factors influencing their awareness and potential adoption of bioplastic materials.

The findings revealed that while most Grade 12 STEM students presented a general awareness of bioplastics, gaps in knowledge still exist, particularly regarding the materials used in bioplastic production and the specific environmental impacts of bioplastics. Students primarily gained awareness through online platforms, school-based learning, and peer discussions. However, some respondents had little to no prior knowledge of bioplastics, highlighting the need for enhanced education initiatives.

Furthermore, students recognized the eco-friendly nature of bioplastics, considering them a sustainable alternative to traditional plastics due to their biodegradability and reduced environmental impact. However, concerns such as cost, accessibility, and durability emerged as key barriers to the widespread adoption of bioplastics. Despite these challenges, the willingness of students to support and use bioplastic products suggests a growing inclination toward sustainability and responsible consumption.

4.2. Recommendations

Given this, the study recommends the following initiatives or actions to the specific stakeholders:

School Administrators and Educators: Given the specified knowledge gaps in bioplastics among students, school administrators should incorporate topics related to environmental sustainability, including bioplastics into the curriculum. This can also be accomplished through interactive learning strategies such as hands-on experiments, sustainability projects, and awareness campaigns. Additionally, schools should improve access to relevant educational materials and provide training for teachers to effectively convey knowledge about bioplastics and their environmental impact.

Government: Policymakers should implement initiatives to promote the adoption of bioplastics. This can include providing incentives for businesses that produce or use biodegradable alternatives. Legislative measures, such as stricter regulations on single-use plastics and increased funding for research on sustainable materials, should also be considered. Additionally, government agencies can collaborate with schools to support sustainability programs and campaigns that educate students and the public about the benefits and challenges of bioplastics.

Manufacturers and Businesses: Companies that produce and distribute bioplastics should work on making their products more affordable and widely available

to encourage greater consumer adoption. Investments in research and development should aim to enhance the durability and cost-effectiveness of bioplastics, addressing common concerns among consumers. Additionally, businesses can collaborate with educational institutions to provide real-world exposure to bioplastic products through internships, sponsorships, and awareness programs.

Environmental Organizations and Advocacy Groups: Non-government organizations and environmental groups should continue their efforts to educate communities about sustainable alternatives to traditional plastics. By conducting seminars, campaigns, and outreach programs, they can raise awareness and inspire behavioral change among individuals.

For Future Researchers: As researchers of the study entitled Exploring the Knowledge and Awareness of Bioplastics Among Grade 12 STEM Students of San Jose Academy, Based on the gathered results we observed that Grade 12 STEM Students lack knowledge and awareness regarding bioplastics. We researchers recommend future research topics such as exploring the components and properties of bioplastics, the perceptions of local markets regarding bioplastics as an alternative from traditional plastics and also for future researchers we suggest that proposing comparative studies in making bioplastic as an experimental and to come up a new innovation since a significant lack of awareness among many students suggests that they are unfamiliar with specific materials used in bioplastics production. This highlights the need for further innovations and alternatives regarding the production of bioplastics. Moreover this could influence more manufacturers and companies in producing bioplastic products as an alternative to traditional plastics. This shift could lead to more environmentally friendly options and help reduce waste pollution in communities.

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Perspectives of Grade 10 Teachers and Students of San Jose Academy in Using AR and VR Tools in Teaching Science Concepts

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Abstract: This research emphasizes the effects of Augmented Reality (AR) and Virtual Reality (VR) as pioneering tools applicable in science education. It sought to ascertain the views of students and teachers regarding the effectiveness of AR/VR technologies, its merits, and challenges as far as teaching science is concerned. The exploratory qualitative research design was utilized in this study with a purposive sample of thirty Grade 10 students and science teachers experienced with AR/VR tools. The interviews held with teachers were semi-structured, and surveys held with students were open-ended. Results revealed generally positive attitudes toward AR/VR technologies. Students expressed how AR/VR could create an immersive, interactive learning atmosphere that enhanced understanding and simplified complex topics. Nonetheless, concerns were raised regarding distractions, misuse of technology, and affordability. Teachers asserted that the immersive nature of AR/VR aims at promoting ideal teaching strategies and enhancing students' learning experiences. While they arranged to include these tools within their teaching programs, the teachers voiced concern regarding preparedness, dependence on technology, and cost associated with the implementation." In conclusion, inasmuch as there is a huge possibility of AR and VR tools in science education, their effective integration hinges on addressing the issues related to financial constraints, readiness for technology, and teachers' training. The study puts forward the capacity-building of teachers, preparation of interactive AR/VR lessons for students, provision of infrastructural support from school administrators, and the need for further studying on the AR/VR applicability in education in general.

Key Words: Augmented Reality; Virtual Reality; Science Education; Teaching Strategies; Immersive Learning

1. INTRODUCTION

1.1 Background of the Study

AR and VR, or known as Augmented Reality and Virtual Reality. Augmented Reality is a technology that overlays digital contents like images, sounds, videos, and 3D models on the real world. AR enhances the user's perception and interaction with the real world, blending virtual elements with physical surroundings. Virtual Reality (VR) is similar to Augmented Reality (AR), it is a fully immersive technology that stimulates an entirely virtual environment, allowing the user to disconnect

from the physical world. VR replaces real-world environments with computer generated simulations.

The first Augmented Reality (AR) headset was first developed by Ivan Sutherland in 1968 called "The Sword of Damocles", which used basic graphics overlaid on the real world. Virtual Reality (VR) was first invented by Morton Heilig in the 1960s. It is called the "Sensorama", an early VR device combining visuals, sounds, vibrations, and smell. Each device has their own Core Technologies. Augmented Reality (AR) technology is about computer vision for object recognition and tracking.

On the other hand, Virtual Reality (VR) is about 3D modeling, rendering, motion tracking, and spatial audio. Today, they are widely used in various applications, including gaming, virtual tours, military training, and medical education, and hold the potential to further transform industries and create new avenues for innovation and exploration.

In February 22, 2017, Generation Xers started to stow their own library cards and the Millennials have started to go beyond access as the Department of Science Technology geared up to give an enhanced experience for their library researchers within the year. The enhancement of the library experience started at the DOST - Science and Technology Information Institute (STII) which holds the largest collection of S&T information materials in the country. STII gave a preview of what library users expected through an application called STARlib or the Science and Technology Augmented Reality Library, which is the place where the institute launched its 30th anniversary celebration.

AR/VR makes learning more immersive and experiential. This leads to increased memory retention among students. It is very helpful for students with learning disabilities. AR and VR are expected to be one solution to overcome student boredom in learning (Sulistianingsih & Kustono, 2022). Both AR and VR analyze and simplify complex topics and concepts for better understanding, AR and VR also promote independent learning and independence among students. It is a great training tool and gives learners confidence. (Fitria, 2023)

The help of Augmented Reality (AR) and Virtual Reality (VR) into educational settings has opened a new opportunity in learning and teaching. AR and VR have revolutionized the educational landscape by offering immersive and interactive learning experiences. Shankar et al. (2023) emphasize the transformative role of these technologies in education, highlighting their ability to create more exciting and engaging learning environments. This experience not only enhances student engagement but also improves knowledge retention and the development of practical skills. The effectiveness of Augmented Reality (AR) and Virtual Reality (VR) have boosted learning engagement confirmed by Chen et al (2023). AR, complementing VR, offers a unique approach to enhancing traditional education materials. (Familoni & Onyebuchi, 2024)

1.2 Statement of Objectives

The study seeks to answer the question: What are the perspectives of the students on applying AR and VR tools for teaching scientific concepts to Grade 10 students at San Jose Academy?

Specifically, the study aims to answer the following questions:

1. What are the other subjects and interdisciplinary approaches, which might be supplemented by insights derived from this study in AR and VR?
2. How can AR- and VR-based tools give an edge to the teaching methods in science subjects?
3. How do AR and VR tools enhance collaboration and interaction among students in science lessons?
4. What adjustments will the students have to make in order to accommodate this new method of teaching, employing AR and VR tools?

1.3 Significance of the Study

The study concerning applying AR and VR tools in teaching science concepts matters to various stakeholders inside and outside San Jose Academy. **Upon completion, this will be beneficial to the following:**

- **Educators-** These findings will provide practical strategies and evidence for successful integration of AR and VR into science curricula that will translate abstract concepts into tangible ones and engaging experiences. Such tools will aid in enhancing teaching practices for a more effective and interactive classroom environment.
- **Students-** AR and VR tools intend to improve student understanding, engagement, and retention of scientific concepts through better entertainment and engaging content, thus giving a more enjoyable learning experience.
- **Government and Non-Governmental Organizations-** Expertise in learning and technology of organizations working in the field can date the findings as a blueprint for which they can strive to ensure that disadvantaged communities have access to high-tech learning aids and that they support the technical development of teachers.
- **Learning Consultants-** By applying this study, professionals who delve into curriculum for their schools or lead a corporation to greater efficiency can seize the study's insights to create immersive and interactive programs that are well-suited to the learners' needs.
- **Future Researchers-** This study will become a valuable reference source for researchers in the future who intend to conduct research on AR and VR in education. It will provide insights into determining how these

technologies have acted in student engagement, understanding, and learning outcomes and inspire future research into innovations aimed at improving practice in science education.

These practical implications illustrate the prospects for AR and VR to transform conventional science teaching into a dynamic, meaningful learning experience.

1.4 Scope and Delimitation

This particular study will be conducted only among Grade 10 students and Science teachers in San Jose Academy in the current academic year. It will only examine the perspectives on the use of augmented reality (AR) or virtual reality (VR) with regard to teaching science in terms of student engagement and learning outcomes. It does not deal with subject areas apart from science and does not consider students or teachers from other grades at school so that it remains relevant and focused on the desired population. It will not cover the technical development or coding of AR/VR software. Specific questions or issues that will not be dealt with include; the long-term effects of using AR/VR upon learning or teacher workload; the application of AR/VR outside the formal classroom; and the effectiveness of AR/VR.

2. METHODOLOGY and RRL

2.1 Review of Related Literature

As technology continues to revolutionize the way educators deliver lessons, Augmented Reality (AR) and Virtual Reality (VR) are emerging as powerful tools for enhancing science education in the classroom as a result of advances in technology.

According to Zhang and Wang (2021), research on AR/VR in K-12 science education has recently gained traction, with an emphasis on inquiry-based learning. Their systematic review revealed that while these technologies significantly enhance student engagement and motivation, they do not always lead to improvements in higher-order cognitive skills such as critical thinking. Additionally, the accessibility and affordability of AR/VR tools continue to be a challenge, leading to a need for structured science teaching programs that incorporate sound theoretical frameworks.

Similarly, Arici et al. (2019) conducted a bibliometric analysis and found that research output on AR in science education has increased significantly in the past decade, particularly in the last five years. The growing accessibility of AR technology has played a crucial role in making science learning more interactive. Their study highlights that AR is particularly effective in helping students understand abstract scientific concepts, such as molecular structures and physics simulations. However, they recommend further exploration of AR's long-term impact on learning outcomes and its scalability in broader classroom settings.

Hung et al. (n.d.) explored the effects of AR and VR wearables on students' motivation and performance in learning, particularly in language education. Their findings suggest that while VR is highly effective in improving

learning engagement, blending it with traditional teaching methods poses challenges. To optimize AR/VR learning experiences, they recommend a learner-centered design approach that incorporates gamification and social interaction. This aligns with Wang (2024), who developed instructional VR software for an eighth-grade physics course and concluded that good interaction design, user-friendly interfaces, and well-structured instructional materials contribute to the success of VR in education. The study also emphasizes that VR reduces educational costs and eliminates safety hazards in science experiments by providing virtual simulations.

Alda, Boholano, and Dayagbil (2020) examined the preparedness of teacher education institutions in the Philippines for Education 4.0. Their findings indicate that while educators are open to integrating digital tools, they lack proficiency in advanced technologies such as AR and VR. This is primarily due to the limited availability of digital infrastructure and virtual laboratories. They recommend restructuring teacher-training programs to enhance digital literacy and the adoption of emerging technologies in education. Similarly, H (2021) developed a framework for AR-based learning tools in senior high school Earth Science and found that AR, combined with gamification, effectively enhances student engagement and comprehension.

2.1.1 Synthesis

The studies reviewed suggest that AR and VR technologies hold great potential for transforming science education. However, their effectiveness depends on factors such as accessibility, instructional design, teacher training, and alignment with curriculum standards. Future research should explore long-term learning outcomes, the integration of mixed-method approaches, and strategies to ensure the widespread adoption of AR/VR in educational institutions.

2.2 Methodology

2.2.1 Research Design

The research design adopted in this study comes under an exploratory type of qualitative research design leveraging a particular focus on AR and VR technologies applied in teaching science for 10th-grade students. The study aimed to explore the opinions of teachers and students towards the use of these technologies, concentrating on the possible significance, and challenges in the domain of science education.

2.2.2 Population Sampling

The study will be using purposive sampling, which is a non-probability sampling technique, to select the participants who have direct experience in working with AR/VR tools in an educational setup. The respondents will include; Grade 10 Students: 15 students per section, a total of 30 students and Grade 10 Science Teachers. This will ensure that insight is obtained from the actual participants in the use of AR/VR technology in the educational context.

2.2.3 Research Instrument

The researchers will employ two data collection modes in this study;
Semi-Structured Interviews: Performed with the science teachers to solicit more in-depth data about their teaching experiences and challenges and their views on the efficacy of AR/VR and Open-Ended Surveys: Issued to students to ascertain their involvement, learning experience, and challenges in using AR/VR technologies.

2.2.4 Data Gathering Procedure

The following steps will be followed in the data collection; First, the researchers will obtain ethical clearance from the school administration and obtain consent from all subjects, assuring their confidentiality and anonymity. Next is conducting semi-structured interviews with the teachers and providing open-ended surveys to the students. Interviews would be audio-recorded (with permission) for transcription, while surveys would be compiled anonymously. The interview recordings will be transcribed and the survey responses will be collated for analysis. The researchers will apply 'thematic analysis' of the qualitative data obtained from interviews and surveys to identify the common patterns and themes on effects and challenges of AR/VR on science education. Descriptive statistics would be carried out to analyze the survey responses to quantify trends among students and teachers. Lastly, they will present the results in a systematic way and highlight the principal insights with evidence-based recommendations.

3. RESULTS AND DISCUSSION

This chapter presents the results of data gathered from interviews of teachers and surveys for students who served as the respondents of this study. It also provides the analysis and interpretation of data that has been gathered according to the research question.

Table 1. Students' perceptions on AR and VR tools

Question	Common Themes	Code Frequency
1.What is your opinion about using AR/VR tools in our school? Are you in favor or not?	a. Favor b. Not Favor	a. 14 b. 4
2.What features of using AR/VR technologies in your science class do you think can enhance your understanding in the subject matter?	a.Enhances Understanding b.Interactive	a. 9 b. 3
3.What do you think are the advantages and disadvantages of using AR/VR technologies in learning science concepts?	a. Distraction b.Misuse c.Efficiency	a. 2 b. 1 c. 8

4.Do you think AR/VR technologies can be beneficial in understanding science concepts? a. If yes, why? b. In what way?	a.Beneficial	a.	10
	b.Technological Advancement	b.	2
	c. Easier Comprehension	c.	7
5.If you answered no, do you have any specific recommendations as to how these concepts can be taught effectively?	a.Engagement	a.	1
6.Do you think that you can adapt to AR/VR technologies (if implemented in our school)?	a.Confidence in Adaptability	a.	6
	b.Optimism	b.	1
	c.Persistence	c.	3
7.If this will be implemented in our school, what will be your main concerns?	a.Financial	a.	2
	b.Implementation	b.	2
	c.Challenges	c.	1

Table 1 presents information about the perspective of Josenian Students on implementing AR/VR tools in learning science concepts.

For Question 1, which asks students' opinion about AR/VR tools, there were two (2) common themes and four (4) students indicated they were not in favor, and fourteen (14) students said they were in favor of using AR/VR tools in school. The students who are in favor of this concept see the potential benefits it could have on their educational experience. In contrast, students who do not support the use of AR/VR do not see any necessity or any reason for using it.

For Question 2, which asks students on how AR/VR tools can enhance their understanding in the subject matter, there were (2) common themes, nine (9) students said that it enhances their understanding, three (3) said that it is interactive. They said that it elevates their learning. While three students have explained how the use of AR/VR can make learning science concepts more engaging for their class by using AR/VR teaching. The following 9 students have shared their thoughts on the way AR/VR Teaching enhances the learning of science concepts.

For Question 3, which asks students the advantages and disadvantages of AR/VR tools, there were (3) common themes, two (2) student said that it could be a distraction for students, one (1) said that students could misuse the technology, and eight (8) students said that it is efficient for them. Distraction Some students feel that AR/VR tools might divert attention from the actual lesson, as the immersive nature of the technology could lead to off-task behavior. Misuse There are concerns about students using AR/VR for non-educational purposes, which could reduce its effectiveness in learning. Efficiency Many students recognize that AR/VR can make lessons more interactive and engaging, helping them understand complex concepts better and improving knowledge retention.

For Question 4, which asks students if AR/VRtools are beneficial for them, there were (3) common themes, ten (10) students said that it is very beneficial for them, two (2) stated that it is a technological advancement, and seven (7) stated that it makes comprehension easier for them. Beneficial Students expect AR/VR to make learning more engaging, keeping them motivated and interested. Technological Advancement They believe it will modernize education and prepare them for tech-driven careers. Easier Comprehension Students anticipate that AR/VR will help them visualize complex concepts, making learning easier and more effective.

For Question 5, which asks the students' recommendations for how science concepts be taught effectively, there was only one (1) theme, one (1) student stated that more engagement on teaching should occur. The one Student who has answered yes still provided a concept on how to use AR/VR effectively

For Question 6, which asks students if they can adapt to these technologies if it were implemented, there were three (3) common themes, six (6) stated that they are confident on adapting to these technologies, one (1) said that he/she is optimistic on these technologies, and three (3) stated that they are persistent on these technologies. Confidence with Adaptability Students believe they will adjust to AR/VR and technological progress. Optimism They see potential in AR/VR but acknowledge both benefits and challenges. Persistence Students expect to overcome learning difficulties with structured AR/VR education.

For Question 7, which asks for students' concerns if these technologies were implemented, there were 3 common themes, such as two (2) students stated that it could affect financially, two (2) said that the implementation could be a problem, and one (1) stated that there could be many challenges like financial and educational preparation, and many more when it is implemented. Financial Students believe AR/VR adoption requires proper funding and financial feasibility. Implementation They see the need for safety measures, responsible use, and proper infrastructure. Challenges Students are aware of practical difficulties and emphasize balancing technology with traditional teaching methods.

Table 2. Perspectives of teachers on the use of AR/VR

Question	Common Themes	Code Frequency
1.How can AR and VR tools help you improve your ways of teaching?	a. immersive experience it provides towards students	a. 2
	b.better experience for students	b. 2
2.Do you think students can adapt to AR and VR technologies?	a. Both Agree	a. 2

3.What benefits do you think AR/VR tools provide to students' learning techniques?	a.Necessity of using these kinds of tools in schools	a.	2
	b.Very Helpful	b.	2
4.What is your opinion on using AR/VR tools in teaching your students?	a.provides entertainment and make learning more exciting	a.	2
	b.make learning a bit better	b.	2
5.If given the opportunity, would you recommend the use of AR/VR tools as a learning experience for the students? Why? Why Not?	a.Doubtful	a.	1
	b.Agree	b.	1
6.What advantages and disadvantages do you think when using AR/VR tools in teaching students science concepts?	a.Enhances learning by seeing virtual concepts of science	a.	2
	b.Technology Reliance	b.	2
7.What concern/s comes to your mind when it comes to using AR/VR tools in teaching?	a.Readiness of Teachers and Students	a.	2
	b.Expenses	b.	2

Table 2 presents information about the perspective of Josenian Teachers on implementing AR/VR tools in learning science concepts.

For Question 1, which asks the teachers' on how AR/VR tools help them improve their teaching, there were two (2) common themes and two (2) teachers indicated that it is an immersive experience for students, and two (2) stated that it is a better experience for students.

For Question 2, which asks teachers if the students can adapt to these technologies, there was (1) common theme, two (2) teachers agreed that students can adapt to these technologies.

For Question 3, which asks teachers the benefits of AR/VR tools in students' learning techniques, there were two (2) common themes, two (2) teachers stated that it is a necessity for the students and it is very helpful for the students.

For Question 4, which asks teachers their opinion on AR/VR tools when teaching their students, there were two (2) common themes, two (2) teachers stated that it makes learning more exciting and makes learning a bit better for their students.

For Question 5, which asks teachers if they recommend these tools for students' learning experience, there was only one (1) theme, one (1) teacher stated that is doubtful on this issue and one (1) stated that she agrees with this.

For Question 6, which asks teachers the advantages and disadvantages of AR/VR tools, there were two (2) common themes, two (2) stated that the advantage of it is it enhances students' learning and the disadvantage is that students may rely on technology and technology only.

For Question 7, which asks teachers' concerns if these technologies were used in teaching, there were three (3) common themes, such as the two (2) teachers stated that the readiness of the students and teachers is one concern and the expenses that will be used another concern.

4. CONCLUSION AND RECOMMENDATION

This study suggests that augmenting and virtualifying science education at San Jose Academy would be a great use for AR and VR technologies. The students showed positive reactions claiming that it could make learning more engaging, enhance understanding, and retention of complex scientific ideas better leading to better performance in science.

For this, however, the Academy needs to overcome several hurdles. Teachers have raised issues regarding misuse, costs involved, and the need for adequate training. A plan is imperative for setting up guidelines for technology use, securing funding, and availing professional development for teachers. It is also necessary to check if current technology can support AR/VR.

The study offers a plan for enhancing science education at San Jose Academy. By tackling challenges and investing in AR/VR and teacher training, the Academy can improve student learning, support innovative teaching, and become a leader in science education. Further research on implementing these tools in the Academy's setting would help maximize their benefits.

This study offers the following recommendations:

1. **For Educators-** Facilitate training sessions and workshops for the development of teachers' integration skills of AR and VR in lesson delivery and invest in affordable technologies and utilize various forms of learning to complement conventional methods.
2. **For Students-** Training courses should include responsible use of AR/VR tools and interactive AR/VR sessions should be designed to enhance participation and understanding of science concepts.
3. **For Government and Non-Governmental Organizations-** In order to help teachers implement a new method of instruction that is more realistic and visually appealing for each class, they must suggest that the government and non-governmental organizations offer a program regarding bringing AR and VR equipment to schools.
4. **For Learning Consultants-** Learning consultants should encourage training, assistance, cooperation, and research

to further the fair and efficient use of AR and VR in science teaching.

5. **For Future Researchers-** Investigate the long-term consequences of AR/VR on critical thinking and academic performance, broaden inquiry into other subjects and broaden research approaches for wider insights

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Exploring the Experiences, and Perceptions of Senior High School Students in San Jose Academy on the Flood Mitigation Measures of the Navotas Local Government Unit

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Abstract: Flooding in Navotas has always been a prevalent issue as it is a city that is surrounded by bodies of water, making floods not only high, but can also cause severe damage to communities in the city. This study aims to identify the weaknesses of the current flood mitigation measures of the Navotas LGU, and determine the areas of improvement in these mitigation measures. As Navotas is a city that is easily and constantly affected by floods, it is no question that flood mitigation strategies are a necessity in the lives of Navotenos, in order to reduce the damage and hindrances that floods bring. Through the use of qualitative research strategies, specifically the phenomenological approach, the experiences and perceptions of Senior High School students in San Jose Academy on the current Flood Mitigation Measures were analyzed. Data was gathered from twenty-one (21) Senior High School Students of San Jose Academy. The research utilized survey questionnaires with eleven (11) open-ended questions to collectively gather the experiences and perceptions of the Senior High School Students, aiming to identify how floods impact the community of Navotas, and how the current Flood Mitigation Measures help prevent these. Through the use of a tabular format, common themes in the experiences and perceptions of our respondents regarding floods and the flood mitigation measures of Navotas City were identified and presented. With the most frequent themes being, Flood Mitigation Improvement, Community Discipline and Waste Management, and Better Flood Preparedness & Increase of Safety Measures. Flood levels have definitely decreased in recent years, but current Flood Mitigation Measures have yet to provide long-term solutions to flood severity in the city. Recommendations regarding flood mitigation in Navotas include implementation of more additional Flood Mitigation Measures, increased safety measures, and a proper drainage or Sewage system that are essential in reducing the impact that floods bring to Navotas and its citizens.

Key Words: Flood/s; Flood Mitigation Measures; Flood Prevention; Flood Management; Risk Reduction;

1. INTRODUCTION

1.1 Background of The Study

Flood Management is constantly changing and being observed as the unpredictable weather can cause unforeseen damage to communities. Flood management refers to several methods that are used in order to reduce or mitigate the effects of floods. This can vary from structural engineering such as dams, or it can take a more natural approach such as flood plain zoning (*Flood Management Strategies - Flooding and Flood Management - OCR - GCSE Geography Revision - OCR - BBC Bitesize*, 2023).

Flood mitigation measures play a vital role in the lives of Navoteños, as Navotas City is one of the most flood-prone locations in Metro Manila. Navotas, being a part of the CAMANAVA, is particularly susceptible to the effects of sea level rise and tidal surges, which lead to severe flooding (Porio, 2011).

Flood management in Navotas is an ever-evolving challenge. This study seeks to gather the experiences and opinions of Navoteño students regarding the flood mitigation measures implemented by the Navotas LGU, with the goal of identifying the weaknesses in the current system and proposing ways to improve it. Navotas Mayor Toby Tiangco stated the importance of developing a national flood control plan that integrates water flow management with effective flood interventions. Such a plan is essential to protecting Filipinos from massive flooding, which disrupts daily life and damages property (Jing Villamente, 2024).

On June 7 2024, the Malabon-Navotas Flood gate was damaged which then caused intense flooding in Tanza, Kaliwa Brgy Tanza I, Navotas City (*Government of the Philippines*, 2025). Then, on July 24th, Super Typhoon Carina brought heavy and non-stop rainfall, causing severe flooding in Navotas city. Leading into countless homes intruded by water. A total of 223 families were rescued and evacuated from their homes during the typhoon .

The findings of this study aim to fill gaps in the existing literature on flood management. For instance, Navotas Rep. Toby Tiangco stated on July 25th that the Tangos-Tanza navigational gate could have prevented severe flooding in Navotas and nearby cities (Lalu, 2024).

Despite having 81 operational pumping stations, flood control in Navotas remains a challenge without functional floodgates, as seawater continues to flow into the city during high tide (Lalu, 2024).

The damage caused by the flood also impacts the budget allocated for developing additional flood control projects. As flood mitigation measures continue to evolve, the cost of these projects also increases. Projects such as the CAMANAVA Flood Control and Drainage Improvement Project, funded and supported by the Japanese government, has enhanced pumping stations and drainage systems in Navotas and its neighboring cities (CAMANAVA Area Flood Control and Drainage System Improvement Project [2000–2009], BCTI Engineering International Co., Ltd., n.d.). Similarly, the Navotas Coastal Dike was designed to prevent flooding along the city's shorelines.

Flash Floods create severe problems in metro manila, which are traditionally blamed on the loss of infiltration due to urban concrete, old drainage system, and clogged streams. (Lagmay et al., 2017)

According to the Comprehensive Land Use Plan of Navotas City, Floods and Sea level rises lead to not only damage in properties, but also decrease in livelihood and decrease in income of farming and

fishing dependent households. (*Comprehensive Land Use Plan | Navotas City*, n.d.)

This study will delve into the lives of the Senior High School students of San Jose Academy in order to gather their collective and shared experiences with the flood mitigation strategies of the Navotas Local Government unit in order to gain knowledge on the various strengths and weaknesses of the flood mitigation in Navotas city.

1.2 Statement of Objectives

This study will answer the question, What are the experiences and perceptions of Senior High School students in San Jose Academy regarding the flood mitigation measures of the Navotas Local Government Unit?

Specifically, this study will answer the following questions:

1. How do floods affect the lives of Senior High School students and their communities?

2. What are the common weaknesses that students identified within the flood mitigation measures in Navotas City?

3. cHow do Senior High School students of San Jose Academy perceive the current state of Navotas flood control?

1.3 Significance of The Study

The findings of this study will be beneficial to the following:

Navotas and Its Residents

This study will serve as a valuable case study for other flood-prone areas and will significantly contribute to improving flood management efforts in Navotas City. Its findings aim to enhance the readiness and resilience of citizens in facing future flood-related crises by empowering schools, families, and community groups to develop more effective support networks.

Flood Mitigation Strategies

Improving flood mitigation measures in Navotas will not only benefit its citizens but also encourage other flood-prone areas to adopt and improve their overall flood control strategies. Flood management and risk control are transitioning from a solely risk-based approach to an integrated one, emphasizing risk communication as a key component in boosting resilience (Genovese & Thaler, 2020). Identifying innovative methods to improve the Navotas LGU's flood mitigation measures will create a safer and more disaster-prepared environment for its residents.

Navotas Local Government Unit

This study will be able to aid the Navotas Local Government Unit in creating better and more efficient flood mitigation strategies for Navotas. This study will also allow the LGU to identify the weaknesses of the current flood mitigation strategies, and innovate them.

Future researchers

Flood mitigation measures will continue to improve and change throughout the course of time. This study will serve as a guide to future researchers to further analyze thoroughly the Flood control in not only Navotas City, but also in other flood prone locations as well.

1.4 Scope and Delimitations

This study investigates the effectiveness of flood mitigation strategies at San Jose Academy (SnJA) in Navotas City. The researchers analyzed Senior High School (SHS) student experiences with flood gate issues and their perceptions of implemented mitigation strategies through surveys. The study's participants will be SHS students aged 15-19 at SnJA in Navotas City. Data collection will be limited to a specific timeframe, potentially influencing the scope of findings. The study will not examine the effectiveness of mitigation

strategies outside of SnJA or explore the perspectives of other stakeholders such as teachers, administrators, community members. Furthermore, this study will not explore the long-term effectiveness of the mitigation strategies beyond the timeframe of data collection.

2. METHODOLOGY AND REVIEW OF RELATED LITERATURE.

2.1 Review of Related Literature

Rahman, Lee and Tan (2023) performed a study on the effectiveness of CBFM in Malaysia. The study focused on the role of the public and their well-structured policies within a flood risk management framework. The findings of the study indicate that the active participation of the community is crucial for the effective mitigation of floods and management of other risks. Additionally, the study highlights the need for more public willingness to participate which can be done through awareness and educational campaigns. These programs can increase the participation of the community and use local knowledge to effectively deal with flooding. Policies that encourage active participation by the public provide a more adaptive and sustainable system for the management of floods.

The conclusions drawn by Rahman et. al (2023) are within the established body of literature on disaster risk reduction that supports the engagement of local communities with the policymakers. The use of these strategies can enhance flood resilient and responsive mechanisms in the most affected areas. Considerable gap exists in the issue of how to improve public participation in management flooding, which should be considered for future studies and the making of policies. Engaging the community would enable the government and other organizations to develop more efficient and sustainable flood mitigation strategies.

Lechowska, E. (2023) found that a group of variables such as and individual's physical location (flood hazard level—flood zone), flood characteristics, the size of consequences (the amount of potential flood losses), the range of impact (direct or indirect hazard depending on the application of flood protection measures), direct experience, socioeconomic and demographic profiles and information are the factors that may affect how flood risk is perceived. Furthermore, this study emphasises the analysis of frequency ratio and frequency of consideration of a given group in flood risk perception. The comparison of the research results provides more useful information in shaping attitudes towards flood risk, and what steps flood risk perception studies should take in order to improve flood risk management.

The recommendations and conclusions drawn from the study of Lechowska, E. (2023) contextualize how these elements influence risk perception and how the public's social and cultural interpretation of flood threats must be evaluated in both metric data and also observation and analysis of social processes and occurrences. The needs of population, attitudes, social practices, etc. are a part of studying risk perception.

Rinen (2020) focused their study on historical analyses of flood control efforts done in the country over the years, focusing on two central approaches: mitigation through risk avoidance and risk reduction. The study examined several efforts done for the reduction of floods and measures taken to evaluate their success. Results show that

flooding is a recurring problem in the Philippines because of geographical, climatic, and anthropogenic factors. To further support the findings, the concept of flood resilience was introduced which argued for planning that is sustainable and adaptive in nature to deal with the planning problems of flooding.

Further, the study had pointed out that a synergistic effect of risk avoidance and risk reduction techniques is needed for effective flood control. Effective flood risk management starts with overdue comprehensive planning that will have structural measures such as levees and drainage systems and non-structural ones like policy measures and education. The research shows that in order to achieve disaster preparedness and disaster risk reduction integration, sustainable and long-term solutions need to be provided in flood risk management.

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Nóvoa, D., Gonzales-Cao, J., & García-Feal, O. (2024) Aimed their study toward advanced numerical models which significantly enhanced early flood warning systems, by improving prediction accuracy and response times. The key findings of this study put emphasis on the importance of integrating real-time data, optimizing computational efficiency, and employing multi-dimensional models for better flood risk management. Through focusing on numerical modeling methodologies, It presented tools for predicting flood events, risk management strategies, and integrating technological advancements to enhance flood preparedness. They explored the different factors that influence flood mitigation behavior and differences between regions of England.

By adopting advanced numerical models, improving data integration for real-time monitoring, and optimizing computational frameworks, these will enhance current early flood warning systems for faster flood predictions. This study also highlights the importance of technological innovation in strengthening flood risk management strategies.

Kurata et al. (2023) Focused their study on the people's flood disaster preparedness and mitigation efforts, which led them to find that these are affected by factors such as perceived risk, response efficacy, and self-efficacy. Social norms and attitudes toward preparedness. Their study highlights the need for community education and policy interventions, Through the use of the Protection Motivation Theory and the Theory of Planned Behavior which uses a mixed-methods approach, employing surveys and statistical analysis to gather data from residents in flood-prone areas to examine factors influencing preparedness behavior.

Their Study recommends enhancing public education campaigns on flood preparedness, strengthening community involvement in disaster mitigation, and improving government support for disaster response strategies.

Barendrecht et al. (2021) Their paper emphasized that preparedness increases with flood experience, especially in the the Midlands, North West, and Thames regions, while in the North East, it's moderate. Whilst Southern and South West regions show higher preparedness. Factors that affect preparedness however, include flooding severity and English proficiency. In two parts, they analyzed the data first, investigating whether there is a difference in the relationship between flood experience and preparedness for the different regions of England using Bayesian hierarchical regression. Then, they investigate the potential influence of other factors on the flood mitigation behaviour in the regions of England.

flood experience and preparedness varies significantly across regions. Policymakers and flood risk managers should develop to improve preparedness, particularly in regions like the Thames, Midlands, and North West, where preparedness increases less with experience. Since flood experience alone does not always lead to increased preparedness.

2.1.1. Synthesis

Previous studies have all commonly highlighted that risk management and risk reduction are essential factors in creating effective flood mitigation efforts particularly, in effective flood control. This study highlights gaps in Navotas' flood mitigation efforts, specifically how the local flood mitigation strategies secure its citizens from the dangers of floods, how these floods impact the lives of its citizens, and how flood mitigation strategies are perceived. This study will address these gaps by analyzing insights gathered from senior high school (SHS) students.

2.2. Methodology

This chapter discusses the methodology to be used by the researchers in order to address the research questions. This includes the research design, hypothesis, research instrument, data gathering procedures, and method of data analysis.

2.2.1. Research Design

This study uses a qualitative research approach, especially a descriptive phenomenological design to investigate the experiences and views of Senior High School students at San Jose Academy on the Navotas Local Government Units (LGU) flood mitigation initiatives. A qualitative technique, specifically the phenomenological approach, is most suited for this study because it gives us a thorough examination of students' experiences, perspectives, and issues related to flooding.

Compared to quantitative research, which focuses on numerical data, qualitative research provides a more comprehensive knowledge of human experiences through rich, descriptive data (Creswell & Poth, 2018).

Descriptive phenomenological design was used to record the firsthand experiences of students affected by flooding in Navotas. This research approach allows participants to freely share their viewpoints, assisting researchers in identifying common themes and recurring patterns in how pupils perceive and cope with flooding (Moustakas, 1994). The project will collect narratives from open-ended survey questions that reflect both the merits and flaws of present flood prevention techniques. This strategy ensures that the voices of those who are directly affected are heard and taken into account when discussing ways to improve flood control measures.

The findings of this study will add to the continuing discussion about flood management by showcasing the experiences of students that are an often-overlooked population in disaster preparedness planning. Focusing on the perspectives of young people the study hopes to give practical recommendations that will assist the Navotas LGU and other flood-prone areas in developing more effective and community-centered flood mitigation methods. This research will also serve as a platform for future studies on catastrophe resilience and risk reduction in urban coastal locations.

2.2.2. Population Sampling

The researchers selected Senior High School students from San Jose Academy**,** as during moments of calamity such as floods, they are one of the sectors that are first affected. Exploring and analyzing the experiences and perspectives of these students will allow the researchers to identify how floods affect and impacted communities in Navotas, how the flood mitigation measures of Navotas protects and ensures the safety of its citizens, and how the local government unit can improve these mitigation measures. Through the use of both Stratified sampling and Simple Random Sampling, the researchers will gather 20 - 25 respondents for the survey.

2.2.3. Research Instruments

The research instruments used in the study are the following: (1) a survey questionnaire that consists of 11 questions, directed to the respondents' experiences regarding floods within Navotas City, and the Flood Mitigation Measures of the Navotas LGU. In order to gain a much deeper understanding and gain more knowledge on the various Flood Mitigation Measures that are conducted in Navotas City, and how they affect the lives of citizens.

2.2.4. Data Gathering Procedure

The researchers will distribute survey questionnaires online, evenly among different sections of senior high school classes in San Jose Academy. After the researchers have distributed and received the answered survey questionnaires, they will compile and divide the data obtained. After the data has been compiled, the researchers must employ coding to analyze the data gathered, collecting common themes and their frequencies. After analyzing the data that has been obtained, the researchers must now record the results.

3. RESULTS AND DISCUSSION

To present the data gathered in the survey questionnaires in a concise and effective manner, a table was used to present the answers of the respondents. Their common themes per question were identified and collected together depending on their connection. The tabular format includes the question, common themes of their answers, and code frequencies of how often each one was mentioned. Given the Eleven (11) questions of the survey questionnaire, the similar questions are grouped together in different tables. Additionally, only the themes mentioned at least more than one are included in the format.

Table 1. How do floods affect the lives of Senior High School students and their communities?

Questions	Common Themes	Code Frequencies
1. In what way did recent floods affect you and your community?	a. Property Damage b. Disruption of Transportation c. Cleanliness & Disinfection d. Public Safety & Hazard	a. 7 b. 5 c. 5 d. 3
2. What were the biggest challenges you faced during the floods, and how did you overcome them?	a. Property Damage b. Rise of Flood Levels c. Transportation Disruptions	a. 6 b. 4 c. 2
3. How did you and your community manage to cope & recover with the damages that floods have brought into your community?	a. Community Resilience & Charity b. Cleaning c. Aid of LGU	a. 12 b. 3 c. 2
4. How has floods affected local businesses, schools, or other important institutions in your	a. Disruption in Education and Business Operations b. Economic and Social Disruptions c. Property damage and	a. 8 b. 8 c. 4

communit y?	Economic loss

Table 1 showcases the questions that ask about how floods affected the lives of Senior High School students and their communities. Each question has their own common themes and the frequencies of each one.

On the first question, the most frequent response is “Property Damage” given the question about how recent floods affected senior high school students and their communities. It is then followed by “Disruption of Transportation”, and “Cleanliness & Disinfection” with both having 5 mentions, then “Public Safety & Hazard” with 3 mentions. Based on the answers presented, the students’ all collectively experienced floods causing damaged property, and difficulty in terms of transportation. The severity of these floods in the city cause various hindrances in the lives of citizens.

On the second question, the respondents were asked about what were the biggest challenges they faced during the floods, and how did they overcome them. The most frequent response is “Property Damage” again with it having 6 mentions. Followed by “Rise of Flood Levels” with 4 responses, and lastly Transportation Disruption with 2 mentions. Again, The biggest challenges that the community faced were Damages of Property, with the addition of Rise of Flood Levels. Although the flood levels of the city have been controlled by the LGU, it is still able to reach dangerous levels in areas that are lower in the city.

On the third question, the respondents were asked about how they and their community managed to cope & recover with the damages that floods have brought into their community. With the most frequent response being “Community Resilience & Charity” with 12 mentions, followed by “Cleaning” with 3 mentions, and lastly, “Aid of the LGU” with 2 mentions. The results showed the resilience and unity of the citizens during times of calamity, as the answers presented showcase the collective charity and aid that the community offer each other when faced with crises like floods.

On the fourth question, the respondents were asked about how floods affected local businesses, schools, or other important institutions in their community. The most frequent response being, “Disruption in Education and Business Operations”, and “Economic and Social Disruptions” having 8 mentions respectively, and “Property damage and Economic loss” with 4 mentions. As the city houses a number of business operations, and education is essential in the city, the floods that the city experiences often causes hindrances in the operations of these sectors. Oftentimes, leading to damage, or these businesses losing profit or having to close.

Table 2. Senior High School Students’ experiences and knowledge on the flood mitigation measures of Navotas.

Questions	Common Themes	Code Frequencies

5. What flood mitigation measures of the city are you aware of? Please name at least one.	a. Pumping Stations b. Flood gate c. N/A	a. 9 b. 3 c. 2
6. How did the Navotas LGU's Flood Mitigation Measures help secure you and your community?	a. Decrease of Floods & Flood levels b. Flood Preparedness and Safety Measures c. Unaware of The Mitigation Measures / N/A d. Flood Control Measures	a. 6 b. 6 c. 4 d. 3
7. In your opinion, do these flood mitigation measures of the navotas LGU help you and your community from the dangers that flood brought?	a. Decrease of Floods & Flood levels b. Flood Control Measures c. Disaster Risk Reduction d. Flood Preparedness and Safety Measures	a. 4 b. 3 c. 2 d. 2
8. In what ways do you think that the flood mitigation strategies of Navotas City can be improved?	a. Proper Community Waste Disposal b. Awareness c. Community Aid d. Drainage / Sewage System	a. 3 b. 3 c. 3 d. 2

Table 2 presents the experiences and knowledge of senior high school students on the flood mitigation measures of Navotas.

On the fifth question, it asks the respondents what flood mitigation measures of the city they are aware of. With the most frequent answer being "Pumping Stations", with 9 answers, followed by "Flood Gate" with 3 answers, and "N/A" having 2 answers. The results show that most students are only aware of the bombastik pumping stations as

the city's flood mitigation strategy, with only few respondents mentioning the navigational flood gate. These results show that awareness regarding the mitigation measures of Navotas should be emphasized as there are also students who do not know, or are not aware of these as well.

On the sixth question which asks, how the Navotas LGU's Flood Mitigation Measures help secure them and their community, The most frequent answers were "Decrease of Floods & Flood levels", and "Flood Preparedness and Safety Measures", having 6 answers respectively. followed by "Unaware of The Mitigation Measures / N/A" with 4 answers, and lastly "Flood Control Measures" with 3 answers. The respondents have found that the current flood mitigation measures of Navotas have been able to decrease flood levels, and promote Flood preparedness. Although there were some respondents that again, stated that they were not aware of the mitigation measures.

On the seventh question, the respondents were asked if these flood mitigation measures of the navotas LGU helped them and their community from the dangers that floods have brought, the most frequent answer being "Decrease of Floods & Flood levels" with 4 answers, followed by "Flood Control Measures", and lastly "Flood Preparedness and Safety Measures" and "Disaster Risk Reduction" with 2 answers each. This question also presents that the Flood Mitigation Measures have decreased flood levels, with the addition of Disaster Risk Reduction being included.

On the eighth question the respondents were asked, in what ways do they think that the flood mitigation strategies of Navotas City can be improved. The most frequent answers being "Proper Community Waste Disposal", "Community Aid", "Awareness" all with 3 answers each. Followed by "Drainage / Sewage System" with 2 answers. The answers of this question present that the waste disposal of Navotas lacks attention from the LGU, as most respondents state that due to improper waste disposal, it causes blockages for the sewage / drainage system of the city, which is one cause of floods in Navotas.

Table 3. The Future of Flood Mitigation Measures in Navotas.

estions	Common Themes	Code Frequencies
9. What long-term changes do you think should be made to prevent future flood damage in your community ?	a. Flood Mitigation Improvement b. Community Discipline and Waste Management c. Flood Preparedness and Increased Safety Measures d. Environmental Care	a. 8 b. 7 c. 4 d. 2

10. How do you think partnerships with private organizations or NGOs can enhance flood mitigation efforts in Navotas?	a. Assistance in Flood Control Improvement b. Community aid	a. 8 b. 7

Table 3. Presents the future of Flood Mitigation Measures in Navotas, based on the perspectives of Senior High School Students.

On the ninth question the respondents were asked, what long-term changes do they think should be made to prevent future flood damage in their community. With the most frequent answer being "Flood Mitigation Improvement" with 8 answers. Followed by "Community Discipline and Waste Management", with 7 answers. Then "Flood Preparedness and Increased Safety Measures", with 4 answers. Then lastly, "Environmental Care" with 2 answers. The continuation of improving the Flood Mitigation Measures of the city is something that the respondents emphasize, with Waste management being another factor that seeks to be resolved. Both are vital in resolving the issues found in the Flood Mitigation Measures of Navotas.

On the tenth and final question, the respondents were asked how they think partnerships with private organizations or NGOs can enhance flood mitigation efforts in Navotas. The most frequent answer being "Assistance in Flood Control Improvement" with 8 answers, Followed by "Community aid", with 7 answers. Partnerships with NGOs can be of help if done responsibly by the LGU, with the respondents stating that they will be a big contribution in Improving the Flood Control in the city, while also being able to contribute in aiding the community and voicing out the concerns of citizens.

4. CONCLUSION AND RECOMMENDATION

The main objective of this study is to identify and analyze the weaknesses and areas for improvement of the current flood mitigation measures of the Navotas LGU, through the experiences and perspectives of Senior High School students of San Jose Academy. This study also explores how floods impact the communities of different areas in Navotas city, and how they cope with the effects brought by these floods.

The study also showed that floods negatively impacted the lives of both the Senior High School students and their communities, causing disruptions in their education, local businesses, loss of important belongings and even damaged homes.

The students also collectively found that the common weaknesses of the Flood Mitigation Measures of the city are in terms of the Drainage and Sewage system of the city. As these commonly experience blockages, causing flood levels to rise continuously.

The students perceived the current state of Navotas flood control as effective, although it does not provide long-term solutions regarding the

damages that floods bring, as floods are still unavoidable in Navotas today.

Moreover, Flood mitigation improvement is also something that is prevalent in order to lessen the damages of floods. The results also show that a high number of respondents are only aware of the pumping stations as one of the mitigation measures of Navotas. This shows that improving the current mitigation measures of Navotas city is truly a necessity in the lives of Navoteños.

4.1 Recommendations

Local Government Unit

1. Since many individuals were impacted by the floods, It is suggested that Navotas should implement more flood mitigation measures / strategies.
2. Implementation of information drives will also serve to raise awareness regarding the challenges and the current state of Flood Mitigation in Navotas.
3. Improving Navotas' waste management system should also be addressed as this is one of the causes for floods in navotas.

Citizens of Navotas

1. The citizens of Navotas should also have proper discipline when it comes to waste disposal. As seen in the results, the irresponsibly disposed garbage causes blockages in the sewage / drainage systems of Navotas City.
2. Citizens should also unite in times of calamity, giving aid and showing charity to those who have been affected by the damages of floods.

Future researchers

1. Future researchers can further explore the various causes and factors that affect flood severity in Navotas, or explore new methods of Flood Mitigation that can be applied in Navotas.

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Expert Perspectives on Designing New Road Patterns towards the Enhancement of Urban Mobility in Navotas City

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Abstract: The increase in traffic in Navotas City has been a problem for many Filipinos living in the area. This research aimed to design a new road pattern to reduce traffic congestion and address road capacity and infrastructure issues. The study is crucial for residents in areas like Navotas, where frequent traffic is prevalent, aiming to improve urban mobility. The data was collected from 7 Civil-Engineers and 3 Architects. The research utilized an interview and survey to gather information on new road patterns for urban mobility in Navotas City, focusing on open-ended, long-answer questions, aiming to gather personal perspectives on the topic. The researchers used a tabular-format to present common themes and codes in participants' responses on designing new road patterns for urban mobility enhancement in Navotas City. The most frequent codes and responses regarding road patterns were ‘needs improvement’, ‘narrow road and flooding’, and ‘good and traffic.’ The main traffic challenges in the city were only two lanes road and narrow road, unplanned constructions and traffic along schools and establishments. Innovative road design to improve traffic flow including road widening, infrastructure, lane policy, road networks, and alternative routes. Key barriers to implementing new road patterns included limited-space, implementation of traffic volume and regulations, traffic law, and overseeing minimal vehicles. Recommendations for road pattern designs included traffic management plans, wider roads, and strategic bike lanes, traffic lights, and pedestrian crossings. This study found that to improve urban mobility, there is a need to identify optimal road design and construction strategies, in order to reduce travel times and congestion, and improve quality of life. The experts suggest proper planning for new road patterns and road widening in Navotas City, as well as establishing traffic laws for the improvement of urban mobility.

Key Words: Road Patterns; Traffic Congestion; Narrow Roads; Urban Mobility; Innovative road design

1.INTRODUCTION

1.1 Background of the Study

The main issue addressed is the Heavy traffic in Navotas City which has been a problem for many people living within the area, whether in time of going to work/school or to any other area where they are in need to travel. The heavy traffic was also observed from recurring road constructions, overflow of vehicle traffic, reckless pedestrians, illegal double parkings, and overtakings. This research aimed to design a new road pattern to reduce traffic congestion and address road capacity and infrastructure issues amidst a realized influx of population brought by prevalent migration. It emphasized improved road quality and reduced driving risk, thus sped up passage of vehicles.

Road patterns help to optimize the road routes and systems that are caused by traffic congestion; it also focused on the development of infrastructure that addressed the congestion in the road that affected routing systems and urban mobility. These patterns of roads are accessible to enhance urban mobility, including the sustainability of urban plans and smart urban mobility. According to Morimoto et al. (2022) and Morimoto and Wang (2022), in the history of road traffic safety strategy planning, traditional road safety has mostly emphasized the responsibility of road users. Experts must consider the needs of people and provide a variety of sustainable plans. Smart urban mobility improves the transportation systems, which makes it more effective and efficient for transportation, and it also helps the goal of urban mobility, which makes it more sustainable and accessible to everyone.

This study also aimed to tackle innovative transportation solutions and infrastructure development. For instance, this study delved on alternative traffic routing systems, smart traffic management, and optimizing road network design to reduce and minimize congestion. With the construction of more resilient and durable roads, utilizing advanced materials and technologies will help in ensuring the safety and well-being of local residents and commuters. Exploring complementary areas can also contribute to a comprehensive understanding of traffic management and road infrastructure.

This study aimed at improving bridges and roads, must consider the potential impact on traffic capacity. Reducing the number of lanes, for instance, can significantly decrease road capacity. Therefore, it's crucial to maintain all existing lanes to ensure smooth traffic flow. Additionally, narrow lanes and transitions can also affect road capacity, highlighting the need for careful planning and design in road construction projects. Furthermore, existing literature addresses traffic congestion at a macro level, such as focusing on large cities or civilized areas. By narrowing the focus to a specific area in Navotas, this provides localized insights, addressing unique geographical, infrastructural, and socio-economic factors that may not be fully explored in broader

studies. This study contributes to the field of urban planning, which promotes better planning strategies that offer a variety of solutions to the problems of transportation departments. Urban planning strategies can also provide a positive impact on sustaining the environment, for they encourage sustainable solutions. This study sought to innovate a road pattern that can assist in reducing congestions.

1.2 Statement of Objectives

The study sought to answer the question: What innovative road patterns can be designed to enhance urban mobility in Navotas City?

Specifically, the study aimed to answer the following questions:

● 1. What is the importance of road patterns in enhancing Urban Mobility?

● 2. How can the geographical constraints of Navotas City be addressed in the planning of new road patterns?

● 3. What are the potential impacts of improved road patterns on local economic activities and social interactions in Navotas City?

1.3 Significance of the Study

Upon completion, the results of this study will benefit the following:

● **Policymakers:** This study will help them to provide better enforcement of traffic laws as well as design and make targeted solutions such as traffic flow systems for the betterment of the transportation system.

● **Urban Planners:** This study might be able to help them with future road planning. Showing them the problems of the current roadworks and possible solutions to combat the high congestion rate in Navotas City.

● **Local Government Units (LGU):** This study may help them to prioritize investments that can help to improve infrastructures such as road widening or constructions.

● **Future Researchers:** This study can assist with how improving road patterns can help in urban mobility and to increase further knowledge on ways that could address the problem of traffic congestion.

1.4 Scope and Delimitation

The research focused on Navotas City, where traffic congestion is a significant concern. The study aimed to identify solutions that would alleviate traffic congestion and improve road infrastructure, which can be applied to other traffic-prone areas in the region. It also examines new road patterns, focusing on elements that affect functionality, efficiency, sustainability, and safety. However, it excludes several key aspects, including physical creation of new road patterns, socio-economic impact, legal and regulatory challenges, cultural and social factors, and environmental impact beyond traffic. Despite its limitations, including inaccessibility of certain roads and reliance on specific stakeholders, the study

aimed to contribute to finding solutions for urban mobility in Navotas City.

This study also excludes several key aspects, including the socio-economic impact on businesses, local economy, and job opportunities; legal and regulatory challenges related to land acquisition and permissions; cultural and social factors affecting community response; long-term effects on urban sprawl, land use, and environmental issues; and broader environmental concerns such as biodiversity loss, noise pollution, and ecological effects of new infrastructure.

2. METHODOLOGY AND RRL

2.1. Review of Related Literature

This section presents a review of relevant literature that delved on the topics of Expert Perspectives on Designing New Road Patterns towards the Enhancement of Urban Mobility in Navotas City. The review features insights from experts in various fields, including urban planning, transportation engineering, and traffic management. We reviewed research addressing similar issues in other urban settings, examining their methods, outcomes, and relevance to the circumstances of Navotas City.

Barter (2021) examines the connections between housing tenure and transportation for urban poor people, mostly in emerging (global south) cities. Transport and housing for the poor have important linkages, but are often misunderstood. Their study has identified a number of policy implications: those implications were housing and urban planning-related recommendations to reduce access problems for the urban poor, recommendations related to displacement, especially transport-related displacement, and transport-related policy and practice reforms with housing-related benefits, and these are the stem to the relationships.

Papageorgiou, et al. (2024) smart urban planning, which could improve urban mobility. They also identified crucial gaps in urban transportation, including a significant emphasis on the development of Intelligent Transportation Systems (ITS) to be able to optimize and reduce the traffic flows and solve the congestion problems. The potential of this is to sustain active modes of transportation to mitigate the environmental challenges. Advancements in Information and Communication Technology (ICT) and digitalization have introduced a novel era of urban smart mobility, enabling and spotlighting the imperative for sustainable transportation solutions (Paiva et al., 2021). Moreover, by utilizing and including technologies that effectively control and enhance services, these services improve the overall quality of urban life, such as traffic optimization, urban congestion, and environmental challenges. Strategies and planning must influence citizens to apply mobility within urban environments; also, building necessary infrastructure helps reduce congestion and improve traffic flows. (Papageorgiou, G., et al, 2024).

According to Tsigdinos, et al. (2022) In an era of complexity, rapid technological advance and need for climate change action, urban roads may need to transform. The aim of this research is to identify the concepts underpinning the fundamental dimensions of the future urban road and open up an interdisciplinary dialogue about its delivery. According to Tzouras et al. (2021), other innovative road design concepts propose the segregation of traffic flows as an efficient measure to address traffic safety problems by creating multimodal corridors or the use of 'shared space', where all road users are encouraged to legally occupy and share the same road space. There is an ongoing debate about the possible impacts on the road network caused by a high penetration rate of artificial intelligence based mobility (Nikitas et al., 2021a).

Yu, et al. (2019) aims to know road network generalization considering traffic flow patterns. According to them, one of the main concerns in cartographic generalization, road network generalization aims to maintain patterns of road networks at map scales. The methods used define the pattern of roads mainly from geometry and topology. But, for navigation purposes, a traffic flow network is also important to generalize the road network. Also, road segments that have a close relationship with the traffic flow system should be kept together on small maps to maintain the totality of the driving route. Their study proposes a method for road network generalization that combines geometry, topology, and traffic flow patterns. The results demonstrate that the proposed method can maintain both the 'Good Continuity' principle and the transport function relationship of roads after generalization.

According to Centeno-Canlas, R. L. (2024) numerous complicated socioeconomic, health, and environmental issues were brought about by the growing urban population, which was made worse by in-migration from rural areas. The study first examines the city's development from colonization to national independence, and then it talks about the local government's efforts to revitalize the city as part of the Mega Manila Dream Plan. Stakeholders identified 12 Key Elements (KEs) contextualized to Metro Manila's urban renewal using Delphi methodology: Kaunlaran (Progress and Development), Kabuhayan (Livelihood), Kapayapaan (Peace), Kaayusan (Order), Kalinisan (Cleanliness), Kapaligiran (Environment), Kalusugan (Health), Karunungan (Education), Kultura (Culture), Kabataan (Youth), Kalinga (Elderly), and Kaisahan (Unity). These 12 KEs served as the foundation for developing sub-indicators of a revitalized and sustainable urban environment. Finally, using the KEs and associated sub-indicators, we propose a future framework that incorporates other methodological approaches such as data analytics, simulation, and meta-analysis. Some comments are made about the use of a future framework to examine megacity urbanization and revival.

Behnam Neyestani (2015) conducted this study by planning and designing streets

in accordance with the goals and principles of this section to contribute to a consistent level of quality and functionality for Manila City's streets. This policy, along with the project's planning framework, should be used to resolve conflicting priorities for limited street space. Furthermore, their efforts are to enhance street safety to lessen the risks of citizens, and urban transportation designs should always be efficient to improve economic vitality. To develop the effectiveness of a Sustainable Urban Mobility Plan, one must ensure that the end result involves its development.

According to Mogul (2020), people migrate from other provinces to locate in Metro Manila or near it. Since rent costs are higher inside the city, most immigrants live in nearby provinces and travel daily to the city to work. This generates a great volume of daily ridership that often leads to congestion in public transportation, as well as in a significant increase in private vehicle usage. This results in daily heavy traffic that causes inefficiency for business and discomfort and inconvenience to users. The continued in-migration also results in the proliferation of informal settlements that provide low-cost lodging for the immigrant working class.

Verzosa, N., & Miles, R., (2016) investigates the various factors contributing to collisions and the likelihood of severe injury or fatality. These factors include the presence and quality of pedestrian infrastructure, spatial characteristics, traffic patterns of vehicles, drivers, and pedestrians, as well as patterns of traffic regulation violations among different road user groups

Limjuco, R. P., & Ruiz, R. M. (2013) studied traffic congestion in Davao City. They found that the highway from Toril to downtown is known for having very heavy traffic. This situation causes inconvenience to the commuters because of the amount of time wasted while waiting for the traffic to flow normally. The researchers found that in the past five years, the commuter population in Toril, Ulas, and Matina has increased due to the construction of new subdivisions and urban villages around the existing route. Because of this, more commuters are complaining about the discomfort of being stuck in traffic, especially during rush hours in the morning and evening. The researcher believes that reducing each commuter's travel time is economically beneficial because people can use that saved time for doing something more productive. This study described the status of vehicular traffic from Toril to downtown Davao City and also explored the possibility of constructing a coastal road as an alternative route. A survey was conducted on the highway and its surroundings from Toril to downtown Davao City to assess the needs of residents regarding the alternative route of commuters traveling in that area.

2.2 Methodology

2.2.1 Research Design

This study uses qualitative research, which defines the various perspectives of experts on how designing the new road

pattern assesses the traffic congestion, particularly in Navotas City. It also provides the different insights of experts on the enhancement of urban mobility and identifies how effective urban planning is in Navotas City.

This study is exploratory in nature, as it aims to gather significant insights for future research on road patterns. The researcher gathered 7 Civil-Engineers and 3 Architects who are experts in designing the roads and engaging the projects.

2.2.2. Population Sampling

The researchers selected civil engineers and urban planners as respondents for the study due to their expertise and invaluable insights in the field of transportation infrastructure development. As professionals responsible for designing, building, and maintaining roads, they possess a deep understanding of the complexities involved in road construction.

By consulting with civil engineers, the researchers aim to gather constructive suggestions on innovative road design and construction methods, as well as gain a better understanding of the limitations, challenges, and critical factors to consider when building roads. Their input will be instrumental in informing the research and providing actionable recommendations for improving urban mobility.

2.2.3. Research Instrument

The research instrument utilized interviews to gather experts' perspectives on new road patterns aimed at developing urban mobility in Navotas City. All the questions are open-ended questions, which require long answers or statements.

2.2.4. Data Gathering Procedure

To gather data from participants, the researchers created an interview guide. This instrument consisted of questions that were composed by the researchers and from the studies they have researched. The researchers also ensured that the interview questions are enough to provide sufficient data for the study. Before the researchers conducted the interview, the question was validated by the research adviser to ensure the accuracy and effectiveness of each question. The study was conducted in Navotas City Hall wherein the researchers used a face-to-face, open ended interview in collecting the data for in-depth information and honest responses. To maintain confidentiality and prevent any biases, the researchers avoided asking for the personal information of each respondent. Additionally, the researchers used an online survey due to the lack of respondents and time constraints in Navotas City Hall. The research survey was promoted online and distributed through a private message. The study utilized purposive sampling to data and to select the respondents based on their knowledge and experiences that are relevant to the study.

3. RESULTS AND DISCUSSION

In order to present the information

obtained briefly and effectively, the researchers used a tabular format to present the common themes and/or codes found in the participants' responses and the code frequencies or the number of times these themes were mentioned. Even with different responses from the participants, all themes (from highest to lowest) are included in the tabular form. Since there are nine (9) questions, they were placed on nine (9) tables.

Table 1. Describing Current Road Infrastructure.

Question	Common Themes	Code Frequencies
1. How would you describe current road infrastructure in Navotas City?	a. Needs improve-ment	a. 4
	b. flooding	b. 2
	c. narrow road	c. 2
	d. traffic	d. 1
	e. good	e. 1

For table 1, the majority of respondents emphasized the need for improvement, citing narrow roads, flooding, and traffic congestion as major concerns. Many respondents also identified flooding as a significant issue, with some attributing it to clogged drainage systems, inadequate infrastructure, and other factors.

Table 2. The greatest transportation problems

Question	Common Themes	Code Frequencies
2. What are the main traffic challenges in the city?	a. Only two lanes road	a. 3
	b. Narrow roads.	b. 3
	c. Unplanned constructions	c. 2
	d. Traffic along schools and establishment constructions	d. 2

For table 2, the common answer of Respondents are several key factors contributing to traffic congestion in Navotas City, including narrow, two-lane roads, unplanned constructions, and traffic buildup near schools and establishments. To address these issues, some respondents proposed the implementation of dedicated bike lanes and motorcycle lanes, which could potentially reduce traffic volume and promote a more efficient flow of vehicles. By incorporating these infrastructure improvements, Navotas City may be able to mitigate its traffic woes and create a more sustainable transportation system.

Table 3. The success of present road layouts

Question	Common Themes	Code Frequencies
3. How do you describe the effectiveness	a. High volume of private	a. 4

of current road patterns in managing traffic flow?	and public transportation	
	b. Heavy volume Of traffic	b. 3
	c. Number of people who own private	c. 2
	d. Narrow roads	d. 1

For table 3, according to Respondents, the traffic congestion in Navotas City has a high volume of private and public transportation, heavy traffic, and a large number of private vehicle owners. Additionally, narrow roads were cited as a significant contributing factor. Other notable reasons for traffic congestion mentioned by respondents included double parking, particularly by private vehicle owners, which further exacerbates the existing traffic woes.

Table 4. Expert's opinion on improving urban mobility.

Question	Common Themes	Code Frequencies
4. Do you Believe patterns can Significantly improve urban mobility in Navotas City?	a. Road infrastructure must that new road have designated road to lessen the congestion configuration	a. 4
	b. Implement the Traffic rules and regulations	b.2
	c. Yes	c. 2
	d. Traffic management and configuration	d. 1
	e. New systems	e. 1

For Table 4, according to this table, most of the answers are that the road infrastructure must have designated roads to lessen the congestion configuration, which indicates designated roads significantly help to improve the urban mobility in Navotas City, implementing the traffic rules and regulations, and traffic management and configurations address maintaining urban mobility. Also, the new systems make it more reliable to be able to improve mobility.

Table 5. Innovative road design suggestions.

Question	Common Themes	Code Frequencies
5. What Innovative road design solutions would you suggest to improve traffic flow?	a. Road widening to improve the flow, infrastructure and one lane policy	a. 6
	b. Road Networks and optimization	b. 2
	c. Alternative Routes and Enforcing Traffic law	c. 1
	d. Utilizing River And improve Public transportation.	d. 1

For Table 5, this table indicates that innovative designs are a solution to improve traffic flow. Road widening, infrastructure, and the one-lane policy are the majority of the respondents' answers. Road networks and optimization, alternative routes and enforcing traffic law, utilizing rivers and improving public transportation is the least answer of respondents. These are significant innovative designs to improve the traffic flow in Navotas City.

Table 6. Key barriers implementing new road patterns

Question	Common Themes	Code Frequencies
6. What are the key barriers to implementing new road patterns in Navotas City?	a. Limited space to build new road	a. 3
	b. Implementation of traffic volume and regulations	b. 3
	c. Implementation of traffic law	c. 2
	d. Overseeing minimal vehicle	d. 2

For Table 6, this presents that the common answer from all the respondents is that the key barriers for implementing new road patterns in Navotas are the limited space, the traffic volume and regulations, budget constraints, road obstructions, and flooding as well as it being a highly populated area. These challenges make it difficult to expand and redesign roads effectively.

Table 7. Recommendations and Comments about redesigning new road patterns and urban mobility.

Question	Common Themes	Code Frequencies
7. Do you have any additional recommendations or comments regarding road redesign plan and urban mobility in Navotas City?	a. Make a traffic management plan	a.3
	b. Address pattern illegal parked vehicle	b. 3
	c. Make a friendly vehicle road	c. 2
	d. Navotas City needs wider roads	d. 2

For Table 7, the majority of the respondents answered that Navotas City needs wider roads, better truck routes, and designated areas for jeepney stops to reduce traffic. They also recommend to maximize the use of roads and sidewalks, as well as lessen the number of private vehicles to ease congestion, to have a better directional flow and improve mobility in the city.

Additionally, some respondents said that the city should enforce strict deadlines for contractors to finish the projects on time and address the issue of illegal parking.

Table 8. Important factors when designing new road patterns

Question	Common Themes	Code Frequencies
8. What do you think are the most important factors to consider when designing new road patterns? commuters	a. Traffic volume and conges-tion rate	a. 2
	b. Road connectivity	b. 2
	c. Feasibility to commu-ters and side walkers	c. 2
	d. Drainage	d. 2
	e. Strategic bike Lanes, traffic lights and pedestrian crossings placement	e. 1
	f. A lot	f. 1

For Table 8, it's a four-way tie between the traffic volume and congestion rate, road connectivity, drainage, and feasibility to commuters and side walkers. These four which had the same number of frequency are the answers which were seen as their personal opinions on what they think are the most important factors to consider when designing new road patterns.

Table 9. Evaluation on the current road condition.

Question	Common Themes	Code Frequencies
9. How would you rate the current Road condition in Navotas City?	a. Low ratings	a. 5
	b. Moderate ratings	b. 2
	c. Need Improve-ments	c. 2
	d. High ratings	d. 1

For Table 9, A majority of the respondents gave a relatively low rating to the current road conditions with one even stating that it's a hassle. They expressed the need for improvements in the current roadworks. Although some chose a neutral stance and a higher rating they still expressed the overflow of traffic in Navotas.

4. CONCLUSION AND RECOMMENDATIONS

This study endeavors to contribute significantly to the development of efficient and sustainable transportation infrastructure. By conducting in-depth research, the study aims to provide valuable insights into

optimal road design and construction strategies. These findings will inform the construction of new roads, ensuring they are designed to alleviate traffic congestion and enhance traffic flow.

The ultimate goal of this research is to improve the quality of life for residents in the area. By reducing travel times and minimizing congestion-related frustrations, the study's findings will have a positive impact on the daily lives of commuters. Furthermore, efficient transportation infrastructure will also promote economic growth, reduce air pollution, and enhance the overall livability of the city.

Policymakers and Urbanplanners

The study's outcomes will provide policymakers and urban planners with actionable recommendations for developing sustainable transportation infrastructure. By adopting optimal road design and construction strategies, cities can create efficient, environmentally friendly, and resilient transportation systems. This, in turn, will contribute to the creation of more livable, sustainable, and prosperous cities, ultimately enhancing the well-being of their residents.

Local Governments

The survey respondents recommended local government units to address the infrastructure development since it causes congestion in the road and also road infrastructure must have designated lanes to lessen the congestion. Experts, or the respondents specifically, recommend implementing a strategic approach to enhance road infrastructure in Navotas City by implementing road expansion, traffic management, urban planning, and connectivity. Implementing one-way traffic schemes, grand efficient truck lane systems, and modern public transport terminals could also enhance road safety and enforcement through road signs, pedestrian crossings, and traffic monitoring systems.

Community

Residents are enjoined to stop illegal counterflowing as it is one of the causes of traffic. Maximize the use of the road and avoid illegal parking. They should also support infrastructure improvements, use public transportation as well as do carpooling for better mobility.

Experts

Experts should establish a larger space for pedestrians and designating lanes for bicycles and e-bikes can help alleviate traffic congestion. By providing separate lanes, these eco-friendly vehicles can bypass traffic, reducing congestion and promoting a healthier, more environmentally friendly mode of transportation.

Future Researchers

Future researchers could enhance this study or carry it out from the perspective of the respondents. Also, by giving them the answers of experienced individuals in the field they may be able to gather their desired data or gain insights for their research related to the perspectives of urban planners from Navotas City about the road patterns.

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The perspective of Senior High School students from San Jose Academy in Constructing More Green Spaces or Parks in Navotas City

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Abstract: The study aims to discover the perspectives of San Jose Academy Senior High School students in constructing more green spaces or parks in Navotas City, what they think of green spaces, and how it helps them. Green spaces or parks play a very important role inside the city or community; they do not only help the environment, but the people also, and this study shall be evidence of how green spaces or parks help the people. This study also aims to examine the view of senior high school students on how aware they are and how much knowledge they have about green spaces. It aims to identify the possibilities of green space overcoming environmental issues, especially pollution. This study only focused on finding out the perspective of senior high school students in San Jose Academy about creating more green spaces or parks. By this research, it seeks to provide insights on how urban spaces could potentially impact local communities and youth. The researchers used survey questionnaires to gather the data needed; 30 students from both Grade 11 and Grade 12 were chosen to answer the survey. Based on the results of this study, it proves that green spaces help improve both the environment and the people living in it. Majority of the respondents answered that green spaces can be a help to their overall well-being, especially mental health. A number of respondents answered that they use green spaces to relax, find peace, and take away their stress, and some answered they use it for recreational activities and gatherings or a place to hangout. This study forwards that green spaces can be beneficial to both people and the community.

Key Words: Green Spaces, Environmental Issues, Mental Health, Perspective, Youth

1. INTRODUCTION

1.1 Background of the study

Green spaces or parks play an essential role in a city or community. It does not only make the city look good; it also helps the people who live in it, especially the environment.

According to Jbrown (2023), Green spaces have a wide variety of positive environmental impacts; they provide wildlife habitat and improve air and water quality, reducing pollution. Green Spaces or Parks also help the people inside the city, according to Sreenivas(2023), Green spaces can help lower stress, reduce anxiety, recharge a person emotionally, and many more.

This study helps the people and the environment inside Navotas City, with the help of everyone, getting their opinions and perspective in constructing more green spaces or parks. The researchers focused on the perspective of senior high school students from San Jose Academy in constructing more green spaces or parks.

In Navotas City, many green spaces or parks are built but never maintained; for example, the Navotas Greenzone Park was accomplished in 2023, but now there are some trash lying everywhere, food wrappers are left on the floor, and the plants and trees are not taken care of; those places are meant to be the ones that reduce pollution, but some people inside the city ruin it, causing it to be destroyed.

Some of the reasons why parks are not properly maintained are because of community neglect, vandalism and misuse, budget constraints, and many more (London, P. F. 2023).

The researchers aim to determine the students' knowledge on the benefits, pros, and cons of constructing more green spaces or parks. This research aims to lay the groundwork in addressing the lack of green spaces or parks inside Navotas City and how it is not taken care of.

1.2 Statement of Objectives

This study aims to examine and further explore each view from the senior high school students in San Jose Academy with regard to additional green spaces or parks in the construction of the city of Navotas. The study sought to answer the question: What are the perspectives of Senior High School students from San Jose Academy regarding the construction of additional green spaces or parks in Navotas City?

Specifically, the study aims to answer the following questions:

1.) How can green spaces or parks contribute to improving air quality, reducing heat, and enhancing social interactions in urban areas like Navotas City?

2.) What recommendations can be provided to local government and urban planners based on the perspectives of Senior High School students?

3.) What do the students perceive as the potential benefits of green spaces or parks for their mental health, well-being, and academic performance?

1.3 Significance of the Study

This study explores the perspectives of senior high school students from San Jose Academy about building or constructing more green parks or spaces inside Navotas City. This study also focuses on understanding the impact of constructing more green spaces on students and Navoteños, specifically San Jose Academy students. By understanding the perspectives of students, the researchers were able to know their insights and opinions regarding constructing and building green spaces in Navotas and how it is beneficial for them and for the environment.

Local Businesses

This study also benefits businesses, as green parks or spaces can attract people and tourists that can boost the growth of local businesses inside Navotas City. This study highlights the potential of green parks that may be beneficial for local businesses, as constructing more green parks can increase tourists and customers.

Local Communities

This study also benefits local communities and residents, especially elderly people. Green spaces and parks can contribute to each individual as they improve mental and physical health, improve air quality, reduce heat, and provide more areas or spaces for refreshment and to be healthier and sustainable. In addition, it can also contribute to a healthier environment for people, as it produces lower risks of diseases. It improves the social and economic well-being of a community. And by having more green spaces or parks, the researchers mean having better habitats for any wildlife.

Local Government and Urban Planners

The local government and the urban planners of Navotas City are the ones who would benefit from our study, as it provides data-driven insights to support sustainable urban planning, helping them identify where green spaces are mostly needed around Navotas City and how they can maximize community benefits. By investing more in parks, they can enhance public health by reducing healthcare costs as well as make local residents have a healthier lifestyle. On top of all these, the green spaces could also contribute towards our environmental sustainability through mitigating urban heat, improving our air quality, and managing stormwater to mitigate risks of flooding. And also this study would enhance public engagement as it aligns the urban development projects with the needs and preferences of the community, leading it to increase satisfaction and a more livable city.

Future Researchers

This study would be beneficial for future researchers who can use the research as a basis for their study. This study's findings can be used as a reference for urban and environmental studies and be improved further in the future.

1.4 Scope and Delimitations

This study focused on determining the perspective of senior high school students at San Jose Academy about providing more or constructing green spaces or parks inside Navotas City. For our limitations, The researchers only focused on senior high school students in San Jose Academy. This research does not explain the reasons and factors that affect their perspective on the said issue.

2. METHODOLOGY and RRL

2.1 Review of Related Literature

This study explores the perspective of Senior High School students from San Jose Academy in constructing more green spaces or parks in Navotas City. It examines their views on how constructing more green spaces could benefit the community in terms of environmental, social, and health outcomes. The research aims to provide insights into the role that youth play in promoting urban sustainability.

A. Urban Planning and Renewal

Chavez, E. M. (2000) hoped to help not just the urban planners but also the government planners and the local government of Manila and other stakeholders that are involved in the management of parks. According to them, their findings will lead to the patronization of the area once again, that the plans will provide new facilities and programs that will not only attract the local but also the foreign tourists, security measures such as security guards visibility will provide a solution to

the safety of the people inside the park, and maintenance programs, such as daily collection of trash, will be implemented. These activities are expected to enhance the park redevelopment and make people once again patronize it. The study was connected through actual sight observation and investigations, especially on the study where redevelopment was badly needed. Interviews with the local officials and concerned staff and park users have also been done, and the preparation of the redevelopment plans was also conducted. They recommend that their study should be used as a reference and guide material for the redevelopment of other major national parks in the near future.

Canare (2007) discovered that there is a need to incorporate solid waste management planning in architectural subjects. Proper solid waste management also helps in the sustainability of a certain area or site. The study was connected by reducing the amounts of waste that must be managed that are collected, dispersed, and disposed of. In addition, it is important to provide citizens with the requisite skills and sufficient knowledge to adequately deal with solid waste-related issues and solutions. It also went through the process of comparison and evaluation of existing guidelines and surveys. They recommend studying more into proper solid waste management because of how it affects a certain area; they also addressed that this is a good way of informing students, especially in the fields of architecture.

According to Tutor J.A. et al. (2017), a study of the six public green spaces in Bacolod City and Iloilo City examined the floristic composition and diversity of urban green spaces in areas around Western Visayas, Philippines. This study found that *Eucalyptus camaldulensis* was the most dominant tree species in Bacolod City, while *Swietenia macrophylla* was the most prevalent in Iloilo City. Bacolod recorded around 1,892 woody species across 52 species, 45 genera, and 26 families, whereas Iloilo had 563 woody species from 34 species, 34 genera, and 21 families.

Based on the Simpson's Diversity Index, both cities exhibited around moderately high diversity. In Bacolod, *Eucalyptus camaldulensis* and its *genus Eucalyptus* exceeded the urban tree diversity threshold, as did *Acacia auriculiformis* and *Terminalia Catappa* in Iloilo. The study also identified *Eucalyptus camaldulensis* as the most ecologically significant species in Bacolod City and *Swietenia macrophylla* as the most important in Iloilo based on the diameter at the breast height and the crown diameter measurements.

According to Duan, L., Niu, X., & Wang, B. (2024), the rapid urbanization and population growth have led to the expansion of residential areas, which often intrude upon natural reserves and contribute to various environmental issues like air and noise pollution, the heat island effect, and biodiversity loss. Urban green spaces such as parks, play a crucial role in mitigating these problems by improving the ecological environment and offering social and cultural services, including recreational spaces for residents. Citizens benefit from these spaces both actively, by visiting parks, and passively, by enjoying the ecosystem services these green areas provide to surrounding neighborhoods.

According to the study of Haaland and Konijnendijk Van Den Bosch (2015), the compact city approach was a popular strategy to use for promoting sustainability by reducing urban sprawl and making land use more efficient. This model will encourage walkability and less reliance on cars but also will pose challenges, particularly the loss of green spaces as cities become denser.

Parks, gardens, and private yards are often replaced by buildings and roads, limiting access to nature, which is essential for our overall well-being. While many studies emphasize the benefits of green spaces, they often lack concrete solutions for preserving them in compact cities. The most possible strategies are the following: rooftop gardens, green walls, and utilizing small underused spaces for greenery. By improving this the quality of existing green spaces rather than just their size can also help.

Overall, Haaland and Konijnendijk van den Bosch (2015) highlight that compact cities can support sustainability, but careful planning is needed to ensure that green spaces are not lost around us. More research is required to balance urban development with the needs of our mother nature.

B. Overall Well-Being

A.C.K. Lee, R. Maheswaran (2011) found that there is weak evidence for the links between physical, mental health and well-being, and urban green space. Environmental factors like the quality and accessibility of green spaces affect its use for physical activity; some studies were limited because of poor study design, failure to exclude confounding, bias or reverse causality, and weak statistical associations. The study was connected by a literature search of academic and grey literature that was conducted for studies and reviews of the health effects of green spaces; articles were found and were appraised for their relevance, then it was critically reviewed and graded accordingly, and then it was thematically categorized. They recommend diving more into this because some studies support that green spaces have a beneficial health effect, but other research says establishing a causal relationship is hard, as the relationship is complex.

Irvine et al., (2013) mentioned that it is important to incorporate nature into the built environment from the perspective of cultural and societal values, economic valuation, and ecosystem function. The study was conducted through open-ended questions and was handed to respondents face-to-face. They recommend that efforts to investigate or promote urban green space as a health resource need to carefully account for the multiplicity of motivations and benefits identified by users. The preservation and expansion of green space could be framed as a health benefit to individuals, which may provide an additive rationale for environmentally sound policy decisions.

C. Perspectives and Approach

According to Membrebe Jr. Z.O. et al. (2017), The Arroceros Forest Park (AFP) in Manila is one of the few remaining urban forest parks in Metro Manila, known as the “last lung” of the city due to its rich variety of trees and plants. Despite its ecological significance, the park is not prioritized politically, and many urban residents are unaware of its value in promoting well-being and mitigating climate change. The study highlights the collaborative management between the Winner Foundation, NGOs, and the local government to maintain AFP but also notes the need for increased awareness and engagement from the community. Strengthening partnerships between the government and private sectors is crucial to preserving AFP as an essential eco space for urban residents.

Lagbas (2019) stated that investment in urban green spaces such as street trees and forest parks may be viewed as a solution to problems like pollution, climate change, and other factors that affect environmental problems. They conducted a study in Arroceros Park in Manila City; they used

a survey to gather their respondents, who ranged from 17 to 28 years old. Survey showed that air quality regulation and climate and temperature regulation were the two most important urban forest ecosystem services. This study provided evidence that pro-environment decisions were significantly influenced by attitude and socio-economic factors. They recommend to conduct a study with the students' demand for these urban green ecosystem services.

D. Social Benefits

Tudorie et al. (2020) stated that student preferences and uses of the campus outdoor environment should draw the attention of campus landscape planners. The study aims to analyze how the university community perceives landscape services by the Spanish Universitat Politècnica de València's campus opening. An online questionnaire was sent to the university community to check its opinions, level of satisfaction, and their demands related to the current situation of the outdoor areas. Their study was unable to demonstrate significant differences in campus open space needs between women and men. They recommend more studies about the university community's demands according to sex by campus landscape planners.

2.1.1 Synthesis

The related research commonly discussed the importance of constructing more green spaces or parks. Studies by Lee and Maheswaran (2011) showed that problems in the environment, like pollution and biodiversity loss, are important to be maintained, and studies by Irvine et al. (2013) showed the benefits of green spaces or parks on physical and mental health and how green spaces or parks improve the condition of the environment. Furthermore, the research stated that green spaces or parks could be maintained by raising awareness and improving local engagement. The findings encourage more study about relating green spaces or parks to health and well-being.

2.2 Methodology

This Chapter focuses on the methodology, what the researchers did and used to gather the data. This chapter includes the research design, population sampling, research instruments, and data gathering procedure.

2.2.1 Research Design

This study aims to explore the perspectives and opinions of senior high school students from San Jose Academy on the construction of more green spaces in Navotas City. It seeks to provide insights on how urban green spaces could potentially impact local communities and youth, focusing on both the benefits and challenges associated with such projects.

This study gathered data using descriptive research design. The primary method of data collection would involve survey questionnaires. To ensure a representative sample, stratified random sampling is used to select 30 students from both Grade 11 and Grade 12.

Atmowardoyo (2020) said that descriptive research is a widely used method to understand and document the perspectives and behaviors of participants; he also mentioned that surveys are effective tools for collecting data from a large

number of participants, providing reliable information.

Guided by this framework, the research design focused on three main aspects: (1) understanding the perspectives of youth on green spaces, (2) analyzing the process of constructing green spaces, and (3) examining the content and features involved in such projects. The results
provided insights into the factors that influence youth opinions and highlight key challenges and solutions for the effective implementation of green spaces in urban areas. This design aims to answer the central research question of the study: What is the perspective of senior high school students from San Jose Academy on the construction of green spaces in Navotas City?

2.2.2 Population Sampling

The researchers chose senior high school students because they are at an age where they are facing significant stress and are directly impacted by urban challenges, like, for example, the lack of green spaces around Navotas City. Their perspective on how more parks would improve their mental health, focus, and overall well-being is very valuable. Additionally, as members of the community, their opinions are important for shaping a future for urban planning and sustainability efforts of Navotas City. By focusing on this group, this study gathered insights that can influence the development of green spaces to benefit both individuals and the broader community. With the use of simple random sampling, the researchers chose to gather 30 or more respondents to answer the survey.

2.2.3 Research Instruments

The researchers used survey questionnaires to gather information and get their perspective on constructing more green spaces or parks in Navotas City. The survey contains the name, grade, section, and gender; it also contains what green spaces are. The questions inside the survey are all open-ended questions, questions that can't be answered with a simple yes or no.

2.2.4 Data Gathering Procedure

The researchers used Survey to collect or gather data, researchers started distributing the survey in the form of Google Forms.

To make sure the respondents can participate voluntarily, the researchers provided a consent form about the details about the purpose of the survey.

After distributing the surveys, the researchers waited for the respondents to answer them. After receiving the data, we analyzed it one by one to make sure the data is great.

3. RESULTS and DISCUSSION

To show the data that was gathered, the researchers used a tabular format to present the common themes and or codes found in the answers of the participants and the code frequencies, or how frequently these themes appeared. With the variety of responses from the participants, only the themes that had 3 or more mentions were included. Since there are ten (10) questions, these were divided into four (4) major sections

Table 1. Benefits of Green Spaces in Mental and Physical Health

1. Have you been to a green space or park in the city?

Question	Common Themes	Code Frequencies
1.1 If yes, what green space or park in the city? 1.1.1 How often do you visit these? 1.1.2 Why do you visit these?	a. Mental Reposes and Peacefulness b. Gatherings and educational purposes c. Physical well-being	8 10 4

Question	Common Themes	Code Frequencies
1.2 If not, have you ever been to a green space or park outside the city? Where are these located?	a. Luneta Park b. Central Park, Bonifacio Global City c. Arroceros Forest Park d. UP sunken garden e. Valenzuela City f. Baguio burnham park g. Manila City	a. 2 b. 1 c. 1 d. 1 e. 1 f. 1 g. 2

2. In your opinion, how can these parks benefit you both mentally and physically?	A. Decrease Mental Health Problems	A. 8
	B.Provides Safety	B. 2
	C.Relaxation and Leisure	C. 12
	D.Promotes Physical Activities	D. 9
	E.Supports the Environment	E. 1

Table 1 presents information about how green spaces or parks give them courage and relaxation that improves their mental and physical health.

For Question 1, it shows how many respondents have gone to the park inside the city and how many have gone to a park outside the city. It also talks about why they visit these parks. There are 3 common themes: Mental Repose and peacefulness, Gatherings and educational purposes, and physical well-being . Gatherings and Educational purposes had the highest frequency as it had 10 mentions, next is Mental Repose and peacefulness, it has 8 mentions. And lastly Physical well-being, it has the lowest frequency which is 4.

Question 2 asks how can parks benefit students both mentally and physically. There are mentions about green spaces or parks reducing stress that improve their mental health and some mentions that green spaces or parks are good for relaxation and physical activities as it provides safety.
There were 8 mentions about ‘Decrease Mental Health Problems’ and 2 for ‘Provides Safety’ 12 mentions about ‘Relaxation and Leisure’ 9 for ‘Promotes Physical Activities’ and 1 mention for ‘Supports the environment’

Table 2. Importance of Green Spaces or Parks In a Community

Question	Common Themes	Code Frequencies
3. Based on your perspective, how can green spaces contribute to your community?	A.Relaxation and Leisure B.Contributes in Physical Health C.Reduces Mental Health Issues D.Improves the Environment E.Provides Safety and Comfortability F. Attract Tourism G. Boost Economic Growth	A. 10 B. 1 C. 6 D. 10 E. 5 F. 1 G. 3
4. How important do you think it is for Navotas City to create more green spaces or parks for the community?	a. Minimizes certain illnesses b. Improves air quality c. Suitable hangout place d. Reduces flood e. Recreation f. Relaxation g. Development of a community h. Improves socialization	a. 3 b. 7 c. 8 d. 5 e. 4 f. 7 g. 5 h. 3
5. Based on your perspective, why does a community need green spaces or parks?	a. Improves air quality b. helps to support biodiversity c. Improves mental health d. Improves physical health e. Bonding area f. Helps to minimize floods g.Helps our environment	a.6 b.3 c.9 d.5 e.4 f.2 g.3

Table 2 presents information about the importance of green spaces or parks in a community.

Question 3 shows the perspective of students of how green spaces can

Question 3 shows the perspective of students of how green spaces can

contribute to their community.There were mentions about green spaces giving them relaxation and proper time for physical activities, and there were also mentions about it improves their mental health but there were only few mentions that it boosts economic growth and attracts tourists. There were 10 mentions about ‘Relaxation and Leisure’ and 1 mention about ‘Contributes in Physical Health’ and 6 for ‘Reduces Mental Health Issues’ and 10 Mentions about ‘Improves the Environment’ 5 for ‘Provides Safety and Comfortability’ and 1 mention about ‘Attract Tourist’ and 3 mentions about ‘Boost Economic Growth’

Question 4 which talks about how important it is to create more green spaces or parks for the community in Navotas City answered by Senior High School Students. There were mentions about it improving the air quality of Navotas City and there were mentions about it helps to reduce flooding in the city and it’s a suitable place to hangout. There were eight common themes: It serves a good hangout spot has the highest frequency that had 8 mentions, It improves air quality and relaxation has the second highest frequency and both had 7 mentions, It reduces flood and for the development of the community has the third highest frequency and both had 5 mentions, For recreation has the fourth highest frequency and had 4 mentions, It minimizes illnesses and it improves socialization has the lowest frequency and had 3 mentions.

Finally, For Question 5 which talks about the perspective of why a community needs green spaces or parks answered by senior highschool students.The most mentioned are that green spaces or parks improves mental health and there were mention about green spaces or parks improves air quality and it helps the environment. There were seven (7) common themes: improves mental health has the highest frequency that had 9 mentions, improves air quality has the second highest frequency that had 6 mentions, improves physical health had the third highest frequency that had 5 mentions, bonding area has the fourth highest frequency that had 4 mentions, helps support biodiversity and helps our environment has the fifth highest frequency that had 3 mentions, and finally helps to minimize floods has the lowest frequency that had 2 mentions.

Table 3: Idea of Constructing Green Spaces or Parks

Question	Common Themes	Code Frequencies
6. What do you think about the idea of constructing more green spaces or parks?	a. Environmental Enhancement b. Promotes Holistic Health c. Gathering and meeting place d. Construction of parks e. Recreation Center	a. 17 b. 6 c. 5 d. 2 e. 4
7. What are your suggestions for the local government regarding the construction of these green spaces?	a. Consider the priority and the benefits that the citizens can gain b. Construct green spaces in areas that are typically prone to the effect of a calamity c. Discipline of the citizens and make sure the park is well maintained d. Make it big enough so that they have a provided space (Food booths, public bathroom, trash can, etc..) e. financial and budget support from the governments f. Make a wise decision	a. 7 b. 5 c. 5 d. 5 e. 3 f. 3
8. In your opinion, what is the biggest challenge of building more green spaces in our community?	a. Societal misconduct b. Lack of budget c. Location d. Poor implementation e. Lack of space f. Lack of resources g. Government	a. 9 b. 5 c. 6 d. 4 e. 16 f. 3 g. 3

Table 3 presents the perspective of students about the idea of constructing green spaces or parks in a community.

Question 6 talks about the idea of constructing more green spaces or parks.

There were mentions about constructing green spaces or parks that can help to improve the environment and reduce environmental problems, there were also mentions about constructing green spaces or parks that must be in an in-demand area with fewer parks that can help to improve mental and physical health. .There are 5 common themes: Environmental Enhancement, Promoting Holistic Health, Gathering and meeting place, Construction of parks, and recreation center. There are 15 respondents that said green spaces can be an environmental enhancement, and 6 respondents believes it promotes holistic health, 5 respondents thinks it can also be used for Gathering and meeting place, 2 respondents thinks it's a good idea to construct more green spaces, and lastly 4

respondents believes it's a good place to do some activity, or recreation center.

Meanwhile Question 7, which talks about the suggestions for creating green spaces in Navotas City emphasized the importance of selecting accessible, visible locations and incorporating functional features. There were mentions about the local government must prioritized constructing green spaces or parks as it gains benefits in health and it helps to solve problems in the environment .There were 6 common themes: 7 participants talks about the benefits they gained and priorities, 5 participants talks about on what areas should be focusing while constructing green spaces especially on areas that are prone to disasters such as floods. 5 mentions the discipline of the people, 5 mentions the space for the vendors and public bathrooms and trash can. 3 mentions the financial budgeting, and finally to make a wise decision that 3 mentions

For Question 8 which talks about different perceptions of students about what are the challenges that may encounter in building more green spaces in the community. There were mentions that problems in constructing green spaces or parks are due to lack of space, budget and resources, they also mentioned that it's difficult to maintain parks in a community. There were seven (7) common themes: Lack of space has the highest frequency that had 16 mentions, Societal misconduct has the second highest frequency that had 7 mentions, Location has the third highest frequency that had 6 mentions, Lack of Budget has the fourth highest frequency that had 5 mentions, Poor implementation has the fifth high frequency and had 4 mentions, Government and Lack or resources has the lowest frequency and both had 3 mentions.

Table 4: Environmental Benefits

Question	Common Themes	Code Frequency
9. In your opinion, can green spaces help with climate change? (Rising temperature, drought, etc.)	a. Having enough Trees or plants to support climate change. b. Helps to reduce or control floods. c. Improves air quality. d. Help to reduce rising temperature by providing shades or cooling effects. e. Helps to lessen the production of carbon dioxide.	a. 11 b. 4 c. 5 d. 9 e. 10
10. Do you think green spaces can lessen natural disasters (floods, landslides, etc.)?	a. Yes, because trees and plants has great water absorption that can prevent landslides and especially floods here in navotas. b. No, I think It will just gonna be the cause of the disaster more	a. 26 b. 3

Table 4 presents the benefits of green spaces or parks on the environment and it also shows how it reduces or lessens disasters and environmental problems.

Question 9 which talks about the opinion of Senior High School, shows whether green spaces help with climate change. There are mentions that it helps to reduce and control calamity such as floods and it improves the quality of the

environment. They also stated that it's enough to support climate change. There are 5 most mentioned ones, but having enough trees or plants to support climate change is the most mentioned one, as trees and plants help to absorb carbon dioxide that is being produced by the machinery around the city. And helping to reduce or control floods is the most unmentioned one, as some green spaces are lacking in maintenance; there is a higher chance that flood control will not work properly. There were five (5) common themes: Having enough Trees or plants to support climate change has the highest frequency that had 11 mention, helps to lessen the production of carbon dioxide has the second highest frequency that had 10 mention, helps to reduce rising temperature by providing shades or cooling effects has the third highest frequency that had 9 mention, improves air quality has the fourth highest frequency that had 5 mentions, and lastly helps to reduce or control flood has the lowest frequency that had 4 mentions.

For Question 10 which talks about how green spaces impact natural disasters, the responses reflected several common themes.There were mentions about how it helps to reduce floods and prevents landslides. There were 2 common themes: 26 participants emphasized that green spaces, particularly trees, help absorb rainwater, reducing flooding and preventing landslides. while the 3 participants also noted that green spaces were skeptical, believing that large green spaces might not effectively reduce disasters.

The main objective of this study is to determine the perspective of senior high school students in San Jose Academy about constructing more green spaces or parks in Navotas City. This study also explores the benefit and importance of green spaces or parks in a community, specifically Navotas City, and it also explores the benefits of green spaces or parks in the mental and physical health of the senior high school student.

The researchers discovered that every student in San Jose Academy has a different perspective on green spaces, how they use the area, how it helps them, and how they all have different activities. The researchers also discovered the effect of green spaces or parks, not only on the environment but also on the people; from physical, mental, and emotional health, green spaces can help us.

The study shows that senior high school students from San Jose Academy believe that more green spaces or parks around Navotas would be very beneficial. Based on the belief of the senior high school, green spaces helped to reduce stress, improve mental health, improve air quality, help our environment, and lastly provide a place for physical activities like running or walking, etc. Senior high schools also understand that green spaces can contribute to cleaning the environment. While most senior high school students see some challenges like limited space and budget. Overall, this study suggests that creating green spaces or parks could improve the quality of life in Navotas City. The findings reflect on students' awareness of environmental issues and their desire for sustainable urban growth that prioritizes public health and ecological balance. Their insights highlight the need for local government and urban planners to prioritize green space development,

aligning with the younger generation's vision for a healthier and more livable city.

4. CONCLUSION AND RECOMMENDATION

4.1 Conclusion

The main objective of this study is to determine the perspective of senior high school students in San Jose Academy about constructing more green spaces or parks in Navotas City. This study also explores the benefit and importance of green spaces or parks in a community, specifically Navotas City, and it also explores the benefits of green spaces or parks in the mental and physical health of the senior high school student.

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4.2 Recommendations

The following are recommendations provided by researchers:

For students - Utilize green spaces or parks to improve their overall well-being, especially when stressed. These spaces can also be used for projects and as recreational areas where students can engage in their favorite activities.

For Local Government Unit - To construct more green spaces in the community, for it helps with the environmental development and well-being of the citizen. Providing parks can be a really big help as it minimizes calamities like floods, and it improves air quality. Having proper implementation is crucial to avoid any complications in the community.

For future researchers:

1. To further study the other contribution of green spaces or parks on urban areas like Navotas City
2. To further evaluate the recommendations of senior high school students on the local government and urban planners
3. To further explore the potential benefits of green spaces or parks other than for the well-being, mental health, and academic performance

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Perspectives and Practices of Filipino Consumers and Market Vendors on Preserving the Shelf Life of Fruits and Vegetables in Navotas Wet Markets

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Abstract: Spoilage is increasingly becoming a substantial contributor to food waste, particularly in fruits and vegetables. This issue is produced by a variety of sources, including intrinsic features, microbial development, and incorrect handling. Furthermore, eliminating this loss necessitates improved preservation techniques, consumer education, and storage procedures to minimize significant spoiling and danger. The majority of the biodegradable waste is waste from foods. Based on UNEP's (2024) and according to a previous study by Aban and Concepcion (2009), food contamination is frequently caused by a lack of information about the production, storage, and handling procedures. That is why this research focuses on perspectives and techniques of consumers and vendors in prolonging the shelf life of fruit and vegetables in wet markets, as they are one of the most contributing to food waste. The researchers aim to figure out how important it is to preserve the shelf life of fruits and vegetables at wet markets by acquiring the various perspectives and practices of consumers and vendors in Navotas wet Markets. This study used qualitative methodology. It employed surveys and interviews to gather people's experiences and viewpoints on the value of preserving fruits and vegetables. To gather the data needed for the study, the researchers chose a sample of seventeen (17) individuals from consumers and vendors in participants of the study. The researchers then collected data from consumers and vendors in local wet markets in Navotas City. They carefully interviewed vendors and created a Google form for consumers and posted it online to gather responses. After the data was collected, the researchers found that it is important to preserve the fruits and vegetables. With the responses of the consumers and vendors, preserving the shelf life of fruits and vegetables in various ways and techniques cannot just help the environment but also the society. This study proves that preservation of shelf life regarding fruits and vegetables can benefit a lot with consumers and vendors in such a way that it'll be efficient and lessen the food waste of these types of wet market products.

Key Words: Preserving; Wet Markets; Fruits and Vegetables; Shelf life; Consumers and Vendors

1. INTRODUCTION

1.1 Background of the Study

Fruits and vegetables are essentials in human health since they're one of the main sources of different varieties of nutrients such as vitamins and minerals. They are also in high demand in various marketplaces due to their nutritional content. Aside from the benefits, fruits and vegetables have short shelf lives due to their perishability. Most fruits and vegetables are severely harmed by insects, microbes, and other factors that might shorten the life of food (Kader et al., 2001).

Preserving and prolonging the shelf life of fresh-cut food have been major challenges since it was first made available to consumers in the 1940s. Manufacturers and researchers have worked extremely hard and made significant progress since the 1980s, when the rise of fast-food restaurants increased the supply of fresh-cut fruits and vegetables. (Ma, L., Zhang, M., Bhandari, B., & Gao, Z., 2017)

Waste is one of the major issues in the food supply network. There's a possibility that food can spoil when it reaches its "best before" or "salable date," meaning when the food reaches its peak, there's a tendency that food can no longer eat. As an important component to addressing the food waste issue, there's a growing curiosity in finding extension of shelf-life solutions that are intended to allow products to survive longer but also to maintain the freshness while enhancing the quality and nutritional value. (Amani et al., 2015).

The majority of the biodegradable waste is waste from foods. Based on UNEP's (2024) Food Waste Index Report, about 2.95 million tonnes of food or 26 kilograms of food waste, are produced each year by the households of the Philippines. The report also says that food spoilage is prone to countries with higher temperatures, such as the Philippines. Food waste affects our environment, so it is important to know the importance of reducing food waste, especially in wet markets. Food waste can be the reason for the health issues of the people because of the bad odor it creates and the consumption of it.

The importance of this study to Filipino consumers in wet markets is that reducing food waste affects not just the environment but also us people, both consumers and sellers. It helps the environment to prevent the production of greenhouse gases that can affect the environment and create climate change.

1.2 Statement of Objectives

Microorganisms generally contaminate the surface of food through soil, water, and air. Furthermore, biopolymers found in food, including proteins, polysaccharides, and lipids, are consumed and destroyed as nutrition for microbial growth and reproduction, causing food spoilage and causing a health risk to people (Wang et al., 2021).

This study seeks to answer the question: What are the different perspectives and practices of Filipino consumers' on increasing

the shelf life of fruits and vegetables at Navotas wet markets?
Specifically, the study aims to answer the following questions:

1. What are their perspectives on the importance of extending the shelf life of fruits and vegetables?

0. What are their experiences with handling fruits and vegetables?

0. What are their techniques or practices in extending the shelf life of fruits and vegetables?

0. What factors influence their adoption of practices in preserving the shelf life of fruits and vegetables?

1.3 Significant of the Study

Upon completion, the results of this study will benefit the following:

Filipino Consumers. This study aids to help the consumers gain knowledge and to be aware of how extending the shelf life of fruits and vegetables can improve the practice of avoiding food spoilage and reducing food waste. Their viewpoints are important since, through this, it can acquire the acknowledgment on how this study can play an important role in extending the shelf life of fruits and vegetables. In this way, the consumers could avoid the usage of plastics that we can see nowadays when we buy fruits and vegetables. This would also help them avoid the daily usage of plastics that can destroy our health when consumed and when they're clinging to the fruits and vegetables we can consume.

Wet Market Vendors. This can help them in gaining perspective on how the extended shelf life of fruits and vegetables can play a significant role in prolonging the shelf life of fruits and vegetables that they sell. These vendors can benefit a lot from this study from their point of view because, in the sense that they can ensure the safety of their customers, that's why their perspective is particular in this study to also understand what the effects would be of extending the shelf life of fruits and vegetables and realize how it can help our environment.

Business owners. The perspectives of people to preserve the shelf life of fruits and vegetables are utilized as their guide to improve the quality to avoid spoilage and life of the fruits and vegetables. The results benefit the business owners' additional knowledge in other techniques and practices that can help them preserve the shelf life of fruits and vegetables.

Local Government. The officials position allows them to provide information and awareness about the importance of preserving the shelf life of fruits and vegetables to the people. They are the ones to aid the business owners in their finances and advertisement, especially in purchasing products about preserving the life of foods so they can continue contributing to the economy.

Community. The research results are beneficial for the community because this study gives them knowledge and awareness about the importance of preserving the life of the vegetables and fruits. The community can gain awareness of the other practices to improve their techniques in preserving the life of the products. This study can also be related

to our environment by providing insights on how it could affect our health and, on how we could maintain and protect the surroundings that cover our environment.

Future Researchers. This study is beneficial for the future researchers' perspectives, in the sense that it can be a big help not just only for the consumers, but also to the business owners. That's why this study can also help them to acquire the knowledge and apply on how extended shelf life of fruits and vegetables can have significance. Also, on how to improve their insight when it comes to the effects on our environment.

1.4 Scope and Delimitation

This study explores the perspective of Filipino consumers in Navotas City about the importance of shelf life for fruit and vegetables on the selected Filipino consumers at Agora and Tangos wet markets School Year 2024-2025 is the main goal of this study. The respondents of this study are selected Filipino consumers in Navotas City at Tangos and Agora wet markets who regularly purchase fruit and vegetables. This research is based on interviews and surveys to gather data and information.

The study mainly assessed the different factors that affect their perspective when it comes to extending the shelf life of fruit and vegetables, moreover also the experience as a consumer and the techniques when it comes to the preservation methods or extending the shelf life of fruit and vegetables.

This study identifies the different factors that can affect their perspective when it comes to extending the shelf life of fruit and vegetables; moreover, it focuses on their experiences and different techniques in preservation methods and possible effects on the environment. The scope of this study is limited to the perspective and practices of Filipino consumers when it comes to the significance of preserving the shelf life of fruits and vegetables.

2.METHODOLOGY and RRL

Review of Related Literature presents the studies and literature that are related and relevant to the topic. Methodology presents the methods that will be used in the study, including the research design, population sampling, research instrument, and data-gathering procedure.

2.1. Review of Related Literature

Food preservation, an important manufacturing step used to provide food safety, maintain quality, extend shelf life, and prevent spoilage, has long been referred to as "food processing." In the context of this book, "process" refers to an operation or treatment, and particularly in manufacturing, a procedure for forward movement such as cutting, slicing, dicing, washing, etc. (Anon., Webster's 1987). To "preserve" food is to can, pickle, or otherwise prepare it for later use (Anon., Webster's 1987). Preservation procedures are the "actual" activities of preservation that keep something from deteriorating. Nicolas Appert, in his 1810 work "The Art of Preserving Animal and Vegetable Substances," was most likely the first to outline preservation methods that depended mainly on heating. Before finishing his investigation, he argued that food preservation could be reduced to two fundamental methods: "one in which desiccation is employed, and the other in

which more or less of a characteristic foreign substance is added to prevent fermentation and putrefaction" (Wiley, 1994).

This study highlights the importance of maintaining food safety, the quality and the longevity of fruits and vegetables to prevent spoilage that causes food waste.

In addition, according to Kalangadan et al. (2024), fruits and vegetables are rich in vitamins, minerals, and antioxidants needed in human diets. The study states that they play an important role in the country's prosperity and health by promoting long-term growth and food security in the food chain. This article explained that consumption is of great importance to us, but the massive production of fruits and vegetables needs to be balanced against their per capita supply to the people, and they are usually retailed at a premium to consumers. This may be due to the higher perishability of fruits and vegetables. Fruits and vegetables must be preserved because it reduces postharvest loss and maximizes availability. Aside, such as pocentresling, inadequate storage and transport facilities, poor postharvest management, and lack of value addition contribute to its perishability. Fruit and vegetable crops account for 6% to 16% of postharvest losses, as stated by Guru (2021).

Preservation or shelf life of fruits and vegetables is needed because it reduces food wastage in wet markets. Not only should vendors preserve, but customers too because consumers too are worthy of purchasing fruits and vegetables, and when they spoil, they will only end up in dumpsters, which could be anywhere and have negative impacts on the environment (Kalangadan et al., 2024). It is because of this that consumer and vendor habits and attitudes towards preservation are needed because they dictate diverse types of sustainability.

According to Ramos, B., et al. (2013) A wide range of minimally processed fruits and vegetables (MPFVs) have been produced in response to customers' need for nutritious, fresh-like, and easy-to-prepare goods, as well as consumer lifestyle changes. To preserve the nutritional value of fruits and vegetables, they must be managed, organized, and preserved appropriately. When these goods are lightly processed, they go through unit activities including selecting, cleaning, washing, trimming, peeling, cutting and shredding, sanitizing, and packaging. Because these processes do not guarantee the absence of microorganisms, minimally processed fruits and vegetables require refrigeration as a key mode of preservation. Consumers are becoming more aware of the limitations of current sanitizing methods and are looking for safe food products that require less preparation while maintaining excellent quality. There are several techniques for reducing microorganism populations on whole and fresh-cut food. The most effective strategy is to prevent contamination in the first place. However, this is not always attainable, and the adoption of measures that reduce/eliminate bacteria is important to prevent foodborne outbreaks.

According to Aban and Concepcion (2009), food contamination is frequently caused by a lack of information about the production, storage, and handling procedures. The low-income group is the one that is less aware about food safety. High-pressure article’s findings. Food safety is one of the most vital concerns that customers should focus on, particularly those who are low-income and buy fruits and vegetables in wet markets.

Food wastage is a major issue impacting public health, the environment and the economy in the context of rising population and decreasing natural resources, wastage occurs at all stages from harvesting to the consumer, calling for advanced techniques of food preservation. This wastage is mainly due to the presence of moisture and microbial organisms present in food (Sridhar et al. 2011).

According to Carmen et al. (2020), in the Philippines, public wet markets are an integral part of the country's history, culture, and economy. Wet markets have been the primary trading centers in towns all over the Philippines since the Spanish colonial times. However, as globalization advances, Iloilo City's hyper marketization endangers the future of wet markets. This research sought to analyze the external environment, resources, enterprise components, and business outputs of Iloilo City's wet markets. Modern supermarkets' more pleasant and hygienic environments ensure customers of food safety measures and quality requirements for both food and non-food goods sold in their stores. Many vegetables and fruits are sold in these markets within the Philippines and this study focuses on the system inside the wet market in the Philippines and how foods and beverages are sold there.

The need to extend the shelf life of fruits and vegetables is primary in the Philippines, a country where a significant portion of the agricultural produce is lost due to spoilage before reaching the consumers. This loss has an impact in the community and food security especially in farmers and vendors and overall sustainability. According to Palumb, M. (2022) overview, highlighted the various technologies, including such as Modified Atmosphere Packaging, controlled atmosphere storage, and irradiation. Moreover, this research talks about the quality losses in fresh produce of fruit and vegetables, throughout the postharvest due to the inappropriate use of preservation techniques. This study examines and monitors the quality, moreover the effectiveness and advantages of some contactless for monitoring the non-destructive techniques for observation of the quality of fruit and vegetables.

According to Esguerra (2017). There was a favorable correlation between home size and consumer-level fruit and vegetable waste. Fruit waste had a positive correlation with household wealth and a negative correlation with shopper age. Compared to those who shopped at wet markets, supermarket buyers purchased more fruit.

However, wet market buyers purchased vegetables in large quantities. The main characteristics of fruits and vegetables that consumers discarded were symptoms of deterioration and quality loss, such as shriveling, wilting, toughening, browning, and softening. The primary causes of this waste, according to the respondents, were "overbuying," "poor quality," "forgot to cook," and "forgot to eat." Organizing their menus, improving storage, buying enough to consume, and using or consuming immediately after purchase are few strategies used by customers to cut waste. Fruits and vegetables are one of the food groups that are wasted the most because of their inherent perishability. Although several studies have been conducted to assess fruit and vegetable waste at the consumer level, less study has been conducted in developing countries such as the Philippines.

This study indicated the need for

further investigation into the benefits of various food waste-reduction techniques (such as shelf-life extension). To that aim, it would be beneficial to establish a technique for studying and monitoring the efficacy of suggested shelf-life extension options for food waste reduction from a holistic system standpoint. Interviews with individuals working in factories and retail outlets found that they prefer to regulate the storage levels of items with a shorter shelf life and prioritize their handling over long-life products. This means that items having a longer shelf life are kept in storage for longer. Furthermore, the extended shelf life of these items results in less frequent manufacture. For example, a product with a one-week shelf life cannot be made only once each week. Yet, if the shelf life is increased to several weeks, this manufacturing frequency may become viable. As a result, the production frequency is connected to the shelf life. These factors may be part of the explanation for why the increase in shelf life didn't totally reduce waste at the storage: the flow of supplies was slowed down from producing to distribution. (Amani et al., 2015).

According to Green and White (2017), consumers generally oppose the use of chemicals on fruits, preferring those that are free from such substances, particularly preservatives. Cheng et al. (2020) suggested that biocontrol agents can effectively extend the shelf life of fruits without the need for chemicals. These natural alternatives could address growing concerns about the effects of chemicals on fruits, consumer health, and the environment.

A study conducted by VG Monterde, et al. (2021) documents different fresh-cut vegetables available in wet markets and supermarkets in Davao City, Philippines, to differentiate fresh-cut processing practices between the two locations, and to identify some inadequacies in their practices. With regards to the pre- and post-cutting treatment they conduct, water was not always used since it was mentioned in their study that the consumers were expected to wash them before cooking and/or eating. Water used for washing was also reused, which could be a source of contamination. It is also stated by VG Monterde, et al. (2021) that during processing, inappropriate craft cutter blades were sometimes used in wet markets, which could lead to more produce injury that may result in more browning. Moreover, packaging was mostly used only upon purchase in the wet markets whereas supermarkets had more pre-packed options. Their study has a significance related to this study in a sense that this provides ways on how to extend the shelf life of vegetables and their study also applies on how to manage the food safety strategies which can be connected to this study.

2.1.1 Synthesis

While these studies focus on food waste caused by consumer actions such as overbuying and incorrect storage, they do not investigate how consumer education and initiatives may help to solve this problem. Furthermore, while the relevant literature covers potential losses from the food spoiling situation, it lacks information on how vendors are affected by this issue. Thus, the research gaps between all these studies are the limited discussion of consumer awareness and factors that influence their behavior when it comes to preserving fruits and vegetables, as well as the lack of focus among vendors on how it affects their lives as individuals who make a living from selling fruit and vegetables.

2.2. Methodology

Methodology presents the methods that will be used in the study, including the research design, population sampling, research instrument, and data gathering procedure.

2.2.1 Research Design

To achieve the goals of the study, including figuring out how important it is to preserve the shelf life of fruits and vegetables at wet markets, the researchers used the qualitative methodology. It employed surveys and interviews to gather people's experiences and viewpoints on the value of preserving fruits and vegetables. The researcher used a phenomenological approach to explore their experiences and practices on handling the preservation of fruits and vegetables. Using this method, the only foundation for the conclusions that answer the original study questions is the interpretation of the data collected from the participants.

2.2.2. Population Sampling

The researchers used the non-probability sampling to conduct a survey and interviews. Under this sampling method, the researchers used the voluntary sampling wherein the respondents voluntarily answered the survey questions. The researchers also used purposive sampling that involves selecting respondents based on the characteristics or criteria, such as consumers who usually buy at market and market vendor who’s handling fruits and vegetables business. The researchers chose a sample of seventeen (17) individuals from consumers and vendors in participants of the study.

2.2.3. Research Instrument

The research instrument gathers qualitative data that help the researchers deepen their understanding and knowledge about their practices, attitudes, perceptions, and challenges of the consumers and market vendors in preserving the shelf life of fruits and vegetables. The research instrument consisted of interview guides for the vendors and survey-questionnaires for the consumers, in this way the consumers and vendors can elaborate more their experiences in preserving the shelf life of fruits and vegetables.

This study used questionnaires to survey the Filipino Consumers in Navotas Wet markets. The questionnaire was constructed based on the objectives of the study. The questionnaires consisted of (12) questions that are divided into two (4) parts for the consumers and the vendors to answer. The first part is about the perspective of Filipino consumers and vendors on the importance of preserving the shelf life of fruits and vegetables. The second part refers to the experiences of Filipino consumers and vendors in handling fruits and vegetables. The third part regards the techniques and practices in preserving the shelf life of fruits and vegetables. The last part is about the factors affecting the adoption of practices in preserving the shelf life of fruits and vegetables of Filipino consumers and vendors.

2.2.4. Data Gathering Procedure

The researchers started by accumulating the respondents and have decided to choose consumers and vendors as their respondents. The data gathering process started by going to local wet markets to collect the data to get through our respondents in local wet markets at Navotas City. The

researchers proceeded on asking questions on vendors, in this case the researchers carefully and precisely interviewed vendors that participated in answering the questions for the data gathering. The researchers attentively listened and took down notes for the answers of the respondents that they gathered for all the specific questions. Whereas for the consumer, the researchers made google forms and posted it online to acquire respondents from the consumers.

3. RESULTS AND DISCUSSION

This chapter presents the results of data gathered from interviews of Filipino vendors and surveys for Filipino consumers who served as the respondents of this study. It also provides the analysis and interpretation of data that has been gathered according to the research question.

To present the results obtained briefly and effectively, the researchers used a tabular format to present the common themes and codes found in the participants' responses from the interview. With the honest responses of the participants, only the codes or themes that had 1 or more mention/s are included. Since there are (12) questions they were divided into (4) sections.

A. Vendors

Table 1. Perspective of Filipino vendors on the importance of preserving the shelf life of fruits and vegetables.

Questions	Common Themes	Code Frequencies
1.How do you feel about fruits and vegetables being wasted due to their spoilage?	a. Sad a. Hurt	a. 3 a. 2
2.Do you think it is important to maintain the shelf life of fruits and vegetables to avoid cases of food waste, especially in markets?	a. Yes, to save money, a. Yes, to prevent contributing to food waste-caused -pollution. a. Yes, to utilize it in a sustainable way.	a. 2 a. 2 a. 1
3.Do you believe it is important for you to have access to fresh and longer shelf life of fruits and vegetables?	a. Yes, fresh vegetables and fruits attract consumers. a. Yes, because fresh fruits and vegetables are delicious. a. Yes, because it is what an	a. 2 b. 2 c. 1

individual deserves.

Table 1 presents information about the perspective of Filipino consumers and vendors on the importance of preserving the shelf life of fruits and vegetables.

For Question 1, which asks how vendors feel about spoilage, there were two (2) common themes, and three (3) vendors indicated they were sad due to the possible loss in their business, and two (2) said they were hurt whenever a spoilage crisis happens as vegetables and fruits are expensive.

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For Question 2, which delves on the importance of extending the shelf life of fruits and vegetables to avoid waste, there were three common themes, such as in order to save money, to prevent contributing to food waste-caused-pollution and in order to utilize it in a sustainable way, Two vendors answered yes in order to save money on buying another, while the two vendors said yes to avoid contributing to food waste-caused pollution, and one vendor responded yes in order to use it in a sustainable manner.

For Question 3, which asks the vendors' perception on the importance of shelf life, there were three (3) common themes, and five (5) vendors answered yes with different reasoning, while the two (2) said yes because fresh vegetables and fruits attract consumers. Meanwhile, one (1) said yes as it is what an individual deserves, and two (2) said yes, because fresh fruits and vegetables are delicious.

Table 2. Experiences of Filipino vendors in handling fruits and vegetables.

Questions	Common Themes	Code Frequencies
1. What are your most common experiences in handling fruits and vegetables?	a. Experienced spoilage a. Experienced carefulness with the product	a. 4 a. 1
2.What is the challenge you encountered in keeping fruits and vegetables fresh?	a. Vegetables and fruits dry due to intense heat a. None	a. 3 a. 2
3.Have you experienced huge losses due to spoilage of fruits and vegetables	a. Yes, very often a. Yes, not very often	a. 4 a. 1

? If yes, how often?		
4.Some fruits in the markets use an edible coating to extend their shelf life. Do you think this method is effective?	a. Yes, it's more safe a. Yes, it's more eco friendly	a. 3 a. 2

Table 2 presents the information about the experiences of Filipino vendors in handling fruits and vegetables.

For Question 1, which explores the most common experiences of vendors in handling fruits and vegetables, four (4) vendors stated that they had previously encountered fruit and vegetable deterioration, and one (1) vendor responded that she/he had been careful with the merchandise because these items can be fragile at times.

For Question 2, which asks the challenge that they encountered in keeping fruits and vegetables fresh, four (4) sellers said that their veggies and fruits had dried owing to the extreme heat, however a (1) vendor stated that she/he had no difficulty keeping fruits and vegetables fresh.

For Question 3, which asks about the significant losses that they encountered due to the spoilage of fruits and vegetables, four (4) vendors said that they encounter it frequently, whereas one (1) seller stated that she/he experiences it occasionally.

For Question 4, which asks that some fruits on the market have an edible covering to lengthen their shelf life. There were two (2) common themes, and three (3) vendors responded yes because they feel it is safer than other alternative coatings, and two (2) said yes because it is more environmentally friendly.

Table 3. Techniques and practices in preserving the shelf life of fruits and vegetables.

Questions	Common Theme	Code Frequencies
1.What technique do you use to extend the shelf life of fruits and vegetables ?	a. Freezing a. Using plastics a. Using newspaper	a. 2 a. 2 a. 1
2.What do you think is the most effective way of	a. Freezing a. Chemicals	a. 4 a. 1

extending the shelf life of fruit?				
3.How do you usually dispose of rotten fruits and vegetables ?	a. a.	Trashing Fertilizing	a. a.	4 1

Table 3 presents the information about the techniques and practices in preserving the shelf life of fruits and vegetables.

For Question 1, which explores the techniques that are used to extend the shelf life of fruits and vegetables, two (2) vendors said that they utilize refrigerators in order to freeze and take out the moisture of the fruits and vegetables in order to prolong their life and avoid early spoilage, while one (1) vendor uses a traditional way to preserve the fruits and vegetables; she said that she used newspaper and wrapped it around the fruit or vegetable in order to suck out all the water inside it and prolong its freshness; meanwhile, two (2) vendors answered that they utilize plastics in order to wrap the fruits and vegetables.

For Question 2, which asks the most effective way to extend the shelf life of fruits, four (4) sellers claimed that freezing is the most effective for them, while one (1) seller said that utilizing safe chemicals is also beneficial for keeping the freshness of fruits.

For Question 3, which asks how they usually dispose of rotten fruits and vegetables, four (4) vendors responded by trashing the fruits and vegetables, but one (1) vendor used his/her decaying fruits and veggies to nurture her home plants.

Table 4. Factors affecting the adoption of practices in preserving the shelf life of fruits and vegetables of Filipino vendors

Questions	Common Themes	Code Frequencies
1.What factors influenced your decision to adopt preserving practices?	a. Cost a. Effectiveness a. Environmental concerns	a. 3 a. 1 a. 1
2.Do you think that government support (such as program, funding, or policy incentives) motivates more	a. Yes, the government is a big help. a. Yes, the government can add knowledge to vendors.	a. 3 a. 2

people to adopt preserving practices?			

Table 4 presents the information about the factors affecting the adoption of practices in preserving the shelf life of fruits and vegetables of Filipino consumers and vendors

For Question 1, which explores the factors that influenced vendors' decision to adopt preserving practices, three (3) vendors said that cost influences their decision, while one (1) vendor responded to the efficacy of the technique, and one (1) vendor also addressed environmental concerns.

For Question 2, which asks their belief on government support (such as programs, funding, or policy incentives) encouraging more people to adopt caring habits, two (2) sellers expressed affirmation, saying that the government can be of great assistance, while two (2) vendors also answered yes, mentioning that the government can provide information to vendors through the programs.

B. Consumers

To present the results obtained briefly and effectively, the researchers used a tabular format to present the common themes and codes found in the participants' responses. With the honest responses of the participants, only the codes or themes that had 1 or more mention/s are included. Since there are (10) questions, they were divided into (4) sections.

Table 1. Perspective of Filipino consumers on the importance of preserving the shelf life of fruits and vegetables.

Questions	Common Themes	Code Frequencies
1.What do you feel about food being wasted due to spoilage?	a. Hurt a. Sad	a. 8 a. 4
2.Do you think it is important to maintain the shelf life of fruits and vegetables to avoid cases of food waste, especially in markets?	a. Yes, to avoid spoilage a. Yes, to have a longer shelf life a. Yes, to save money	a. 7 a. 4 a. 2

Table 1 presents the information about the perspective of Filipino consumers and vendors on the importance of preserving the shelf life of fruits and vegetables.

For Question 1, which explores what they feel about food being wasted due to spoilage, there were two (2) common themes, and four (4) consumers said that they were

sad and eight (8) were hurt because of the waste of food and money at the same time.

For Question 2, which asks, do you think it is important to maintain the shelf life of fruits and vegetables to avoid cases of food waste, especially in markets, there were three (3) common themes and seven (7) consumers answered yes to avoid spoilage, and four (4) said yes to have a longer shelf life, while the two (2) said yes to save money.

Table 2. Experiences of Filipino consumers in handling fruits and vegetables.

Questions	Common Themes	Code Frequencies
1.Describe your typical experience handling fruits and vegetables.	a. Preserving food by putting it in container and refrigerator a. Avoiding spoilage a. Wash the fruits and vegetables a. Food safety	a. 5 a. 5 a. 3 a. 1
2.List some of the challenges you commonly face in keeping fruits and vegetables fresh.	a. Incorrect storing method a. Insects a. Expose trough air a. Heat temperature a. Hectic schedules	a. 5 a. 4 a. 3 a. 2 a. 1
3.Some fruits in the markets use edible coating to extend the shelf life of fruits. Do you think this method is effective?	a. Yes a. Protect and have a longer shelf life a. Maintain freshness a. No a. Wash and put it on cooler	a. 9 a. 7 a. 3 a. 2 a. 2

Table 2 presents information about the experiences of Filipino consumers and in handling fruits and vegetables.

For Question 1, which explores the typical experience of consumers in handling fruits and vegetables, five (5) consumers stated that they preserve food by putting it in a container and in the refrigerator, meanwhile five (5) stated that they are avoid spoilage, and three (3) responded said that s/he always wash the fruits and vegetables, and one (1) said that is for food safety.

For Question 2, which asks to list some of the challenges you commonly face in keeping fruits and vegetables fresh, four (4) consumers answered that the commonly challenges they're facing is insects, while the three (3) stated that their challenges is when the fruits and vegetables are exposing through the air, and two (2) said that due to the heat

temperature, and one (1) responded due to their hectic schedules, meanwhile five (5) answered that incorrect storing method are the challenges.

For Question 4, which asks that edible coating is an effective method to in extending the shelf life of fruits and vegetables, nine (9) consumers answered yes, while two (2) answered no, and three (3) said that is it to maintain the freshness, meanwhile seven (7) stated that it's an effective method to protect and have a longer shelf life, and two (2) respondents said that they just wash and put it on the cooler instead of using the edible coating.

Table 3. Techniques and practices in preserving the shelf life of fruits and vegetables.

Questions	Common Themes	Code Frequencies
1.List some common techniques you use to extend the shelf life of fruits and vegetables.	a. Using container and refrigerator a. Storing properly a. Wash thoroughly	a. 9 a. 3 a. 2
2.What do you think is the most effective way to extend the shelf life of fruits?	a. Putting in refrigerator with cool temperature a. Wash, dry, and storing properly a. Don't leave it aside	a. 9 a. 3 a. 2
3.How do you usually dispose of rotten fruits and vegetables?	a. Use them as Fertilizer a. Wrapping in paper before throwing a. Segregation	a. 7 a. 3 a. 2

Table 3 presents information on approaches and practices for extending the shelf life of fruits and vegetables.

For Question 1, which asks the common methods used to extend the shelf life of fruits and vegetables, nine (9) respondents said they use refrigerators and containers to preserve fruits and vegetables, while two (2) said that they washed well, and three (3) stated that they were stored appropriately.

For Question 2, which explores the most effective approach to extend the shelf life of fruits from their perspective. Nine (9) stated that they put it in the refrigerator at a cool temperature, meanwhile three (3) said they washed, dried, and stored it appropriately, and two (2) said that don't leave it after you bought it.

For Question 3, which asks how they usually dispose of rotting fruits and

vegetables, seven (7) respondents use fruits and vegetables as fertilizer, and three (3) said they wrap them in paper before throwing them away, and two (2) segregate them properly.

Table 4. Factors affecting the adoption of practices in preserving the shelf life of fruits and vegetables of Filipino consumers

Questions	Common Themes	Code Frequencies
1.What factors affected your decision to use these methods of handling the fruits and vegetables and explain why.	a. Cost a. Effectiveness a. Environmental Concerns a. All	a. 7 a. 7 a. 5 a. 1
2. Do you think government support (such as training, funding, or policy incentives) encourages more people to adopt care practices? (Yes/No)	a. Financial support a. Free trainings	a. 6 a. 2

Table 4 includes information regarding the factors influencing the adoption of practices for preserving the shelf life of fruits and vegetables by Filipino consumers.

For Question 1, which explores the factors that affect the decision using these methods of handling fruits and vegetables. There were four (4) different answers provided by respondents. There were seven (7) who said that for both cost and effectiveness, and five (5) for environmental concerns, and one (1) for saying that everything influences them.

For Question 2, explores how government support encourages others to embrace caring practices. There were two (2) common answers given by respondents and six (6) of them responded that financial assistance would help, while two (2) said that free training will help encourage others to embrace caring strategies.

4. CONCLUSION AND RECOMMENDATION

This chapter presents the conclusion based on the analysis and interpretation of

data and recommendations offered.

CONCLUSION

This study highlighted the importance of preserving the fruits and vegetables. With the responses of the consumers and vendors, preserving the shelf life of fruits and vegetables in various ways and techniques cannot just help the environment, but also the society. So, we can see that preservation of shelf life regarding fruits and vegetables can benefit a lot with consumers and vendors, in such a way that it'll be efficient and lessen the food waste of these types of wet market products. It also shows that we should pay more attention to these types of improvements so that everyone can gain knowledge and learnings on how to practice preserving techniques and ways to elongate the shelf life of the fruits and vegetables in wet markets of Navotas City.

Based on Statement of the Problem 1, it is stated that most of the respondents said that, they were hurt and sad if they can't preserve and elongate the shelf life of fruits and vegetables, that's why they stated that it is important to preserve the shelf life of fruits and vegetables because, this avoids food waste and such as common themes like, in order to save money, to prevent contributing to food waste caused pollution and in order to utilize it in a sustainable way. Also, as stated, preserving the shelf life of fruits can maintain freshness and good quality, which attracts customers and because this is what every individual deserves.

For the Statement of the Problem 2, the respondents expressed that there are various ways on how they experience on handling fruits and vegetables, it is stated that some of them experienced fruit and vegetable deterioration, and one vender stated that she/he had been careful with the merchandise due to these items that may be fragile at times. Also, there are challenges they experience while handling these fruits and vegetables, just like the vegetables and fruits are dried owing to extreme heat, which causes the shortening and spoilage of these fresh items. On the other hand, some use refrigerators to handle the freshness and quality of fruits and vegetables.

Now, regarding to Statement of the Problem 3, this presents the information about the techniques and practices in preserving the shelf life of fruits and vegetables, some respondents said that they utilize refrigerators in order to freeze and take out the moisture of the fruits and vegetables in order to prolong their life and avoid early spoilage, one vendor stated that she used newspaper and wrapped it around the fruit or vegetables in order to suck out all the water contents inside it. Meanwhile, some vendors as respondents said that they use plastic to wrap the fruits and vegetables, also they usually dispose of rotten fruits and veggies by trashing them or decaying it to nurture home plants. There are various ways on how they handle fruits and vegetables, but the most common is refrigerating them to ensure the nutritional value, freshness, flavor, and most importantly

extends the shelf life.

RECOMMENDATIONS

Based on the results and conclusion of the study, the following recommendations are offered:

Local Government
The government should offer practical advice or suggestions to the Navotas City local government unit to enhance fruit and vegetable preservation in wet markets. The government will be able to create policies and interventions to increase the shelf life of perishable foods, decrease food waste, and improve the sustainability of wet markets by concentrating on both the behaviors of market sellers and the viewpoints of consumers.

Wet Markets
Fruits and vegetables should be handled and stored properly by the vendors to prevent quick deterioration. Additionally, they should learn how to store produce, maintain the right temperature for the fruits and vegetables to prevent spoiling, and properly wash them to prevent contamination and preserve their freshness.

Consumers
Wet Markets should purchase in sensible amounts to avoid excessive spoiling, minimize food waste at home, and be environmentally conscious. They should also receive education on proper food storage methods to extend the freshness of fruits and vegetables they buy at wet markets.

Future Researchers
They should investigate the preservation techniques employed by Navotas Wet Markets vendors as well as Filipino customers. Understanding the elements that affect shelf-life preservation techniques and how to optimize them to cut waste and enhance produce quality should be the main goals of the study.

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The Lived Experiences of Diabetic Individuals in Navotas City With Their Transition from Sweet Treats to Diabetic-Friendly Desserts

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Abstract: Based on the study of Cando, L. et. al. (2024), 4.3 million Filipinos have diabetes, with 2.8 million undiagnosed. Most of them were diagnosed with diabetic retinopathy, which causes blindness in diabetics at Region 3, while diabetic nephropathy accounts for 38% of renal disease cases. This research aims to identify the experiences of the diabetic individuals with their dietary transition. Thus, making this study relevant to the diabetic individuals in Navotas City. With four research questions to be answered, the study used a qualitative method, specifically a phenomenological approach. The study delves into the experiences of the population with a certain phenomenon. Therefore, the researchers chose Navotas City because it's prevalent with diabetes, in particular, Brgy. Tangos South and Brgy. San Jose. The researchers used the purposive sampling method because it's the one that is fitted in our study. In addition, the research instrument the researchers used is an interview guide. The study reveals that the most common coping mechanism for diabetic individuals dealing with cravings is portion control, followed by avoiding sweets and substituting traditional sweets with natural options. In addition, the study also highlights the impact of transition with their biological changes. The transition to a healthier lifestyle was emotionally and mentally challenging for many, leading to emotional distress and memory loss. The findings of the study suggest that following instructions, maintaining a healthy lifestyle, and following the doctor's advice is essential for diabetic individuals to maintain their dietary goals while living a life that they had before diabetes. To conclude, the study found that diabetic individuals often use 'portion control' as a coping mechanism, consuming low-sugar and low-carb meals and avoiding high-sugar foods.

Key Words: Diabetes; Experiences; Diet; Transition; Sweets

1. INTRODUCTION

1.1 BACKGROUND OF THE STUDY

Diabetes is a chronic disease that occurs in two ways, either when the pancreas does not produce enough insulin or when the body cannot effectively use the produced insulin. To dig deeper, insulin is a hormone that regulates blood glucose. Diabetes mellitus, a term derived from the Greek word "diastos" meaning "to pass through" and "mellitus" meaning "sweet," is a condition

characterized by excess sugar in blood and urine. It was first recorded in English in 1425 and later added to the term "mellitus" in 1675 by Thomas Willis. The sweet taste of urine in diabetes was noticed by ancient Greeks, Chinese, Egyptians, Indians, and Persians. It was known in the 17th century as the "Pissing evil"*(News-Medical, 2023)*.

In the Philippines, diabetes is one of the leading causes of morbidity and mortality. According to the World Health Organization (WHO), there are an estimated 463 million adults living with diabetes worldwide, of which 80% are from Low- and Middle-Income Countries (LMIC) This disease requires significant lifestyle changes, including dietary modifications, to manage blood sugar levels. Which is very alarming since the Philippines' delicacy is mostly made with sugars.

This research explores the personal experience of diabetic individuals in their lifestyle changes due to the transition being one of the difficult challenges to face. Since many diabetic people have struggled to give up their favorite desserts, foods, and everyday lifestyles. Some people experience changes in their lives when they know they are diabetic. There is an existing study featuring the importance of developing diabetic-friendly desserts that are precisely healthy and also appealing to individuals with diabetes. Unfortunately, there is an absence of research on the experiences of diabetic individuals on their transition from sweet treats to diabetic-friendly desserts. *(Li, X., Bai, Y., Jin Z., Et. Al., 2022)*

This research aims to address the gaps by exploring the difficulties in transitioning from sweet treats to healthier desserts of diabetes with people in Navotas City. This study seeks to understand their real-life experiences, as well as the adjustment they made to adapt to the new lifestyle habits. Also, on the steps they did to cope with the changes happening in their lives as they did this transition. The research aims to understand the changes and transitions diabetic individuals experience.

1.2 STATEMENT OF OBJECTIVES

This study aims to know the experiences of diabetic individuals on their transition from high-sugar sweets to sugar-free sweets and its contribution to the existing data to help the diabetic individuals on their journey on transitioning. Thus, making the study help the individuals in Navotas City and its barangay with the highest record of diabetes. This study ought to answer the following question:

1. What are the experiences of diabetic individuals at Navotas City? What coping mechanisms can diabetic individuals use to deal with cravings for traditional sweet treats?

2. How does this transition affect the individual's overall well-being and quality of life?

3. What psychological and emotional obstacles must diabetic individuals

overcome throughout the dietary transition?

4. What are the factors leading up to their decisions on their transition from consuming sweet treats to friendly desserts?

1.3 SIGNIFICANCE OF THE STUDY

This research aims to determine the experiences of diabetic individuals on their transition, how this affects them in their journey, and how this will contribute to the existing knowledge there is for diabetes.

Particularly, the study has noteworthy contributions to:

Diabetic Individuals: The results will provide a valuable understanding of the living experiences of diabetics in Navotas City. As Navotas City shifts out from the traditional sweets diet and toward diabetic-friendly substitutes, individuals will be more capable of dealing with their emotional baggage, coping mechanisms, and the impact on their general health. This kind of particular approach acknowledges that diabetes management involves more than just diet; it also involves how individuals and communities view nutrition. By giving credibility to an individual's experiences, the work will encourage and validate the process of establishing communities and communicating experiences.

Healthcare Providers: Healthcare professionals will gain insight into the mental and emotional barriers that diabetic patients face when making dietary changes as part of this study. Estimates suggest that the findings will enhance educational programs and support systems by increasing patient involvement in dietary recommendations and ultimately leading to better outcomes for diabetes management. This understanding can lead to patient-centered care that prioritizes the patient's needs and difficulties.

Local Governments: Local governments will make use of this study to contribute to having more events, encouragement and medicinal help for the diabetic individuals in Navotas City. Also, Navotas can use this research to strengthen their tools and apparatus in terms of caring for diabetes, wherein the local citizen can experience not worrying about their chronic disease.

Food Technologist: The food technologist will make use of this study's results, which share challenges people with diabetes face in reaching diabetic-friendly options or making it work, along with the role of creating a product or resources for the diabetic individuals. In return, this knowledge can help refine productive design and marketing efforts to expand access to affordable, yet healthier alternatives to the existing goods in Navotas city and other communities

Future Researchers: This research will provide and support further studies regarding diabetes management and dietary changes. The information that can be collected from individuals can help future researchers in the study of such a topic. The methodology and findings of the study can provide recommendations for future research, potentially leading to further understanding and addressing the difficulties faced by diabetic individuals in managing their condition and improving their overall well being. This study focused on individuals with diabetes in the area of Navotas City, which can be compared to other communities, leading to generalization regarding management strategies when it comes to dietary changes.

1.4 SCOPE AND DELIMITATIONS

The study limits its coverage only to the diabetic individuals in Barangay in Navotas City that has the highest record of diabetic individuals and a diabetes specialist. The main purpose of this study is to get the experiences of diabetic people on their transition from consuming sweet treats to diabetic-friendly desserts and to determine the factors behind their decisions involving their transition and see whether the discussion would open eyes and raise new ideas.

The limitations in this study involve a small sample size and time constraints that may impact the data collection and the quality of results. Also, the limitation on our study is that the result of the effects of their transition only came from the perspective of the respondent. By determining this delimitation and boundaries, this will put the researcher's discipline to the test that would give them a careful start not to expand the study enough to be unmanageable. Distinguishing the limits of this study allows the researchers to draw the boundaries of the area the researcher could only explore and this permits the study to be focused solely on its objective.

2. METHODOLOGY AND RRL

2.1 REVIEW OF RELATED LITERATURE

FACTORS

This study explores the experiences of individuals with diabetic retinopathy (DR) in Co. Donegal, Ireland, and their daily lives. The research focuses on the emotional impact of DR, self-management, and lifestyle changes. The study found that DR leads to a sense of dependence, social isolation, and loss of important roles. Social and family support are crucial for maintaining psychological well-being. (Devenney et al., 2011)

The "Emergence of a Butterfly" study examines the transition of young Taiwanese adults and adolescents with type 1 diabetes (T1D) to adulthood. The study highlights the importance of social support and spirituality as coping mechanisms for T1D patients. Healthcare providers should provide personalized counseling, technology-based information, and reciprocal conversations between healthcare providers and patients. (Chiang et al., 2020b)

The paper also investigates factors affecting the consumption of sugar-sweetened beverages and awareness of their health effects among nursing students at Mindanao State University-Sulu. The findings reject the hypothesis that socio-environmental factors do not significantly affect awareness of the effects of sugar-sweetened beverages. This suggests that socio-environmental factors can influence a person's awareness of the effects of SSBs and should be considered in a diabetic's transition from sweet treats to friendly desserts. (Salim et al., 2022)

FOOD INTAKE

This study investigates the prevailing food intake, health beliefs, and physical activity in rural agricultural communities in San Juan, Batangas, Philippines, as a basis for diabetes prevention programs. Results show poor average energy intake and a carbohydrate-heavy diet, with 91% of participants having moderate to high physical activity levels. The study recommends the intervention of affordable plant-based protein sources to reduce heavy food intake and maintain overall health. (Sandoval et al., 2024)

A randomized, open-label trial compared the effectiveness of the Filipino plate method against standard nutrition education in reducing 2-hour postprandial blood glucose levels (2h-PPG) among patients with type 2 diabetes. The results showed that plate scores increased significantly from pre to post-teaching, while 2h-PPG results decreased significantly from baseline to post-teaching. The Filipino plate method surpassed standard nutrition education in boosting food group choices and proportions, along with 2h-PPG in patients with type 2 diabetes. (Montevirgen et al., 2021)

Another study investigates the effects of sugar intake on human health, finding that despite its importance as a food ingredient and activating "feel-good hormones," it is highly harmful for the body. This knowledge may prompt diabetics to transition from sweet treats to healthier, more sustainable desserts. (Misra et al., 2016)

LIVED EXPERIENCES

Paterson et al. (2007) explore the lived experience of diabetes, using meta-analysis to incorporate system beliefs and health system ideologies. It reveals that individuals learn to balance diabetes through experiences and experimentation with managing illness strategies. This process is a developmental process, where one individual assumes control of diabetes management. Nurses must recognize their clients as individuals and their expertise, as a healthy balance determines a person's willingness to participate in self-care.

DIETARY CHANGE

The article "Stages of Change for Healthy Eating in Diabetes" by Vallis et al. (2003) discusses the use of the Transtheoretical Model/TTM to promote healthy eating behaviors among people with diabetes. It assesses the stages of change individuals have moved through to adopt healthier diet patterns

and commit to healthier eating. The study emphasizes the importance of programs aligned with a person's readiness to change, increasing the likelihood of sustained dietary improvements. Stage-matched strategies can lead to better understanding of dietary recommendations and better diabetes prevention management. The article emphasizes the role of readiness in encouraging long-term healthy habits for diabetic patients.

Type 2 Diabetes Mellitus management is crucial for maintaining quality of life and preventing long-term complications. Effective self-management practices include monitoring blood glucose levels, dietary restrictions, and regular physical activity. Social support systems, including family, peers, and healthcare providers, can reduce stress and improve treatment adherence. The social environment, including emotional, informational, and tangible support, also plays a significant role in diabetes management. A study by Muring et al. (2023) found a strong correlation between social support and self-management behaviors in Barangay Poblacion II, Tagbilaran City. Healthcare providers should recognize the impact of a supportive environment on health outcomes (Muring et al., 2023).

2.1.1 SYNTHESIS

The collection of related literature has proven that there are different factors that are correlated to a diabetic's transition. The collected literature conveyed that socio-environmental factors influenced the decision-making of diabetics. This includes the widely known effect of plenty of sugars on the human body and this well-known harm may be one of the factors that affect the food intakes of diabetics. Thus, this information may require them to switch to a healthier consumption or do portion control.

Another set of details has also indicated that transitional periods have altered a diabetic's lifestyle and eating habits, and these experiences of diabetics have impacted their well-being to be in need of emotional and social support. But with all these groups of knowledge, the exact factors and effects are still unclear and leave these topics with further investigation. It is important to identify the accurate information to determine the possible solutions.

2.2. METHODOLOGY

2.2.1 RESEARCH DESIGN

This study uses a qualitative method, specifically a phenomenological approach wherein ,it studies the experiences of the said groups or phenomenon. The researchers conducted this study with the use of an interview questionnaire. With this, the study utilized a Non-Probability Sampling, specifically Purposive Sampling and Simple Random Sampling to select participants who are diabetic individuals from Navotas City who have transitioned to diabetic-friendly desserts. The researchers collected information from Barangay Tangos and San Jose that met the criteria of having diabetes

and making dietary changes. This method ensured that the gathered data of the researchers were relevant and aligned to the study's objective.

2.2.2 POPULATION SAMPLING

The study utilized non-probability sampling, a branch of sample selection that uses non-random ways to select a group of people to participate in research. Specific types of sampling are Purposive and Simple Random Sampling to select participants who are diabetic individuals from Navotas City who have transitioned to diabetic-friendly desserts or even alternatives. The researchers gathered information from Barangay Tangos and San Jose that met the criteria of having diabetes and being in a process of dietary changes. Assured that this method, the gathered data from diabetic individuals, was relevant, aligned, and unbiased to the study's objective.

2.2.3 RESEARCH INSTRUMENT

This study aims to identify the experiences of diabetic individuals. The researchers utilized an interview guide to gather the needed data. Also, the research instrument contains four main questions, with additional eleven sub-questions to answer the main questions. The instrument guide is approved for reliability and validity by the research adviser.

2.2.4 DATA GATHERING PROCEDURE

The researchers made an interview guide and had it validated and approved by the research adviser. A consent letter for every respondent was provided by the research advisor. The researchers conducted the research in Tangos and San Jose, Navotas City, through an interview, due to the advantage of the interview method for the study. The researchers used a purposive sampling technique for its convenience. The researchers clarified the terms enclosed by the consent letter to inform the respondents with the full knowledge of their responsibility as the subject of the study. Before the initial start of the interview, the researchers have to record the conversation that is given permission with the bounds of the consent letter. Following the approved interview guide the researchers made, they asked the questions that were written inside it. There were also additional and further questions to make the study more broad and complex. Furthermore, the collected data were gathered together for further analysis to provide an answer to the research questions.

3. RESULTS AND DISCUSSION

This study aims to gain the perspectives and experiences of diabetic individuals regarding their transition from consuming sweet treats to diabetic-friendly desserts. This chapter presents the data collected from the conducted interviews with diabetic individuals in Barangay San Jose and Tangos along Navotas City. By using a Tabular Format, the collected data are organized based on the four research questions, common themes from the gathered data, and code frequencies, where the researcher tracks how often the particular result or code appears.

Table 1. Diabetic individuals' coping mechanisms

Questions	Common Themes	Code Frequencies
1. What are the things you do to cope with the craving?	A. Didn't avoid B. Avoiding C. Less D. Portion	A. 3 B. 4 C. 1 D. 9
2. What is the alternative you've used when it comes to sweets?	A. Eating less B. Used alternatives C. Doesn't follow anything D. Moderate	A. 1 B. 10 C. 3 D. 3
3. How did they contain themselves from eating sweets with high sugars?	A. Can't contain B. Avoids C. Monitoring D. Moderate	A. 2 B. 3 C. 2 D. 8 E. 1 F. 1
	E. Effects F. Used alternatives	

The most common reported coping mechanism in dealing with cravings among diabetic individuals was 'portion control', with a frequency of nine. This frequency suggests that rather than completely or suddenly avoiding sweets, most individuals manage their cravings by consuming sweets with a cautiously controlled amount. In having alternatives, the most frequent approach was 'substituting traditional sweets with natural sweets', such as sugar-free or low-carb options, which had a frequency of (10). It indicates that many participants prefer to modify their rather than eliminate the sweets altogether. Lastly, the most frequent strategy in maintaining themselves in consuming sugary foods was 'moderation,' with a frequency of (8). With this, diabetic individuals are more focused on balancing the consumption than having restrictions. Overall results according to the frequency leads to allowing individuals to maintain their dietary goals while still living the life that they had before diabetes.

Table.2 effects of the transition with the individual's overall well-being and quality of life?

From this data, the ‘biological changes’ are relevant in the effect of transitioning wherein it reflects a frequency of eleven. This suggests that diabetics experienced some physical transformation, such as the improvement of health conditions after they undergo on reducing the sugar intake. Twelve diabetics have stated that they were affected by these changes right after being ‘detected’ in check ups.The most frequent response was being more conscious which has a nine frequency in knowing how the transition affected their lives as a diabetic individual, stating that they become more aware of their diet choices and health. This result shows that awareness played a crucial position in the individual’s well-being, showing how dietary changes influenced their long term and daily lives.

Questions	Common Themes	Code Frequencies
1. What are the noticeable effects of this transition in your lives?	A. Lifestyle B. Conscious C. Biological changes	A. 4 B. 1 C. 11
2. When did this affect your well-being and the quality of your life?	A. Detected B. Symptoms C. Giving birth	A. 12 B. 3 C. 2
3. How did this transition affect their lives as a diabetic individual?	A. Nothing B. Conscious C. Difficulty D. Better	A. 2 B. 9 C. 1 D. 5

Table 3. Psychological and emotional obstacles experienced

The most likely frequency reported in psychological challenges encountered by the diabetic individuals during their transition was ‘stress’, it has all over eleven frequencies. This indicates that changing or adjusting to a new diet was emotionally and mentally challenging for many, likely due to the cravings, restrictions, and the adjustments in lifestyle. Despite these difficulties, the most common response regarding how these challenges affected the individual was ‘motivation’ with the frequency of twelve. It suggests that transition was tough as it goes, it ultimately made the individuals become more determined in maintaining and managing their health. While the majority of responses stated that they ‘experienced these challenges a long time ago’ with nine responses, it is implied that the hardest phase was the first stage, and over time they eventually learned to adapt to their new lifestyle.

Questions	Common Themes	Code Frequencies
1. What are the kinds of emotional or psychological challenges you have discovered in your transition?	A. Stress B. Memory C. Nothing D. Emotional distress	A. 11 B. 1 C. 2 D. 3
2. How do these challenges help/set you back?	A. Nothing B. Motivated C. Financial	A. 4 B. 12 C. 1
3. When did you experience these kinds of challenges in their transition?	A. Detected B. Long ago C. Financial struggle D. Childhood E. Did not transition	A. 4 B. 9 C. 2 D. 1 E. 1

Table 4. Reason for transitioning and their advice

According to this data, the majority of diabetic individuals cite families with the frequency of ten as the main reason for transitioning to a healthier lifestyle and this highlights that the family plays a vital role in supporting diabetic individuals' to transition to the lifestyle. Derived from this data, the adoption of a healthy lifestyle is the most recommended approach. Hence, eight respondents' outcome of this recommendation, as stated by the respondents, is better blood sugar control since it helps to regulate blood sugar levels.

Questions	Common Themes	Code Frequencies
1. What is the reason you decided to do that transition? If not, why?	A. Healthy B. Advised C. Family D. Felt good E. Own	A. 4 B. 1 C. 10 D. 1 E. 1
2. What is your advice for the fellow diabetic individual?	A. Follow the instructions. B. Diet C. Exercise D. Moderate E. Do a healthy lifestyle F. Maintain	A. 2 B. 2 C. 2 D. 2 E. 8 F. 1

	blood sugar levels	

4. CONCLUSION AND RECOMMENDATION

4.1 CONCLUSION

The research aimed to explore and understand the different experiences of diabetic individuals. The population of this study is the different diabetic individuals in Navotas City, specifically Barangay San Jose and Barangay Tangos South, with the help of purposive sampling to distinguish the respondents of the study, which was conducted on February 13-14, 2025 with the use of an interview questionnaire. Additionally, this study used a qualitative method approach, to be exact, a phenomenological approach that tackles the experiences of a phenomenon.

The most common reported type of coping mechanism among the diabetic individuals is 'portion control' which means that a person manages to actively portion their diet, according to their needs and health. In addition, most of the diabetic individuals consume alternative food with low-sugar and low-carb meals and most of them avoided eating food with high-content of sugar. Some diabetic individuals experienced 'physical transition', while some individuals also experienced changes in their health once they had their health check-up. In addition, some of the diabetic individuals experienced awareness with their diet choices and health. Moreover, the diabetics that transitioned with their lifestyle and diet experienced stress for the reason that they were thinking about their diabetes in existence. Although some of them experienced hardship throughout their transition, most of them used this as their motivation for their transitioning. Furthermore, some of them stated that they had experienced these hardships a very long time ago, specifically when they knew they had diabetes. Most of the diabetic individuals prefer to transition to healthier options, having their health secure and enabling them to live without hesitations.

4.2 RECOMMENDATIONS

With these findings, the researchers recommend the following:

Future researchers

1. The researchers recommended future researchers study other factors leading them to eat more sweet treats.
2. To study more specifically with regards to the variable, namely, overall well-being and quality of life.
3. To evaluate other factors that lead to physiological and emotional step backs experienced by the respondents.

Diabetes patients

4. To consult with professionals with assurance for their steps for how to transition their dietary.

Local government

5. To launch awareness campaigns in order to educate individuals on the benefits of reducing sugar intake and adapting diabetic-friendly alternatives.

Food industries

6. Food industries and healthcare institutions should have collaboration to develop affordable and accessible diabetic-friendly products in local markets.

Healthcare institution

7. Hospitals and Healthcare Facilities should offer a comprehensive dietary plan as part of diabetes treatment to guide individuals with diabetes through their transition.

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Enhancing Academic Writing Skills of Grade 11 Students at San Jose Academy: An Analysis Using Grammarly

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Abstract: This study explores the analysis of Grammarly in enhancing the academic writing skills of Grade 11 students at San Jose Academy. As the growth of artificial intelligence (AI) is rising, these tools are becoming a tool in helping students generate academic papers and enhance their academic writing skills. It specifically examines Grammarly's enhancement of critical thinking, grammar, and sentence structure, while also identifying its use's positive and negative effects. Given the growing influence of artificial intelligence in education, it is important to understand the potential benefits of integrating such technology into the classroom and the challenges that may arise from its use. A qualitative approach was employed, utilizing face-to-face interviews with sixteen (16) selected students who actively use Grammarly for academic writing. Findings indicate that Grammarly significantly enhances grammar accuracy and sentence clarity, making students' written work more structured and precise. However, while it aids in correcting grammatical errors, its role in developing critical thinking remains limited. Students generally perceive Grammarly as a helpful tool, but some report occasional inaccuracies and accessibility limitations due to premium features. Despite these challenges, the study concludes that Grammarly is a valuable writing aid when used critically and in conjunction with traditional writing instruction.

Key Words: Academic writing skills, critical thinking, grammar, Grammarly, sentence structure,

1. INTRODUCTION

1.1 Background of the Study

One of the fundamental skills that significantly impacts students' educational journeys is their academic writing skills, especially Senior High School level. For Grade 11 students, the ability to communicate effectively through written language becomes increasingly important as they prepare for college and other opportunities. However, many students at this grade level encounter difficulty with grammar, critical thinking, and clarity in their writing. These issues can hinder their ability to express ideas clearly and negatively impact their academic performance.

According to Englist (2020), the process of expressing complex ideas, thoughts, or opinions is acquired along the way as writers learn to construct an argument or explanation for their statement by combining sentences into paragraphs and paragraphs into an essay as it demands students who are obtaining this skill to avoid vagueness and undergo direct communication to help readers comprehend their ideas. Academic Writing is used naturally in an academic setting to construct a statement that can disseminate knowledge, critical analysis and even persuade. It

incorporates essays, research papers, and many more journal articles or books on academic matters that are used for scholarly publications in a formal way of writing.

Due to the efficacy of academic writing, writers will be able to broaden their perspectives through qualified writing discourses in the form of good arguments, narratives, and opinions (K. Wijaya & C. Mbato 2020). Englist (2020) expressed that it improves students' strong communication skills through the way of convincing or persuading in an informative manner, it also assesses critical thinking and reasoning skills, the capability to understand the mind of the audience, language skills, and research skills.

However, in the past few years, there has been a growing application of artificial intelligence technology in writing instruction. One of the most commonly used applications is Grammarly, it is an English language writing assistant that has been used, sometimes taken advantage of most. Grammarly is an AI tool that ensures convenience by not only presenting accurate spelling, grammar structure, and punctuation errors. It also creates a clear, captivating, and easy-to-comprehend text. It is an AI guide used also to generate prompts and follow instructions by just giving commands. Proper utilization of this kind of software that is designed to support students in proofreading, grammar checking, and generating AI for academic writing is an issue. (Yuan Yao et. al.,2024)

This study focuses on analyzing how an application like Grammarly can enhance students' academic writing skills, particularly in addressing issues of critical thinking, grammar, and clarity that are often challenging for Grade 11 students. Given the growing influence of artificial intelligence in education, it is important to understand not only the potential benefits of integrating such technology into the classroom but also the challenges that may arise from its use.

1.2 Statement of Objectives

This study's objective is to examine the enhancement of Grammarly on enhancing students' academic writing skills, specifically among Grade 11 students. It seeks to identify the key areas Grammarly improves the most, including critical thinking, grammar, and sentence structure (e.g., clarity). Additionally, the study analyzes both the positive and negative effects of Grammarly on students' writing proficiency. Furthermore, it explores students' perceptions regarding Grammarly's role in enhancing their academic writing skills, providing insights into its effectiveness as a writing tool.

1.3 Scope and Delimitation of the Study

The scope of this study focuses on how Grammarly can help enhance the academic writing skills of Grade 11 students at San Jose Academy. It focuses on assessing their writing and comprehension when using Grammarly, identifying common mistakes, and evaluating how the tool enhances grammar, critical thinking, sentence structure, and overall clarity. By analyzing students' progress, the study aims to understand how Grammarly enhances their academic writing skills.

This study is delimited only to Grade 11 students from San Jose Academy and does not include students from other levels or schools. It examines Grammarly's role in enhancing academic writing without considering other writing tools or teaching strategies. The research will assess grammar, sentence structure, critical thinking, and clarity changes but will not deeply analyze creativity or writing style. Since Grammarly is an AI tool, the study will not account for the enhancement of direct teacher feedback or reviews. Additionally, factors like students' prior writing abilities, motivation, and personal learning habits are beyond the study's control. The researchers will use Purposive Sampling to narrow the scope of the participants in the study. The research will also be limited to a specific timeframe, meaning the long-term effects of Grammarly use will not be explored. Despite these limitations, the study aims to provide insights

into how Grammarly can support students in developing better writing skills.

1.4 Significance of the Study

Through this study, we want to see how effective Grammarly is in helping students become better writers and how it can make academic writing easier and more understandable for them. The results of this study will be beneficial to the following:

Students. This study will be useful because it will help Grade 11 students enhance their academic writing skills with the help of Grammarly. This will help them write clearer and more organized essays, research papers, and other academic papers. In the long run, this can also boost their confidence in writing and prepare them for future academic and professional writing tasks.

Teachers. Instead of manually correcting every mistake, teachers can use Grammarly to help students recognize their common errors and learn how to fix them independently. This can make the writing and revision process more efficient and allow teachers to focus on teaching more advanced writing techniques.

School. The findings of this study can help the school decide whether Grammarly or similar tools should be recommended for students. If proven effective, the school can consider integrating Grammarly into writing programs or providing access to students as part of their learning resources. This can contribute to improving students' academic performance and helping them develop stronger communication skills, which are important for their future.

Future Researchers. This study can serve as a reference for future researchers who want to explore how technology can help students enhance their writing. It can provide useful insights into the impact of Grammarly on academic writing, and future studies can build on this research to explore other factors, such as how different students respond to the tool or how it compares to traditional teaching methods.

2. METHODOLOGY and RRL

2.1 Review of Related Literature

2.1.1 Local literature

AI tools that leverage text mining, such as Grammarly, have a profound impact on student learning by streamlining the way information is accessed and analyzed, which is crucial for enhancing academic writing skills. Grammarly can sift through extensive academic texts, extracting relevant information and summarizing key points, thereby helping students grasp complex topics more efficiently. Furthermore, by identifying trends and patterns in writing data, Grammarly supports personalized learning experiences, allowing educators to tailor resources to meet individual student needs. This targeted feedback not only enhances comprehension but also fosters critical thinking skills, empowering students to engage more deeply with their writing and studies. Overall, the integration of AI and text mining in education, exemplified by tools like Grammarly, represents a significant advancement in how students learn and interact with information, ultimately improving their academic writing proficiency. (Maala et al., 2025)

Cauring A, et al. (2023) To overcome problems in students' writing, some students use computer-based writing methods like Grammarly which helps to check for errors in students' writing. The study employed a descriptive-survey research design, utilizing a modified survey questionnaire from Cavaleri and Dianati (2016) to gather data from the Grade 9 to 12 student-researchers of ARMM Regional Science High School. This study examined the students' perceptions of utilizing the Grammarly application to enhance their research writing skills. Results showed that most students perceived positively the need for digital support, especially in proofreading from the Grammarly application yet they have enough background in research writing Also, they gave positive responses towards Grammarly how helpful was Grammarly no drawbacks and extremely useful

and easy it to use. Therefore, it concluded that the use of the Grammarly application has positive and helpful feedback, is easy to use, and is extremely useful that it can improve students' writing skills.

Javier, D. R (2022) reviewed Grammarly's application as a pedagogical tool in L2 writing classrooms. The review highlighted Grammarly's usefulness in checking grammar, spelling, punctuation, and style, making it a valuable resource for both students and educators. However, it also pointed out limitations, such as the tool's inability to provide comprehensive feedback on content coherence and organization, underscoring the need for teacher involvement to address higher-order writing concerns.

Evardo, O. J., et al. (2024) examine the use of Grammarly in enhancing the writing skills of students. An Automated Writing Evaluation (AWE) tool was studied to identify the effectiveness of Grammarly. Despite the significant reduction on grammatical errors, enhancement of students' confidence, and enriching autonomous learning, the need for further investigation into Grammarly's long-term effects on the development of writing skills particularly its efficacy remains.

According to the article by Javier (2022), Grammarly has emerged as an effective digital tool for enhancing academic writing skills. The study highlights that Grammarly's sophisticated algorithms not only detect and correct grammatical and syntactical errors in real-time but also provide valuable explanations that aid in the learning process. This dual function of error correction and instructional feedback positions Grammarly as a beneficial resource for both native and non-native English speakers in academic settings. Moreover, the article emphasizes that by offering suggestions on style and coherence, Grammarly contributes significantly to the overall clarity and professionalism of academic texts. Despite some noted limitations in handling complex sentence structures and contextual nuances, the tool is regarded as an indispensable asset in modern academic writing practices, complementing traditional methods of language learning and editing.

2.1.2 Foreign literature

According to Noudjoud et al. (2024), artificial intelligence tools have become increasingly useful in improving students' academic writing by offering personalized feedback and suggestions. These tools can help identify common errors in grammar, punctuation, and style, allowing students to learn from their mistakes and enhance their writing skills over time. Moreover, AI can assist in organizing ideas and structuring essays, making the writing process more manageable and encouraging students to express their thoughts more clearly and effectively.

Putri Maulidina and Hanafi Wibowo (2022) analyzed if there was an improvement in students' writing abilities through Grammarly. The research was conducted in two cycles using an approach called Classroom Action. Using the Arikunto model, planning, acting, observing, and reflecting were carried out as action research strategies. To conclude the study, there was an improvement in students' writing ability observed. Moreover, during the second cycle, there was a positive response regarding the implementation of the action; It suggests that Grammarly can enhance students' writing skills.

Galingging et al. (2023) conducted a study at SMA Negeri 1 Lau Baleng to assess the impact of the Grammarly application on students' ability to write descriptive texts. The research employed a true experimental design with two groups: an experimental group that used Grammarly and a control group that did not. The findings revealed that the experimental group demonstrated a significant improvement in their writing skills compared to the control group. The study concluded that Grammarly is a beneficial tool for enhancing students' writing abilities and recommended its integration into the curriculum for tenth-grade students.

Muhamad Nova (2018) studies the student's experiences in utilizing Grammarly in enhancing their academic writing skills. The study aimed to find the weaknesses and strengths of Grammarly on enhancing academic writing by conducting an interview and

documentation of postgraduate students' experiences for exploration through a narrative inquiry. It showed color-coded feedback. However, through further analysis, it needed a much thorough investigation on the efficiency of the feedback given by Grammarly in enhancing the quality of the students' writing skills.

Zinkevich and Ledeneva (2021) paper aims to present the results of the experiment in applying the online writing assistant Grammarly to evaluate ESP students' essay writing skills. Quantitative and qualitative methods enabled the researchers to analyze the essays by setting five parameters: audience, formality, domain, tone, and intent. At the other end, the application broke down the outcome by five measurable factors: correctness, clarity, delivery, engagement, and style issues. Grammarly cannot do work for students: it cannot think for them, neither can it write for them, but it can help learners identify the reoccurring writing problems, eliminate them, and monitor their progress. Another objective of the research was to explore the potential of the online writing tool for students' self-study. The functionality of the Grammarly premium version allows for a choice of styles, type of addressee, tone of writing, and many other nuances, which could be beneficial not only for studies but in future professional life. Nonetheless, despite Grammarly's advanced features, it only suggests a better variant, sometimes it errs, and in no way is it a substitute for a teacher.

2.2 Methodology

2.2.1 Research Design

The researchers utilized a qualitative approach for the study as this method is the most suitable one to use in order to attain the objectives of the study, which is to explore how Grammarly enhances the academic writing skills of Grade 11 students at San Jose Academy. The qualitative approach is appropriate because it allows for an in-depth understanding of students' experiences, perceptions, and challenges in using Grammarly to enhance their Academic writing skills.

2.2.2 Population Sampling

The sixteen (16) participants in the study were Grade 11 students from San Jose Academy who were selected based on their active usage of Grammarly for academic writing. These participants were chosen using the Purposive Sampling method, which was employed to ensure that only those with direct experience using Grammarly were involved in the study. This method was ideal because it allowed the researcher to focus on individuals who could provide relevant and detailed insights into how Grammarly enhanced their Academic writing skills.

2.2.3 Research Instrument

The researchers have prepared a face-to-face interview with the sixteen (16) selected Grade 11 students of San Jose Academy. The interviews aimed to explore their experiences, perceptions, and challenges in using Grammarly as a tool for enhancing their academic writing skills. A ten (10) item interview guide was developed to ensure consistency in questioning while allowing flexibility for participants to elaborate on their responses. Each interview was audio-recorded with the participant's consent to ensure accurate data collection and transcription for thematic analysis. The recordings were then carefully transcribed and analyzed to identify recurring patterns and insights regarding Grammarly's role in enhancing students' Academic writing skills.

2.2.4 Data Gathering Procedure

The procedure conducted in order to obtain the needed amount of responses is face-to-face interviews with the sixteen (16) selected Grade 11 students of San Jose Academy during their break times to ensure minimal disruption to their academic schedule. Before the interviews, the researcher's research adviser, Ms. Camille Perez validates the interview questions. Then, before the interview, the participants were informed about the study's purpose, and their consent was obtained for both participation and audio recording of their responses. The interviews

were conducted in a quiet and comfortable environment within the school premises, allowing participants to freely express their thoughts and experiences regarding Grammarly's enhancement of their academic writing skills. Each interview lasted approximately 5 to 10 minutes. The recorded responses were later transcribed and analyzed to identify patterns and insights relevant to the study's objectives.

3. RESULTS AND DISCUSSION

To present the information concisely and effectively, the researchers used a tabular format to display the common themes found in the participants' responses. The table includes the code of frequencies, indicating how often each theme was mentioned. Given the diversity of responses, only themes mentioned at least two (2) times were included. Since the study involved ten (10) questions, these were grouped into four (4) major sections for clarity

Table 1. Students' experiences in using Grammarly

Question	Common Themes	Code Frequencies
1. How often do you use Grammarly when working on academic writing tasks?	a. Always b. Sometimes c. Depends on the situation d. During English subjects	a. 4 b. 3 c. 4 d. 5
2. What features of Grammarly do you find the most useful to enhance your writing skills?	a. Grammar corrector b. Paraphraser c. Word Suggestions	a. 9 b. 4 c. 3
3. How would you describe your academic writing skills before using Grammarly?	a. Limited vocabulary b. Wrong grammar c. Need improvements	a. 4 b. 6 c. 6

Table 1 represents the interview questions' results specifically for the students' experiences in using Grammarly in their academic writing. Categorizes responses into common themes and provides frequencies of mentions for each theme.

The first question focuses on how frequently the students use Grammarly. The responses indicate that students use Grammarly at varying frequencies. Most students used it "During English subjects" (5 mentions), followed by "Always" and "Depends on the situation" (4 mentions each), with "Sometimes" being least mentioned (3). This suggests that Grammarly is commonly used when students engage in academic writing, particularly in English-related school work.

The second question asks what feature of Grammarly the students find the most useful and, Among Grammarly's features, the "Grammar corrector" was the most frequently mentioned with 9 mentions indicating that students primarily rely on Grammarly to identify and correct grammatical errors. "Paraphraser" was the second most useful feature with 4 mentions, while "Word Suggestions" received only 3 mentions.

Question three asks to describe the student's academic writing skills before using Grammarly. Before using Grammarly, students most frequently mentioned: "Wrong grammar" and "Need improvements" (6 mentions each), followed by "Limited vocabulary" (4 mentions). This highlights their grammar-related weaknesses and underscores Grammarly's role in improving academic writing.

Table 2. Key areas Grammarly enhanced

Question	Common Themes	Code Frequencies
4. What are the key areas of academic writing skills Grammarly improved the most? For example, critical thinking, grammar or clarity.	a. Grammar b. Sentence Structure c. Clarity d. Critical thinking	a. 11 b. 3 c. 8 d. 3

Table 2 highlights the key areas of academic writing skills that Grammarly has improved for

students. “Grammar” was the most frequently mentioned area (11 mentions), indicating that students primarily use Grammarly for correcting grammatical errors. “Clarity” followed with 8 mentions, suggesting that Grammarly also helps make writing more understandable. “Sentence structure” and “critical thinking” were mentioned less frequently (3 mentions each), implying that while Grammarly aids in structuring sentences, it has a limited impact on enhancing critical thinking skills. Overall, the results suggest that students value Grammarly most for its grammar correction and clarity-enhancing features

Table 3. Effects of Grammarly in students’ academic writing skills

Question	Common Themes	Code Frequencies
5. What specific improvements in writing skills have you experienced after using Grammarly?	a. Improvements in grammar b. Right punctuation c. Improved sentence clarity	a. 8 b. 2 c. 8
6. What positive changes in your writing habits have been observed since you started using Grammarly?	a. Improved grammar b. Precise statements c. Proper sentence structure d. Critical thinking	a. 4 b. 5 c. 5 d. 4
7. What challenges or frustrations have you encountered while using Grammarly?	a. Inaccurate or incorrect answer b. Limited access	a. 7 b. 4

Table 3 presents the effects of Grammarly on students' academic writing skills, focusing on improvements, changes in writing habits, and challenges encountered. It categorizes responses into common themes with corresponding frequency counts to highlight the most significant impacts of using Grammarly.

The most notable improvements students experienced after using Grammarly were enhanced grammar and improved sentence clarity (each 8 mentions). Right punctuation was the least mentioned (2), indicating that students found Grammarly most beneficial for grammar and clarity rather than punctuation corrections.

The most frequently mentioned changes were precise statements and proper sentence structure (5 mentions each), followed by improved grammar and critical thinking (4 mentions each). This suggests that Grammarly helps students develop clearer and more structured writing but has a relatively lesser impact on critical thinking.

The most common challenge faced by students was inaccurate or incorrect answers (7 mentions), followed by limited access (4 mentions). This indicates that while Grammarly is useful, students sometimes encounter errors in its suggestions or face accessibility issues, possibly due to premium features being restricted.

Table 4. Students’ perception of Grammarly’s enhancement

Question	Common themes	Code Frequencies
8. How does Grammarly help in identifying mistakes and gaps in your academic paper?	a. Correcting grammar b. Correcting punctuations c. Correcting words	a. 7 b. 4 c. 5
9. How do students perceive the accuracy of Grammarly's feedback in certain writing contexts?	a. Highly accurate – Very helpful b. Moderately accurate – Sometimes provides incorrect answers	a. 12 b. 4
10. Can you describe a specific situation where Grammarly enhanced your writing skills?	a. Enhanced grammar when writing academic essays	a. 16

The table presents students' perceptions of Grammarly's effectiveness in enhancing their academic writing skills. It highlights how Grammarly assists in identifying writing mistakes, the accuracy of its feedback, and specific instances where students found it beneficial.

In question 8, students acknowledged Grammarly's role in correcting grammar (7 mentions), punctuation (4 mentions), and word choice (5 mentions). This suggests that Grammarly is primarily valued for improving grammatical accuracy, followed by refining word usage and punctuation.

For question 9, most students (12 mentions) found Grammarly's feedback highly accurate and very helpful, while a smaller group (4 mentions) believed it was only moderately accurate, sometimes providing incorrect suggestions. This indicates that while Grammarly is generally trusted, some students recognize its occasional inaccuracies.

All 16 participants credited Grammarly with enhancing their academic essay writing, particularly in enhancing their grammar. The high number of mentions indicates that Grammarly is a valuable tool for students striving to produce well-structured and grammatically sound essays. Overall, this finding reinforces Grammarly's role in supporting students' academic writing development.

4. CONCLUSION AND RECOMMENDATION

The primary objective of the study is to analyze whether Grammarly can enhance the academic writing skills of Grade 11 students from San Jose Academy. By examining the effects, both positive and negative, of using Grammarly on writing their academic paper works and the overall perception of Grade 11 students on using Grammarly to enhance their academic writing skills.

Based on the findings of the researcher, Grammarly has significantly enhanced key areas of academic writing skills, with grammar being the most improved aspect, as indicated by the highest code frequency. Sentence structure and clarity also showed notable improvements, helping students construct more precise and coherent academic papers. While some students acknowledged slight enhancements in critical thinking, it was not as prominently improved compared to grammar and clarity. Overall, Grammarly's primary impact lies in refining grammatical accuracy, sentence construction, and writing clarity, making it a valuable tool for students aiming to enhance their academic writing proficiency.

Grammarly has a significant impact on students' academic writing skills, offering both positive and negative effects. On the positive side, the findings indicate that Grammarly helps students improve grammar, sentence structure, punctuation, and clarity. Many students reported that Grammarly enhances their ability to write academic essays, making their work more precise and structured. Additionally, it aids in developing better writing habits, such as using correct grammar and forming clear, well-organized statements.

However, some negative effects were also noted. Students experienced occasional inaccuracies in Grammarly's suggestions, which sometimes led to incorrect corrections. Additionally, limited access to premium features restricted students from utilizing more advanced writing enhancements. Despite these challenges, Grammarly remains a valuable tool that significantly contributes to students' academic writing improvement, provided they use it critically and verify its suggestions.

Students generally perceive Grammarly as a highly effective tool for enhancing their academic writing skills. The majority find it particularly useful for correcting grammar, punctuation, and word choice, which significantly improves the overall clarity and grammar of their writing. Many students report experiencing notable improvements in grammar and sentence clarity due to Grammarly's feedback. However, some perceive its accuracy as moderate, noting occasional incorrect suggestions. Despite these limitations, students largely view Grammarly as a valuable aid in refining their writing, especially for academic essays, making their work more polished and

precise.

Based on the concluded information about the research problem and the study itself, the researchers would recommend Grammarly as a tool in writing academic paper as it also contributes in enhancing the students' academic writing skills. Thus, the following recommendations for students, teachers and future researchers is presented:

- Use Grammarly to build confidence. Writing can be hard, especially for students who struggle with grammar. Grammarly's explanations can be a confidence booster by showing students what they're doing right, not just what they need to fix.
- Since Grammarly is most effective in improving grammar and sentence clarity, educators should integrate it into writing instruction. However, students should also be encouraged to supplement Grammarly with other grammar resources and writing exercises to reinforce their understanding of language rules beyond automated corrections.
- Since Grammarly's impact on critical thinking was limited, academic programs should focus on teaching students how to analyze and structure their writing independently. Workshops, peer reviews, and writing exercises that encourage deeper engagement with content can help students develop stronger critical thinking skills.
- Beyond school, good writing helps with college applications, job interviews and even social media posts. It can highlight how Grammarly can be used for writing professional emails, resumes, and personal projects to make learning more relevant.
- Researchers can explore how Grammarly performs in various types of writing, such as creative writing, research papers, and professional communication, to determine its versatility and limitations across disciplines. Since this study found that Grammarly has a limited impact on critical thinking, future researchers could explore how AI-based writing tools influence higher-order thinking skills and whether they can be integrated into critical writing instruction.

5. ACKNOWLEDGMENTS

The Faculty of the Senior High School Department, San Jose Academy accepts the Research Paper entitled:

Enhancing Academic Writing Skills of Grade 11 Students at San Jose Academy: An Analysis Using Grammarly

Submitted by Louisa B. Basa, Crystal Jane P. Conejero, Raineer C. Dela Cruz, Louise Andrea F. Marcelino, and Shian Marty G. Reforma for Practical Research 1 for School Year 2024-2025.

Ms. Camille M. Perez
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Utilizing Modern and Traditional Classroom Visual Aids to Enhance the Memory Retention Skills of Grade 9 Students in San Jose Academy

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Abstract: Using various visual aids in teaching has become increasingly prevalent during class discussions. Many educators utilize both modern and traditional visual aids as part of their teaching strategies. According to Leal (2020), while visual aids can enhance reading comprehension, they may only promote surface-level retention of information. However, there is still some ambiguity regarding which types of visual aids are most effective for improving students' retention skills. This study aims to investigate whether the use of modern and traditional visual aids influences students' memory retention skills. The researcher wants to understand the differences between modern and traditional visual aids with student engagement during their learning process and class discussions. They are also interested in students' experiences and how these two types of visual aids affect their memory retention. The researchers conducted semi-structured interviews with seven questions with Grade 9 students serving as the sample group. The findings reveal that both modern and traditional visual aids are effective in enhancing information retention during class discussions. Grade 9 students encounter modern visual aids, such as PowerPoint presentations, videos, pictures, and simulators, more frequently than traditional ones like whiteboards and charts. Modern visual aids are perceived as more engaging due to their interactive features. Such modern visual aids enhance accessibility, providing comprehensive details that facilitate deeper understanding. In contrast, traditional visual aids are effective in enabling students to grasp information, as they often present information more straightforwardly making students easy to cope with. Overall, both modern and traditional visual aids are effective in enhancing students' memory retention skills when utilized.

Key Words: Modern visual aids; Traditional visual aids, Memory retention skills

1. INTRODUCTION

1.1 Background of the Study

Visual learning is an instructional strategy that uses visual aids to communicate knowledge. It talks about the teaching strategy known as visual learning, which uses visual aids to communicate knowledge. This technique improves comprehension and retention by taking advantage of our natural capacity to digest visual information more quickly than text alone.(Main, 2023).

Traditional visual aids are the most important teaching aid that teachers always use in their teaching-learning process every day like books, blackboards, chalk, dusters, indicators, pictures, maps, graphs, charts, posters, bulletin boards, museums, projectors and also important visual aids in teaching (Class 2024). These visual aids helped the teachers to shape and hone each student's skills and smarts, however as time moves forward so does technology.

Visual technology has transformed the digital landscape, becoming an integral part of our daily lives. From entertainment and education to business and healthcare, the significance of visual tech is undeniable. encompasses a wide range of tools, techniques, and strategies that enable us to create, manipulate, and interact with visual content, Meeting Store (2023). Visual technologies are online videos, photos, printing, and many more. The unstoppable rapid evolution of humanity gave us many tools to use, many of which are

used for education. For fostering and improving a learner's capabilities and creativity.

A study that examines how visual aids affect first-year psychology students at Ifugao State University's memory recall. Although it is generally accepted that visual aids help with memory retention, their efficacy might vary depending on how they are presented, how well they fit the learning preferences of the students and other factors. Using a variety of instructional strategies and making sure teachers receive the right training on how to use visual aids effectively are two recommendations. (Binwag et al., 2023)

While students must comprehend the lessons being taught, it's equally critical that professors assist students in understanding what they are teaching. Visual aids in the classroom make learning easier for both the teacher and the students. Students' learning experiences can be improved when teachers use visual aids in the classroom. This also improves the student's cognitive abilities, especially memory retention.

The goal of the study is to determine whether contemporary visual aids like televisions and projectors are useful. as opposed to the more conventional visual aids, such as writing on manila paper, using a blackboard, etc. Both modern and traditional visual aids are useful for helping students understand difficult ideas, especially in disciplines that need a thorough comprehension of abstract theories and procedures. The use of visual aids is a crucial component of good instruction since they help to strengthen memory recall.

Visual aids are essential for improving student learning and the efficacy of instruction in these resources, whether modern or traditional, aid in understanding, participation, and memory retention—especially in subjects where abstract ideas need to be represented clearly. Modern tools like projectors and digital media offer interactivity and dynamic visualization, while more conventional tools like charts and blackboards offer accessibility and simplicity. This study emphasizes the necessity of comparing the two forms of visual aids' efficacy in enhancing students' memory recall. Teachers are better equipped to include the best visual aids in their lesson plans when they are aware of their effects. In the end, using visual aids appropriately creates a more stimulating and productive learning environment, which improves academic achievement.

The Grade 9 students at San Jose Academy have witnessed the transition from online to in-person instruction. While online instruction can be replayed because class meetings are recorded, in-person instruction is challenging for them because it's a significant change, especially after they become accustomed to the online learning environment. It has been discovered in earlier studies that memory and concentration are related. According to Lamba et al. (2014) and Podila (2019), 46% of students had average concentration and 10% had poor concentration.

1.2 Statement of Objectives

This study seeks the effect of visual aids on memory retention among Grade 9 students to develop the teaching quality in their class. Our research addresses the following questions regarding the utilization of classroom visual aids in the learning capacity of Grade 9 students. First, to discover the similarities and differences of Modern and Traditional visual aids when it comes to student's engagement. Second, to identify how Modern and Traditional visual aids affect the students memory retention. Lastly, to examine the student's experience with Modern and Traditional visual aids.

1.3 Significance of the Study

The research is conducted to give information about utilizing modern and traditional visual aids in the memory retention of grade 9 students. The result of the study will benefit the following:

Students. The research will benefit the students by letting them know themselves better and focus on what visual aids can help them memorize things better in their classes. Through the help of this research, allows students to effectively store and recall information learned during class.

School. The research can benefit the schools to ensure that with the use of modern and traditional visual aids, they provide good quality education to the students. It will also help them to wisely spend their budget by knowing which classroom room equipment, specifically technological visual aids like projector and TV, are worth spending on.

Teachers. The research can help teachers in identifying what visual aids are better to use in their teachings. This study will enable them to enhance their teaching strategies by incorporating modern and traditional visual aids that facilitate learning and memory retention. It will also help them to have a better relationship and communication with their students because they know how to guide them while dealing with their memory retention in science subjects.

Parents. This research will help the parents of the children benefit from the study as it reveals the most useful learning tools that can foster their children's education. Parents will be able to help their children by choosing and using the right study aids at home. This understanding will help them assist the child's learning process in an effective manner and create conditions that facilitate more academic success.

Future researchers. This study will benefit future researchers as they will have references for future usage. It will help them to have more knowledge about the use of modern and traditional classroom equipment. They can also use it to better understand the relationship of classroom equipment in the memory retention of children in subject science.

2. METHODOLOGY AND RRL

2.1 Review of Related Literature

In this day and time, teachers have used various technologies in their teaching techniques to their students. The incorporation of various technologies has become essential for enhancing teaching qualities. Modern visual aids are tools and technology that are used for presenting information that uses graphics, videos, images, and different platforms online. The integration of these technologies has had a profound impact on teaching styles and methods. According to Cayetor et al., (2022), educational videos can significantly improve students' focus by enhancing their learning and memory retention capabilities. Moreover, their studies have shown that modern visual aids provide more development and greatly motivate the students, as these visual aids are interactive which makes learners effectively engage because they align with their task.

Averion et al. (2020), the effects of using LED TV in the classroom by using a combination of quantitative and qualitative methods, including phenomenology to describe the essence of teacher's live experiences and phenomenography to structure the impact of LED TV on students' learning. Based on the richness of the data collected, a validated researcher acceptability survey questionnaire, a semi-structured interview guide, and focus groups grounded in the Unified Theory of Acceptance and Use of technology and Technology Acceptance Model (Kolog, et al., 20215), this study revealed that the using LED TV in the classroom is a beneficial and effective educational tool because it has a variety of effects on both teachers and students. Teachers gained competence, self-assurance and effectiveness through the use of LED TV.

With the advancement of modern technology, many elements of our life have altered, particularly in the realm of education. According to Mayag-as et al, (2023), Programs are available to assist with the complete development of teachers' abilities in every subject. However, it won't be sufficient if educators don't instill the knowledge they'll need to instruct the current generation. If this is the outcome of their participation in the programs, it might not satisfy the student's knowledge needs.

Traditional visual aids, such as printed charts and static slides, may not be as effective in today's digital learning environment. Vacalares et.al. (2024), modern students prefer interactive and adaptable e-learning tools that enhance engagement and comprehension. Traditional classroom methods, while fostering face-to-face interaction, often lack immediate feedback and practical applications that digital platforms provide. E-learning platforms offer dynamic features like online discussions and simulations, which promote collaboration and hands-on learning. Therefore, integrating digital tools with traditional methods can create a more effective and engaging educational experience for tech-savvy students.

Based on Arnobit, et al. (2018), those who participated in traditional classes showed low grammar proficiency. But, the majority of the performance was very satisfactory. The students used the correct structures with some errors.

Memory retention is important in the brain. The things that exert influence on it are very crucial and numerous. For example, memory retention skills are a big factor that affects students because they are necessary to make education easier to understand. Comighud (2021), the memory retention of students can affect academic performance due to motivational practices and experiences, goal setting and accomplishments, personalized learning, teaching strategies and learning activities, and educational resources and learning devices. These factors are discussed to improve the memorization and recall of information in everyday life. Many things affect memory retention skills and most people don't even notice that this can be damaged. While you use your cognitive brain you don't realize that it is being affected, that's why it should be always considered.

Visual aids play an important role in a student's education. Visual aids are images, illustrations, videos, drawings, and tables that help in presenting information

in a way that it is understandable. According to Sara (2024), there is a phenomenon called the "picture superiority effect" that suggests that images are more likely to be memorized rather than words. We can use this phenomenon to take full advantage of memory retention and recall. Visuals can add information and memorability. However, there is still a gap between modern and traditional visual aids in terms of which is more effective on the student's memory retention skills.

Alabi (2024) the use of different modern visual aids such as multimedia, particularly audio, image, videos, and graphics, can greatly improve the memory retention of students and help in having a deeper level of understanding in challenging concepts in learning. Furthermore, it can benefit educators in improving the overall quality of their teaching. Additionally, in using modern visual aids, visual information is more likely to be remembered easily rather than information that has been transmitted verbally, further enhancing memory retention (Fiveable, 2024). The utilization of modern visual aids in education can increase student engagement with the learning material and help them retain the facts and knowledge easily and fast. Through this educators can ensure that students have understood the lesson effectively.

Lohman (2023), modern visual aids are used to help an audience to understand and to remember information in a presentation. Such as video clips, audio visual aids, diagrams and posters are examples of modern visual aids. It helps to understand the information shared in the presentation. The utilization of modern visual aids in the classroom are effective tools that teachers can use to enhance student interest, comprehension, and the retention of information and concepts. Teachers can use visual aids such as designs involving audio and video clips for motivational quotes and engaging characters to make learning more interesting, enjoyable, and effective.

However, despite the advantages of modern visual aids, they also have certain disadvantages. Even if classroom visual aids such as projectors are useful and a part of modern life, we cannot deny that students still confront certain academic disadvantages. According to Sander (2024), Nearly 70% of students claim that even something as little as a phone ringing might cause them to lose interest in the lecture. When teachers have to deal with the different digital temptations that digital tools bring into the classroom, it can be challenging to keep students engaged. Some apps offer a membership to create better visual aids for students, which helps teachers use the gadgets and make presentations more easily and keeps the students interested in the task. It can be difficult for schools to find enough money to hire or contract with IT professionals who manage these systems and fix technical problems.

Goerndt (2024), that using the bold colors of chalkboards and whiteboards can help students be more attentive, with the help of these visual aids the teachers can direct their student's focus to what's most important. It is a great tool to utilize to fully hone a student's ability and information retention.

Hadžimehmedagic et.al. (2015) Traditional visual aids, such as posters, charts, whiteboards, and printed materials, have been widely used in presentations and educational settings. However, these tools come with several disadvantages that can limit their effectiveness. A key issue with traditional visual aids is that they often struggle to reach larger audiences, especially in larger spaces. For example, if posters or flip charts are too small or poorly displayed, not everyone in the room may be able to see or read the information. This can reduce the impact and effectiveness of the visual aids in conveying the message. Updating traditional visual aids is another challenge. If a mistake is made or if changes are needed, it often requires erasing and rewriting, which can disrupt the flow of the presentation. This contrasts with digital tools, which allow for quick and easy updates. In addition, traditional visual aids require considerable physical space for display and storage. Materials such as posters, printed handouts, and flip charts can be difficult to transport and store, making them less convenient. Presenters may need to carry multiple resources or spend time organizing them after each session. Furthermore, traditional visual aids often offer limited design flexibility. These materials are usually created using basic tools like markers or printed paper, which can make them less visually appealing and engaging than modern digital alternatives. As a result, the design may not capture the audience's attention as effectively. Another limitation is that traditional visual aids are often unable to represent complex or dynamic content. For example, multimedia presentations or real-time data visualizations are difficult to create using paper-based charts or posters. Finally, the environmental impact of traditional visual aids is a concern. The constant use of paper materials, such as printed handouts and posters, contributes to waste, especially when these materials are discarded after a single use. This increases the environmental footprint of presentations. Based on the study of Hadžimehmedagic et al. (2015),

Memory retention is the ability to remember and recall information over time. According to Karunarathna. et al., (2024), memory is a human cognition that has four primary types that point to its temporal and functional characteristics: sensory

memory (SM), working memory (WM), recent memory (RM), and long-term memory (LTM). Sensory working memory: is the short-lived memory for sensory details of events, this also includes the human main senses. Working memory: the ability to recall, store, and use information while performing mental activities. Recent memory: is the temporary storage of information. Long-term memory: is the event that happens lifelong ago that is permanently in our brain. These general types affect how we look back on information that is stored in our brain, and this also enables humans to have an organized cognition for faster looking back on any details.

2.2 Methodology

2.2.1 Research Design

The researchers will use the qualitative interview because this study is seeking what visual aids, modern or traditional, are more efficient when being utilized in the classes of Grade 9. It also attempts to know how the two forms of visual aids influence the memory retention skills of Grade 9 students. A semi-structured interview will be conducted with the participants for the researchers to ask follow-up questions for clarity and further explanations. The researchers will expect to get objective and subjective answers from the participants to get their opinions and preferences.

2.2.2 Population Sampling

The target population includes all students of Grade 9 in San Jose Academy. After this purposive sampling technique is used to select participants who meet specific criteria relevant to the study. The researcher selected fifteen (15) Grade 9 students who had experienced or encountered both traditional and modern visual aids. The researchers also included the students who have great insights and knowledge about themselves.

2.2.3 Research Instrument

Before conducting the interview, the researchers submit to Ms. Camille Perez the interview questions for validation. Face-to-face interviews were conducted using seven (7) questionnaires. The inquiry focuses on how their experiences with both modern and traditional visual aids have affected their ability to retain information.

In this study, the researchers will employ interviews. The interview is a conversation between a researcher and a participant where the researcher asks questions to gather information that will be used in their study. The first part of the interview is the introductory stage, this is where you meet the interviewer, and exchange greetings, and this also includes being asked to briefly introduce yourself and your interest in the position. The second part of the interview refers to the follow-up questions or more in-depth discussion of a subject during an interview, usually concentrating on the interviewee's answers being clarified, more specific information, or concrete viewpoints

2.2.4 Data Gathering Procedure

The researchers interviewed to attain the required amount of responses and data. Through a qualitative research approach, the study aims to determine the differences and similarities between modern and traditional visual aids to the student's memory retention. To achieve this, fifteen (15) Grade 9 students from San Jose Academy were selected using purposive sampling, ensuring that the participants had prior experience with both modern and traditional visual aids.

To collect data for this study, interviews are conducted with Grade 9 students. The process begins with the preparation stage, where a set of structured and open-ended questions was developed to explore the impact of visual aids on memory retention. Participants were carefully selected, and necessary permissions were obtained from school authorities. They were also informed about the purpose of the study and assured of confidentiality.

The interviews are conducted through face-to-face discussions, allowing participants to share their experiences and insights. The responses are going to be recorded using audio devices and note-taking to ensure accuracy in data collection. After gathering the responses, the data is going to be transcribed and categorized based on recurring themes, enabling a comparative analysis of modern and traditional visual aids in memory retention.

3. RESULTS AND DISCUSSION

This chapter presents the data that was gathered, the results of the analysis, and the interpretation of the data obtained from the respondents. The researcher uses a tabular format to illustrate the frequent themes observed in the participants' responses, as well as the code frequencies, which represent the number of times these themes were addressed.

Table 1: Different Visual Aids

INTERVIEW QUESTIONS	COMMON THEME	CODE FREQUENCIES
1. What kind of visual aids do you encounter during discussions and lessons in your class?	a. Powerpoints b. Charts c. Whiteboards d. Videos	a. 15 b. 3 c. 10 d. 5

They mentioned (6) six visual aids and PowerPoint had the highest frequency as it had 15 mentions, whiteboard had second to the highest frequency as it had 10 mentions, videos had five (5) mentions, as charts got three (3) mentions.

Table 2: Thoughts about Modern and Traditional Visual aids

INTERVIEW QUESTIONS	COMMON THEME	CODE FREQUENCIES
2. How do you feel about using visual aids in your class? 2.1 Modern Visual Aids 2.2 Traditional Visual Aids	2.1 a. Happy b. Engaging c. Helpful d. Comfortable 2.2 e. Overwhelming f. Nostalgic g. Ineffective h. Helpful	a. 5 b. 2 c. 5 d. 3 e. 5 f. 2 g. 4 h. 5

Question 2 How do you feel about using modern and traditional visual aids in your class?

There were five (5) mentions for happy and helpful, comfortable had three (3) mentions, engaging had two (2) mentions. There were also five (5) mentions for overwhelming and ineffective had four (4) mentions, nostalgic had two (2) mentions.

Table 3: Frequency of encountering Modern vs Traditional visual aids

INTERVIEW QUESTIONS	COMMON THEME	CODE FREQUENCIES
3. How often do you encounter modern visual aids compared to the traditional?	a. Encounter modern more b. Not often	a. 13 b. 2

Question 3 How often do they encounter modern visual aids compared to the traditional, 13 mentions that they encounter modern more while two (2) mention not often.

Table 4: Experiences in Memory Retention

INTERVIEW QUESTIONS	COMMON THEME	CODE FREQUENCIES
4. Have you noticed a difference in how easily you remember information when using modern vs. traditional visual aids? If yes, in what way?	a. Deeply Ingrained (Modern) b. Easier to Comprehend (Modern) c. Accessible (Modern)	a. 3 b. 9 c. 3

Question 4 how easily they remember information when using modern vs traditional visual aids, easier to comprehend. Modern had the highest frequency as it had nine (9) mentions. Deeply ingrained (modern) and accessible (modern) had three (3) mentions.

Table 5: Preferences of Students

INTERVIEW QUESTIONS	COMMON THEME	CODE FREQUENCIES
5. Which visual aids do you think works better for you? and why?	a. Interactive (Modern) b. Cognitively and Physically Accessible (Modern) c. Practical (Modern) d. Both	a. 4 b. 9 c. 2 d. 2

Question 5 asks about which visual aids are more effective for the participants. The visual aids that most participants picked are cognitively and physically accessible which is part of modern visual aids that is mentioned nine (9) times. It is followed by interactive, also a part of modern visual aids and that is mentioned four (4) times, practical and both had a tie and mentioned two (2) times. and captivating got the least mentioned.

Table 6: Experiences in Interests and Engagement

INTERVIEW QUESTIONS	COMMON THEME	CODE FREQUENCIES
6. How do these visual aids affect your interest and engagement in learning?	a. Motivates me to learn b. Compiled to avoid overwhelming c. Listens more because of aesthetics d. Informative e. Interactive makes it fun f. Concentrate	a. 8 b. 2 c. 4 d. 6 e. 3 f. 3

Question 6 inquires as to how visual aids help individuals learn. The most frequently mentioned theme, with eight (8) mentions, was one of six common themes identified. Informative came next with six (6) mentions, then aesthetics with four (4), interactive and concentration with three (3) and lastly, the least mentioned, which received two (2) is compiled.

Table 7: Factors of Modern and Traditional Visual aids that Affects Memory Retention

INTERVIEW QUESTIONS	COMMON THEME	CODE FREQUENCIES
7. Do you think using these kinds of visual aids (modern and traditional) affects your memory retention skills? If yes, how?	Yes a. Completeness makes it more understandable b. Elaborates makes it easy c. Summarizes to easily remember d. Accuracy e. Appealing that makes it stuck on the mind	a. 6 b. 2 c. 3 d. 5 e. 3

Question 7 asks about how visual aids affect the student's memory retention skills. The highest frequency is completeness as it had six (6) mentions. Next is accuracy with five (5) mentions, appeal and summarize both had three (3) mentions and lastly elaborates had two (2) mentions.

4. SUMMARY OF FINDINGS, CONCLUSION, AND RECOMMENDATION

4.1 Summary of Findings

Modern visual aids enhance student engagement by offering interactive experiences that stimulate interest. Some students have said that traditional visual aids make them feel unmotivated and disengaged during discussions, as this visual aid often presents an excessive amount of information. This overwhelming feeling can diminish motivation and hinder active participation of students in the classroom. But overall, these two visual aids effectively capture students' attention, particularly for visual learners, as they present information in a captivating manner that appeals to visual processing.

Modern visual aids enhance memory retention by facilitating comprehension of information, as they typically present content in a summarized and straightforward manner. In contrast, traditional visual aids allow students to easily cope with the material,

fostering a better understanding of the lessons while maintaining practicality.

The experiences of Grade 9 students using modern and traditional visual aids indicates that several of them encounter modern visual aids such as Powerpoints, videos and simulators more often rather than traditional ones like whiteboards, charts and physical models during classes.

4.2 Conclusion

The primary aim of this study is to examine how modern and traditional visual aids enhances the memory retention skills of Grade 9 students. Additionally, the research investigates the differences between these two types of visual aids in terms of student engagement during class.

The researchers discovered that students encounter modern visual aids more frequently, such as PowerPoints, videos, and simulators, compared to traditional visual aids like whiteboards, charts, and physical models during their lessons. Students tend to feel happy, engaged, and comfortable when using modern visual aids, which effectively encourage and support their learning. In contrast, traditional visual aids can leave some students feeling unmotivated, overwhelmed, and ineffective. However, some appreciate traditional visual aids for their nostalgic value, finding them easier to understand and beneficial in their learning process.

Students vary in their ability to retain information, largely influenced by the type of visual aids used. Modern visual aids facilitate comprehension and note-taking, enabling students to retain information more swiftly. Additionally, traditional visual aids help students to adapt easily to the material. Overall, both types of visual aids are effective in promoting information retention among students. Modern visual aids are more engaging for students and are both cognitively and physically accessible. While modern visual aids are interactive, traditional aids remain practical. Both types of visual aids enhance student motivation and concentration. They support the learning process and improve memory retention by providing informative and well-organized content. Additionally, the aesthetic appeal of visual aids encourages students to be more interactive. Lastly, the researchers found out that both modern and traditional visual aids significantly impact students' information retention, as they provide comprehensive and detailed content. Visual aids help to summarize information and enhance accuracy.

4.3 Recommendations

As for our future researcher, it is recommended to conduct interviews across various grade levels to use this diverse population in gathering additional insights on how both modern and traditional visual aids can significantly enhance students' memory retention skills. Furthermore, to deepen the study, it is essential to investigate the prevalence of teachers' use of these two types of visual aids. Future researchers should aim to discover which specific visual aids teachers commonly utilize in their classrooms and the reason behind their choices.

5. ACKNOWLEDGMENTS

The Faculty of the Senior High School Department, San Jose Academy accepts the Research Paper entitled:

"Utilizing Modern and Tradition Classroom Visual Aids to Enhance the Memory Retention Skills of Grade 9 Students in San Jose Academy"

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Automation vs Authenticity: Assessing Quillbot's Influence on Grade 11 Journalists of San Jose Academy

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Abstract: This study, titled "Automation vs Authenticity: Assessing Quillbot's Influence on Grade 11 Journalists of San Jose Academy," studies how Quillbot, an AI paraphrasing tool, affects the writing of Grade 11 student-journalists. As artificial intelligence (AI) is usually used in education and journalism, it is important to know how these tools impact students' writing, their critical thinking skills, and their integrity. The goal of this research is to discover if Quillbot helps improve students' writing in terms of clarity, grammar, and productivity, or if it causes them to rely too much on the tool and lose their originality. The study used interviews with fifteen (15) student-journalists from grade 11 STEM at San Jose Academy. The data from these interviews were organized into common themes to show both the positive and negative influences of using Quillbot. The findings show that Quillbot helps students with grammar checking, making their writing clearer and easier to read. It also makes the writing process faster, as it helps with tasks like proofreading. Many students mentioned that the tool made them more productive and helped them express their ideas more clearly. The study also found that using Quillbot has negative effects; such as, reliance, dependency, and lack of accuracy. The study suggests that students should not rely too much on Quillbot, as it could reduce their creativity and originality. It is important to balance the use of AI tools with the development of personal writing skills and critical thinking. The researchers recommend using Quillbot within limits to keep students' work authentic and original. This research provides useful insights for students, teachers, and future researchers by showing how AI tools can impact education and journalism. It also suggests future research to compare Quillbot with other AI tools and to explore how advancements in AI might affect the future of writing and journalism. By balancing technology with personal input, students can use AI tools without losing their creative touch.

Key Words: Artificial Intelligence Tools; Journalism; Paraphrasing; Quillbot; Student-journalist

1. INTRODUCTION

1.1 Background of the Study

In the digital age, artificial intelligence (AI) has revolutionized multiple industries, including journalism. One of the most notable AI-driven tools is Quillbot, a language model developed to generate human-like test, assist in writing. Journalism showcases the truth that is to be announced to the public–for information, entertainment, new perceptions, and for educational reasons. It is an act of gathering and producing news and data to provide the audiences with factual knowledge about the current events taking place locally or internationally (The Editors of Britannica, 2025).

This study, "Automation vs Authenticity: Assessing Quillbot's influence on Grade 11 Journalist of San Jose Academy," seeks to explore the extent to which Quillbot impacts student journalist in terms of their writing skills, critical thinking, and ethical considerations by nature, requires a deep understanding

of context, quality, and originality. According to the study of Mahari and Pataranutaporn (2024), the increasing reliance on AI-powered tools raised questions about whether young journalists are developing their authentic voices or becoming overly dependent on automation. This research is also meant to help students and teachers understand how to use AI in a way that supports learning without losing the personal touch and honesty that journalism requires. It is about finding the right mix between using helpful tools and staying true to what journalism is all about: sharing authentic, original stories.

Prior studies highlight the benefits of AI in journalism, such as assisting in data analysis, enhancing productivity, and reducing workload (Amponsah & Atianashie, n.d). However, scholars also emphasize the risks of misinformation, plagiarism, and the loss of human creativity (NUJ, 2025). This research aims to analyze the balance between leveraging AI for journalistic growth and maintaining authenticity in reporting. It is aimed to discover how the rise of Artificial Intelligence has impacted journalism and journalists. Whether it has impacted them in a positive or negative manner–and how they can say so. This analysis will discover the influences of these new and evolving technologies, especially when it comes to speaking the truth.

By focusing on Grade 11 journalists of San Jose Academy, this study will assess how students perceive and utilize Quillbot, its effects on their journalistic integrity, and whether it serves as a tool for enhancement or a crutch for dependency. The findings will contribute to the ongoing discourse on AI's role in journalism education and its implications for the future of media ethics.

1.2 Statement of Objectives

This research explores how artificial intelligence (AI) influences Grade 11 student journalists at San Jose Academy. Today, AI tools are being used to write articles, edit content, and check facts. This study aims to understand how these tools affect students' work—whether they make writing easier and more efficient or if they take away from the students' originality and creativity. For Grade 11 journalism students at San Jose Academy, it is important to figure out if Quillbot helps them improve their writing while still keeping their own unique voice and creativity. Just like the students in the study, the journalists might face challenges with maintaining their authenticity when using Quillbot. The findings from this study can help understand how these students might use Quillbot to improve their writing while still staying true to their ideas and the standards of journalism.

1.3 Significance of the Study

The rapid growth of AI technology has one of the major discussions related to the increase in the adoption of AI tools such as Quillbot in just about all fields concerning creativity, authenticity, and human skills. This study aims to investigate the influence of these advanced AI tools on Grade 11 journalists at San Jose Academy by exploring the diversity of automation versus authenticity within the journalistic practice. The results of this study would have importance for different stakeholders: school departments, students, teachers, and future researchers.

Student Journalists. This study will teach Grade 11 journalism students the further basics on how AI tools, like Quillbot, can enhance or act as a hindrance to their journalistic skills. By examining the advantages and disadvantages of Artificial Intelligence in writing and research, students will be trained to look critically at the use of technology in their own work. It will also stimulate students to reflect upon the important principles of authenticity and originality in their work against the backdrop of technology being taken advantage of.

Teachers. This particular research study will offer an understanding to teachers/educators on how Grade 11 journalism students engage with AI tools, revealing technical strengths and weaknesses. This knowledge will guide educators in modifying their teaching techniques toward the enhancement of critical thinking, creativity, and ethics in the use of AI tools. It will then help teachers grapple with issues like dependence on automation and plagiarism, thus maintaining a balanced approach to technology in journalism education.

School Departments. This research is especially useful to relevant school departments, particularly those regulating journalism programs, curriculum development, and the integration of technologies. The findings will give school administrators and department heads a way forward regarding the use of AI tools, such as Quillbot, by Grade 11 journalism students. This information may be used to help determine whether to formally introduce AI tools into the curriculum, and, should they do so, how to mitigate problems such as over-dependence on automation or deterioration of critical-thinking skills. The study can also assist with establishing centers in their departments for policies, programs, and training to ensure students' responsible

and ethical use of AI, ever mindful of the school's mission to impart technological proficiency and journalistic integrity.

Future Researchers. The literature on AI and journalism will gain much from this research study. By focusing on the Grade 11 journalists' experiences, it sheds ample light on how young learners navigate numerous challenges and opportunities presented by AI. The results can lay a foundation for future study into the long-term implications of AI on journalism education and practice.

2. METHODOLOGY AND RRL

2.1 Review of Related Literature

2.1.1 Local Sources

Quillbot. According to Bogdankovich (2024), Quillbot is a useful tool when it comes to reiterating phrases, terms, wordings, and clarity of sentences. It provides a great range of assistance when it comes to refining users' language, so that the messages are certain to be clear and precise. Quillbot's innovative tools, such as paraphrasing, text enhancements, simplifications, and accessibility, makes it effective for users to incorporate it with their work. In addition to that, Salazar, et. al. (2023) have stated that the Artificial Intelligence, Quillbot, is locally used among students in schools and universities. It is possible that a difference can be implemented with the writing habits of students, specifically, when requirements of subjects need to be achieved with literacy.

The study by Nurmayanti, Suryadi, and Buana (2023) looks at how students use Quillbot to help improve their writing, especially when it comes to writing clear and original papers in English. The researchers asked students to use Quillbot and then gave surveys to see how well it worked for them. The results showed that many students liked using Quillbot because it helped them rephrase text and avoid plagiarism without changing the meaning. However, the study also pointed out that some students still had trouble paraphrasing correctly and needed to make sure they double-checked their work to keep the meaning accurate.

Despite those uses, this tool has its limitations as well. According to Rogerson and McCarthy (2017), paraphrasing tools, such as Quillbot, are capable of rewording simple sentences to fully constructed essays. However, they may seem useful to native speakers, but to non-native English speakers, they appear more flawed and imperfect; making the tool inaccurate and should not be considered as a substitute for paraphrasing, and instead should be learned individually (Bilokon, 2022).

Artificial Intelligence in Journalism. AI tools like QuillBot have a strong connection to journalism because they help journalists write more efficiently, accurately, and clearly. In journalism, delivering news in a simple and direct way is important, and AI-powered tools assist journalists in many ways.

AI tools in journalism, like those integrating large language models such as Quillbot, are transforming the ways news content is produced. They allow journalists to automate content creation, improve productivity and streamline tasks like summarization and transcription. However, there are concerns about the limitation of AI, such as the generation of generic content and potential biases which can impact the quality and authenticity of journalistic writing (Ayupova, 2024).

QuillBot's AI-powered writing tools are revolutionizing journalism by improving productivity, enhancing text clarity, and offering advanced paraphrasing and grammar correction features. These capabilities enable journalists to create high quality content quickly, while also expanding their creativity by suggesting alternative expression while Quillbot increases efficiency, the reliance on AI also raises questions about content originality and the potential for biases in automated writing (FinanceFeeds, 2024).

According to Corcuera (2024) Journalism influences AI-generated writing by guiding it toward clear, fact-based, and structured content. AI tools like Quillbot enhance student's writing by incorporating these journalistic principles of accuracy and coherence. However, as AI models learn from varied sources, the potential for inheriting biases from journalistic content highlights the need for careful, ethical AI integration in writing.

AI-integrated paraphrasing tools, like Quillbot, have had a significant impact on students' writing skills by enhancing efficiency and reducing plagiarism. While these tools offer time saving benefits and help in rephrasing content, they also pose risks such as dependency on automated suggestions and potential loss of original meaning. It is essential for journalistic students to critically engage with AI-generated content and make necessary adjustments to preserve context and originality (Malon et al., 2024).

QuillBot helps with paraphrasing and rewriting, allowing journalists to restate news stories, adjust content for different audiences, and improve clarity in reporting. This is useful when journalists need to

simplify complex information or avoid repetition while maintaining the original message (Kurniawan & Kastolani, 2024). Studies have shown that AI-powered writing tools enhance textual coherence and readability, making them valuable in journalistic writing (Rahman et al., 2022).

AI tools also improve the overall quality of writing by refining sentence structure, enhancing vocabulary, and correcting grammar mistakes. This leads to more polished and professional news articles, ensuring credibility and readability for audiences. Research indicates that QuillBot effectively enhances paraphrasing skills, making it a useful tool for journalists who need to refine their reports (Miftah et al., 2024). Additionally, AI-driven writing tools assist in reducing linguistic errors, improving the overall clarity of journalistic content (Kurniawan & Kastolani, 2024).

Time is critical in journalism, especially when covering breaking news. AI tools like QuillBot help journalists work faster by generating summaries, paraphrasing content quickly, and suggesting headlines. This allows journalists to meet tight deadlines while maintaining accuracy in their reports. AI-based writing tools also assist journalists in adapting content across different media platforms, ensuring consistency and accessibility for diverse audiences (Rahman et al., 2022).

This is where QuillBot has some truly critical differences with journalism: its handling of cultural and contextual nuances. For example, idiomatic expressions, regional dialects, or politically sensitive terms may be paraphrased incorrectly, denoting misrepresentation or misinformation (Raheem et al., 2023). In fact, all of these limitations become severe when dealing with investigative reporting because, in investigate-aspect, everything needs to be precise and contextual at all times (Grájeda et al., 2023).

2.1.2 Foreign Sources

Quillbot. The study by Mohammad et al. (2024) looks at how Quillbot can help students improve their paraphrasing skills, based on feedback from teachers. The researchers surveyed 40 teachers who work with students in the preparatory year to get their opinions on Quillbot. Most teachers agreed that Quillbot was helpful for students, especially when it came to rewording text without changing the meaning. However, some teachers also pointed out that students might rely too much on Quillbot and not work on improving their own writing skills. Despite this, the teachers felt that Quillbot could still be a useful tool in the classroom if students are taught how to use it correctly.

There are several questions that have arisen with the use of the integration of AI-powered paraphrasing tools such as QuillBot regarding the quality of writing and issues of academic integrity. Study results indicate that drawing more from QuillBot actually has adverse effects to students and their writing skills since there is a lack of deep involvement in language and context, eventually leading them to depend entirely on automation for solutions (Amyatun & Kholis, 2023). Promoted as a plagiarism mitigation tool, however, they often just retain structural similarity to the original texts, ironically increasing the possibility of unintentional plagiarism and violations in academic integrity standards, as proven by Latifah et al. (2024). Very pertinent issues in students and professionals who advocate originality and ethical sourcing in their work.

Equally important is the fact that another deficiency of QuillBot leads to the homogenization of language by removing the typical stylistic characteristics that form the unique voice and creativity in writing. For Raheem et al. (2023), such standardization results in generic information and deprives individuality and reliability of users' work. Besides, it raises ethical issues, given that it may distort meaning through paraphrasing, uncertain or context-dependent information. According to Latifah et al. (2024), such inaccuracies may enlarge the horizon of misinformation and create suspicion in academic or journalistic outputs. Ceremoniously, these risks reveal the limitations of the tool in efficiently juggling ethical and factual accountability.

Also, using QuillBot usually degrades critical thinking and analytical rigor. Paraphrasing jobs are now done by artificial intelligence; therefore, the users avoid any intellectual effort to understand and reformulate ideas of their own that restrict their creativity and problem-solving skills required for their development in academia and job markets (Amyatun & Kholis, 2023).

Artificial Intelligence in Journalism. AI tools like QuillBot have a strong connection to journalism because they help journalists write more efficiently, accurately, and clearly. In journalism, delivering news in a simple and direct way is important, and AI-powered tools assist journalists in many ways.

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Journalism has played a crucial role in shaping AI writing by influencing its structure, credibility, and ethical considerations. AI tools, such as Quillbot, often adopt journalistic principles like clarity and fact-based reporting but may also reflect biases present in news sources (Lafitah et al., 2024). As AI-generated writing continues to evolve, maintaining journalistic integrity while mitigating bias and misinformation remains essential (Sun Times Philippines, 2023).

Journalism's impact on AI-driven writing tools like Quillbot is evident in its influence on content structure, accuracy and clarity. As Quillbot's AI learns from datasets related to grammar, tone, and sentence structure, it enables writers to produce content that aligns with journalistic standards of coherence and readability (Pfeifer, 2024). However, AI tools also face challenges in replicating journalistic integrity, as they might inadvertently reflect biases from the data they are trained on emphasizing the need for ethical safeguards in AI generated content (Pfeifer, 2024).

According to Corcuera (2024) Journalism influences AI-generated writing by guiding it toward clear, fact-based, and structured content. AI tools like Quillbot enhance student's writing by incorporating these journalistic principles of accuracy and coherence. However, as AI models learn from varied sources, the potential for inheriting biases from journalistic content highlights the need for careful, ethical AI integration in writing.

Kurniati and Fithriani (2022) have stated that journalism shapes the way AI tools like Quillbot influence academic writing by embedding journalistic values of clarity, factual accuracy and structure into the writing process. However, the reliance on AI tools may also raise concerns regarding bias in content, which stems from the data they are trained on, including journalistic sources.

2.2 Methodology

2.2.1 Research Design

This study has a qualitative approach, where the researchers collected and analyzed non-numerical data to understand the perceptions of the Grade 11 journalists (Bhandari, 2025). Hence, this research follows a descriptive approach which aims to discover the “whats” and “hows” of the study instead of the why (Heath, 2023). This design intends to describe the population, phenomenon, and situations. Moreover, this research describes the insights of the population studied to understand the knowledge of the student-journalists regarding artificial intelligence tools, specifically Quillbot.

2.2.2 Population Sampling

In this study, fifteen (15) Grade 11 journalists from ABM, HUMSS, and STEM are the selected participants. The persons who were invited in this assessment are chosen using a purposive sampling technique, where the interviewees possess the characteristics that are needed in the study’s sample (Nikolopoulou, 2023).

2.2.3 Research Instrument

In this qualitative research, the tool used to obtain and analyze the information from this study’s participants are interviews. Six (6) questions are asked per participant, the data was gathered using transcriptions from audio-recordings and one-on-one questioning. The researchers considered the preparedness and pressure of the participants during the data collecting process. Hence, the researchers conducted open-ended questionnaires to acquire different views and valid responses without affiliating personal bias. Moreover, the instrument was validated by having consults from research advisers before it was set on the study.

2.2.3 Data Gathering Procedure

The data in this study have been collected through in-person interviews. Interpretations and analyses were conducted by the researchers to further describe the experiences by the participants. Thus, the information was gathered systematically; the research goal was established, data collections were selected, plans to accumulate data, then proceeding to the data collection process. Moreover, the interviews were reviewed to finalize the information gathered.

3. RESULTS AND DISCUSSION

In order to present the information obtained briefly clearly and effectively, the researchers used a tabular format to present the common themes and codes found in the participants' responses and the code frequencies; the number of times in these themes were also mentioned. With the diverse responses from the fifteen (15) participants, the common themes that had at least two (2) mentions were included. The researchers have prepared six (6) questions which have been divided into two (2) major parts–the positive and negative effects of using Quillbot; to determine the influence that Quillbot has on the student-journalists of San Jose Academy.

Table 1. Positive Influence

Questions	Common Themes	Code Frequencies
1. In what ways has QuillBot influenced the accuracy and clarity of your articles?	a. Correcting grammatical mistakes	a. 7
	b. Clarity and message support	b. 3
	c. Vocabulary and language adjustments	c. 2
	d. Improving simplicity and readability	d. 3
2. In what ways has QuillBot enhanced your workflow or productivity as a journalist?	a. Improved language and vocabulary skill	a. 2
	b. Time and workflow efficiency	b. 2
	c. Enhanced clarity	c. 3
	d. Amplified comprehension	d. 9
	e. Speeding up proofreading processes	e. 3

Table 1 presents the useful side of Quillbot's influence on the writings of the student-journalists.

For Question 1, it addresses the impact of the tool on document quality measured in terms of readability and precision. There were four (4) common themes: 'Correcting grammar mistakes' had the highest frequency at 7, 'Clarity and message support' was mentioned 3 times, while 'Vocabulary and language adjustments' 2 times and 'Improving simplicity and readability' had 3 mentions.

Question 2 is about how QuillBot might have made everyday work, as a journalist, easier or faster. This has five (5) common themes: 'Time and workflow' having 2 mentions, 'Improved language and vocabulary skill' and 'Enhanced clarity' both had 2 mentions. While 'Amplified comprehension' and 'Speeding up proofreading processes' both had 9 mentions.

Table 2. Negative Influence

Questions	Common Themes	Code Frequencies
3. Have you encountered any ethical concerns while using QuillBot in your work? If so, what?	a. Lack of accuracy and details	a. 4
	b. Reliability and dependency	b. 5
	c. Writing quality	c. 2
	d. Additional errors added	d. 3
4. In what ways might reliance on QuillBot affect the originality and credibility of journalistic work?	a. Loss of message and quality	a. 2
	b. Risk of AI detection and plagiarism	b. 4
	c. Loss of journalistic integrity and	c. 4

	originality d. Weakens critical thinking e. No effects when used with limits	d. 3 e. 2
5. What ethical concerns arise when journalists use QuillBot to rewrite or paraphrase sensitive or controversial topics?	a. Lack of understanding and interpretation b. Inaccurate paraphrasing of critical content c. Altering the core message and topic d. Loss of journalistic credibility and originality	a. 2 b. 3 c. 4 d. 6
6. Have you noticed any unintended consequences of using QuillBot, such as impacts on your writing style or critical thinking?	a. Failure to convey original message b. Impacts on critical thinking and judgement c. Loss of focus and clarity d. Lack of originality and effort e. Losing personal touch as a journalist	a. 2 b. 4 c. 3 d. 4 e. 2

Table 2 presents the contrasting side of using Quillbot–it showcases the opposing influences that the tool gives to the student-journalists.

Question 3 looks into the interplay between QuillBot usage and how it might alter the writer's style. This has four (4) Common Themes: 'Reliability and dependency' had the highest frequency at 5, 'lack of accuracy and details' had 4 mentions, 'Additional errors added' had 3 mentions, and 'Writing quality' had 2 mentions.

Question 4 asks if journalists have begun to rely on Quillbot for the tools in terms of paraphrasing. This has five (5) common themes: Both 'Risk of AI detection and plagiarism' and 'Loss of journalistic integrity and originality' had the highest frequency at 4. While 'Weakens critical thinking' had 3 mentions. And 'Loss of message and quality' along with 'No effects when used with limits' have 2 mentions.

Question 5 is about potential problems when using QuillBot when working on sensitive topics. This question has four (4) common themes: 'Loss of journalistic credibility and originality' having the highest frequency at 6, then 'Altering the core message and topic' had 4 mentions. 'Inaccurate paraphrasing of critical content' had 3 mentions, and 'Lack of understanding and interpretation' had 2 mentions.

Question 6 looks into the ethics and consequences of QuillBot usage where journalists are concerned. This has five (5) common themes: both 'Impacts on critical thinking and judgement' and ' Lack of originality and effort' have the highest frequency at 4 mentions. While 'Loss of focus and clarity' followed at three (3) mentions, then both 'Failure to convey original message', and 'Losing personal touch as a journalist' all had 2 mentions each.

4. CONCLUSION AND RECOMMENDATIONS

The primary objective of this research is to discover the influences of Quillbot towards journalism–to figure out whether it is appropriate to use Artificial Intelligence tools in writing articles or not. This study also acknowledges the ethical concerns and the enhanced productivity that the tool has given to the students.

This study examined the impact of Quillbot on journalism, particularly its effects on journalistic integrity, originality, paraphrasing, creativity, and critical thinking. The research found that Quillbot is a useful tool for improving grammar, rewording sentences, and enhancing overall clarity in writing. It helps student-journalists by streamlining the proofreading process, adjusting vocabulary for better comprehension, and increasing productivity. By providing quick revisions and corrections, Quillbot allows journalists to focus more on content development rather than minor grammatical issues.

The researchers found out that Quillbot is an effective tool in paraphrasing texts and articles when it comes to correcting grammar and rewording documents. This study has shown that this Artificial Intelligence tool can be crucial when it comes to

amplifying productivity, along with incorporating clarity within the texts. Moreover, journalism can benefit from using this AI-tool due to the appliance's efficiency when it comes to brisk improvements of articles–more so, the proofreading processes, adjusting to reader's comprehensiveness, simplicity, and vocabulary are the terms that are usually affected with the tool positively. Hence, the truth-to-be voiced out by the student-journalists can be structurally assisted with generated content that utilizes refining sentences and grammar improvement. The vocabulary and language use can be further refined, which makes the journalists' ideas and message clearer to the readers.

Meanwhile, Quillbot also highlights the concerns of dependency and reliance between journalists and their way of use. The tool may relay inaccurate terminologies that are far from the core message of the journalists. In addition to that, more errors may be added once it is paraphrased, leading to a loss of quality in regards to the message's authenticity. The journalists' critical thinking may also be negatively affected once reliance has occurred. Thus, leading to a lack of effort and originality, along with the decreasement of personal touch as a journalist. With the tool being AI-generated, there are instances that the works done with the assistance of Quillbot can be detected as plagiarism. The student-journalists' integrity can be lessened because of the lack of originality.

The study also identified ethical concerns regarding the overuse of Quillbot. Excessive reliance on the tool may reduce journalists' originality, weaken their critical thinking skills, and lead to a loss of personal style and authenticity in writing. Additionally, there is a risk of inaccuracies in paraphrased content and potential plagiarism, which can affect the credibility and integrity of student-journalists. The tool may also oversimplify complex ideas, leading to a loss of depth in journalistic writing.

Based on the gathered information, Quillbot is a functional tool that utilizes correct grammars while improving the overall work of the journalists. However, there are risks of losing the authenticity of the journalists' pieces because of dependency and loss of originality–leading to a loss, or decreased, effort to the writing styles of the journalists.

Moreover, the researchers would recommend to keep a balance between automation and authenticity, leading to a practice of using assistance while also improving critical thinking and creativity to maintain journalistic integrity. The researchers recommend that Quillbot must be used with limits, leaving space for effort and originality that a writer brings to their work.

As for future researchers, it is recommended to consider comparing Quillbot with other AI writing tools. This could help determine whether Quillbot uniquely affects authenticity, or if similar trends are seen across other automation tools used in journalism and academic writing. Also, AI writing tools are constantly evolving, the researchers suggest keeping an eye out for new features or updates to Quillbot that could impact future research findings.

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"Automation vs Authenticity: Assessing Quillbot's Influence on Grade 11 Journalists of San Jose Academy"

Submitted by Eunice Claire D. Fababeir, John Rey G. Marquez, Daphne Aesha DC. Ramirez, Zeus Kurt U. Rodriguez, and Ashley Julienne T. Sanchez in partial fulfillment of the requirements for Practical Research 1 for School Year 2024-2025.

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Perceptions and Practices of Energy Conservation Among Grade 12 Science, Technology, Engineering, and Mathematics Students in San Jose Academy

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Abstract: Energy conservation is crucial in reducing energy consumption, minimizing costs, and easing environmental impact. This study examines the perceptions and energy-saving practices of Grade 12 STEM students at San Jose Academy, aiming to identify which factors influence their awareness and behavior towards responsible energy use. Using a qualitative-descriptive approach, data were collected through interviews with purposively selected students. The study's findings indicate that students recognize the importance of energy conservation in reducing power outages, lowering electricity costs, and promoting sustainability. Many respondents practice energy-saving habits, such as turning off unused appliances and preferring public transportation. However, challenges such as lack of resources, dependence on electrical appliances, and unawareness prevents consistent energy conservation efforts. Additionally, family, school, and social media play significant roles in shaping students' perspectives on sustainability. The study highlights the need for enhanced educational initiatives to allow for better energy conservation awareness and foster long-term sustainable behaviors.

Key Words: Energy conservation, energy-saving habits, STEM-students

1. INTRODUCTION

1.1 Background of the Study

Energy conservation is the practice of reducing energy consumption through mindful and efficient usage. One of its key benefits is the reduction of consumers' energy bills while simultaneously decreasing greenhouse gas emissions (Zach S., 2024). As global warming continues to pose a significant threat to the planet, energy conservation can help mitigate its effects. By using energy more efficiently, individuals and communities can contribute to a healthier environment. Therefore, this research aims to raise awareness about energy conservation and promote responsible energy consumption.

Energy is essential for everyone as it enables work and powers various tasks (Tara E., 2025). Responsible energy use significantly impacts daily life and contributes to sustainable development. Kardogan (2018) stated that global energy demand has been increasing, making energy efficiency more critical than ever. Reducing energy consumption can help protect the environment by lowering carbon emissions and minimizing the overall carbon footprint. Therefore, adopting energy-efficient practices is vital for ensuring a sustainable future.

Energy is crucial for everyone because it is the ability to do work, specifically on a certain task (Tara E., 2025). Responsibly using energy can have a significant impact on everyone's life and can cause sustainable development. Kardogan (2018) stated that the demand for energy has increased worldwide, so obtaining energy efficiency also increased at the same time. It also claimed that the reduction of energy use can protect the natural environment from carbon footprint.

According to Jeff T. (2022), climate change is a natural phenomenon that helps the Earth to be sustainable for living otherwise the planet would be cold or uninhabitable. Unfortunately, because of the

Industrial Revolution it influenced global warming to be as rapid as it was before. As a result, it has brought a dramatic impact to the world which increased the temperature, increased flooding, drought, intense storms, and rising sea levels. Furthermore, the report from IPCC's Sixth Assessment in 2021 has found that there is nearly 2 degrees of Fahrenheit from human emissions, so it was expected to reach or exceed the global average temperature by about 3 degrees Fahrenheit within a few decades (Cermak, A., 2024). Regardless of that, by lessening the overall demand of energy, this will lead to a more sustainable living for everyone.

1.2 Statement of Objectives

Energy conservation plays a crucial role in reducing energy consumption, lowering costs, and minimizing environmental impact. As global energy demand continues to rise, responsible energy use and efficiency become essential for sustainable development. By raising awareness and encouraging energy-saving practices, individuals can contribute to reducing greenhouse gas emissions and slowing down global warming. Through this research, the importance of energy conservation will be highlighted, fostering a mindset of environmental responsibility among Grade 12 STEM students and promoting a more sustainable future for generations to come. Furthermore, this aims to gather and formulate a strong avenue for the development of the environmental field.

1.3 Significance of the Study

This study examines the perceptions of energy-saving practices of Grade 12 STEM students at San Jose Academy. By exploring their awareness and behaviors regarding energy conservation, the research aims to identify key factors influencing their habits and promote more sustainable practices for the future generations.

STUDENTS. The study provides Grade 12 STEM students with the chance to evaluate their own energy conservation habits and deepen their understanding of sustainability. By participating in the research, students will gain a clearer picture of the impact of their energy usage and develop a sense of responsibility toward environmental conservation. Additionally, it could inspire students to incorporate energy-saving practices into their everyday routines, which they can carry into adulthood and share with peers and family members. Ultimately, it empowers students to become proactive contributors to global sustainability efforts.

EDUCATORS. This study offers insight into the current level of energy conservation awareness among students. The findings can help teachers and administrators identify gaps in knowledge or misconceptions about energy conservation. Educators can use the results to tailor their teaching methods and integrate more focused lessons on sustainable practices into the curriculum. Furthermore, the study provides educators with concrete data on how students in STEM programs perceive and practice energy conservation, allowing them to create more engaging and relevant educational content to promote responsible energy use among students.

SCHOOL. This study will encourage the school to instill a more sustainable learning environment that will help students to develop habits of conserving energy wisely. Moreover, it can improve and hone the school system in a way that will allow students and school facilities to practice on how to live sustainably. School is the first place where students are taught to be prepared to face the reality of life, so it is vital for the school to take action to make a better learning field.

SOCIETY. On a broader scale, the study's findings have the potential to impact local communities and society by showing how students—who are future leaders in technology, science, and other fields—can be instrumental in promoting energy conservation. As these students enter the workforce, they can use the knowledge gained from this study to inspire sustainable practices in their future careers, influencing their workplaces and communities. The ripple effect of this study can help foster a culture of sustainability that extends beyond the classroom and into real-world applications.

FUTURE RESEARCHERS. This research opens the door for future studies on energy conservation, particularly in educational settings. It provides an initial exploration of how students in STEM fields engage with environmental issues and sets the stage for more detailed research into the factors that influence students' attitudes and behaviors regarding sustainability. Future researchers can build upon this study to explore the effectiveness of different educational interventions or to examine how energy conservation practices vary across different regions or demographics. By identifying trends and patterns, this research contributes to the growing body of knowledge about energy-saving behaviors and the role of education in fostering long-term sustainability.

2. METHODOLOGY AND RRL

2.1 Review of Related Literature

2.1.1 Local Sources

Energy conservation

The Department of Energy (DOE) has recently issued a warning about potential power shortages in the Luzon grid, predicting up to 12 yellow alerts this year that could result in brownouts due to forced outages. Current estimates suggest outages could range from 500 to 600 megawatts, but historical data shows that these figures can be much higher, sometimes hitting 3,500 megawatts, especially during the summer months. With electricity prices rising, this will complicate the problem because it is possible that some of the demands may have to be supplied through more expensive diesel-fired power plants. The DOE, therefore, is urging Filipinos to put energy conservation as part of daily life, saying that Filipinos should use only energy-efficient appliances and practice sustainability. With the country's economic recovery and the growing demand for electricity, it's essential to cultivate an energy conservation mindset, particularly among the youth, like Grade 12 STEM students, whose awareness and actions could significantly influence future energy consumption (Manila Bulletin, 2023).

A 2023 study that surveyed over 500 Filipino college students to explore how their personal experiences with climate change impacts the influence of their energy-saving behaviors at home. According to a study conducted by Bordallo (2023), students who had firsthand encounters with climate-related events perceived higher risks associated with climate change, which in turn strengthened their intention to conserve energy. This suggests that personal experience and heightened risk perceptions play a crucial role in making energy-saving actions among the youth a necessity.

Energy-saving habits not only benefit the environment by reducing carbon emissions, but they also help save money by consuming energy efficiently. As stated in the Department of the Environment and Energy (2018), changes in individual energy consumption routines can lead to saving money while simultaneously benefiting the environment, all without sacrificing anything for our own sake. For instance, optimizing natural ventilation and lighting can promote a more practical lifestyle for individuals, creating a healthier environment and reducing air pollution (Billionbrick, 2024). Furthermore, energy-saving strategies can mold individuals to live a lifestyle sustainably and conserve energy. This fosters awareness among individuals about the importance of wise consumption, helping to make habitual practices in their day-to-day lives.

Environmentally-friendly society

Environmental consciousness has raised awareness in the Philippines. In fact, the Department of Energy and legislation implemented a law that aimed to enhance the effectiveness of energy conservation across the Philippines. Furthermore, it is roughly expected that it will prevent approximately 50.9 million tons of CO_2 corresponding with the greenhouse gas emissions (Department of Energy, n.d.). It is evident that the Philippines is promoting environmental sustainability of the country by imposing a law that takes action in energy conservation. This empowers society to play an active role in preserving the environment for future generations.

Despite the progress made towards a sustainable environment, there are still gaps that must be addressed to achieve success. Unfortunately, the Philippines faced the low rank for environmental sustainability, placing 168th out of 180 countries (CEDTyClea., 2021). This state shows the need for environmental empowerment across all nations. Particularly in energy conservation, this can reduce abundant harmful emissions and promote sustainable living within the society. This initiative benefits not only individuals but also includes various living organisms.

2.1.2 Foreign Sources

Energy conservation

Energy conservation (EC) plays a crucial role in achieving global sustainability, though it often receives less attention compared to energy efficiency (EE). A review of 329 studies revealed that 88.8% focus on EE, leaving only 11.2% dedicated to EC. This imbalance highlights a significant research gap, especially regarding the empirical validation of EC strategies in real-world settings and across diverse demographic groups". The literature emphasizes the need for more field-based studies, integrating theoretical models with practical applications, and calls for stronger policy interventions and behavioral research to enhance energy conservation efforts. Addressing these gaps is essential to support global sustainability goals and foster more effective energy conservation initiatives worldwide (Jan, B. & Asif, M., 2025).

Recognizing the amount of energy used up by high-energy and low-energy appliances may be able to enhance perceptions in regard to conserving energy. According to a 2023 study on Consumers' Perceptions of Energy Use and Energy Savings, published on PubMed Central, people tend to misunderstand their energy consumption and their recognition in potential energy-saving activities. The findings reveal that consumers tend to overly estimate the energy consumption of appliances requiring low-energy while underestimating the usage of high-energy counterparts. The study highlights the need for clearer and more accessible information to help consumers make better decisions about energy conservation.

According to Lesic et al. (2018), consumers often misjudge electricity use in appliances, usually overestimating low-energy devices and underestimating high-energy ones. People also prefer reducing usage time over investing in energy-efficient appliances. The study shows that many lack knowledge about actual electricity savings from different strategies. When judging an appliance's energy use, consumers rely on mental shortcuts. However, those with better math skills and stronger environmental concerns make more accurate guesses. These findings highlight the need for better consumer education and targeted efforts to improve energy-saving habits.

Lowering heating temperatures, using household appliances and air conditioning more efficiently, and turning off lights can lead to significant short-term energy savings. As buildings transition toward smarter, more energy-efficient designs such as net-zero or positive energy buildings the influence of end-users in managing energy demand is expected to grow. Encouraging behavioral changes alongside technological advancements can further enhance energy conservation efforts (Guerra Santin & Itard, 2023).

Environmentally-friendly society

A healthy lifestyle within the community promotes a sustainable environment. According to Chen Y. (2015), traditional methods of production and consumption must evolve to call for change to ensure sustainable development. Even small changes in someone's habits can significantly impact their overall lifestyle. An eco-friendly lifestyle elevates the preservation of succeeding generations (Air WP, n.d.). The assurance of a maintained environment begins with how individuals responsibly conserve natural resources.

The rate of carbon emissions has remained alarmingly high over the years. A study conducted by the Environmental Protection Agency (2022) presents a crucial effect of carbon dioxide from fossil fuels on greenhouse gas emissions of about 79.7%, particularly in the United States. Energy conservation offers substantial benefits for the environment by reducing the amount of carbon emissions produced from harmful pollutants. Furthermore, it can help combat climate change by utilizing great alternative energy, such as wind and solar power. Both wind and solar are recognized for 16% of the net generation from all fuel sources in 2023 (Sabins D., 2024). This indicates that there are numerous natural sources we can convert to more efficient ways of protecting the environment.

2.2 Methodology

2.2.1 Research Design

This is a qualitative research study that explores the diverse perceptions and practices of energy conservation among Grade 12 STEM students at San Jose Academy. The purpose of this study is to assess the

students' awareness of energy conservation and how they implement it in their daily lives. Specifically, a descriptive-qualitative approach will be employed to describe individuals' perceptions and their practices of energy conservation. Interviews will be held to conduct the study and provide in-depth data analysis.

2.2.2 Population Sampling

Grade 12 students under the STEM strand are more exposed to scientific and technical knowledge, including topics related to energy conservation, sustainability, and environmental impact. Their academic background makes them a suitable group for studying awareness and practices related to energy conservation. Additionally, senior high school students, particularly those in STEM, often use energy-requiring devices such as laptops, calculators, and laboratory equipment for the conduction of their studies. Students across 5 sections will be purposely selected for a total of fifteen (15) respondents in the STEM strand using purposive sampling techniques.

2.2.3 Research Instrument

This research employs an interview method supported by a guided questionnaire consisting of nine (9) questions designed to address the research questions posed at the outset of the study, titled Perceptions and Practices of Energy Conservation Among Grade 12 Science, Technology, Engineering, and Mathematics Students in San Jose Academy. The questionnaire is open-ended, allowing participants to respond based on their personal experiences and insights. No predefined response options are provided, ensuring that participants can express their views in their own words. Rather than conducting a formal, structured interview, the researchers believe that providing participants with sufficient time to reflect on their responses will encourage more thoughtful and accurate answers, which will then be shared verbally with the researchers. This approach aims to capture a deeper, more authentic understanding of the students' perceptions and practices regarding energy conservation.

2.2.3 Data Gathering Procedure

The researchers will first seek validation of the questionnaire from the teacher-researcher to examine if it aligns with the statement of the problem. Upon approval, the researchers will utilize the guided questionnaire to collect data through interviews. The researchers will then explain the background of the study and the purpose of the research. Furthermore, the confidentiality of the data from participants will be strictly maintained. During the interviews, the researchers will be open to answering any questions from the respondents for any clarification, if necessary. Additionally, the researchers will utilize an interpretative method to thoroughly analyze and explain the data collected from the interviews.

3. RESULTS AND DISCUSSION

This section presents the results and discussion of the gathered data, which was collected through interviews. The researchers utilize a tabular format to display the common themes identified in the participants' responses, along with the frequency of these themes. Additionally, there are nine (9) questions, divided into 3 major sections, which address the statement of the problem.

Table 1. Perception of energy conservation

Question	Common themes	Frequency
1. How do you define energy conservation, and why do you believe it is important?	a. Saving energy b. Cost - Effectiveness c. Lessening power outage d. Environmental awareness	a. 12 b. 1 c. 1 d. 1
2. Do you believe that conserving energy directly impacts the environment and society ? Why or why not?	a. Efficient use of energy b. Reduce air pollution c. Renewable energy	a. 6 b. 4 c. 2 d. 2 e. 1

	d. Sustainable Development e. Economical	

Table 1 presents the diverse perception on the importance of energy conservation among Grade 12 STEM students at San Jose Academy.

For question one (1), this study explores the diverse perceptions of energy conservation and its significance. Four (4) common themes emerged: saving energy, which had the highest frequency at twelve (12) responses. This was followed by cost-effectiveness, lessening power outages, and environmental awareness, each of which had a frequency of one (1).

Question two (2), on the other hand, assesses whether energy conservation directly affects the environment and society. All fifteen (15) respondents believed that energy conservation has a direct impact on both the environment and society. Their reasons included six (6) mentions of the efficient use of energy, four (4) mentions of reducing air pollution, and two mentions each for renewable energy and sustainable development. Lastly, the economical theme received only one (1) response.

Table 2. Energy saving habits and practices

Question	Common themes	Frequency
3. How often do you turn off appliances when they are not in use?	a. Energy conserving b. Occasionally conserving c. Not conserving	a. 11 b. 3 c. 1
4. Do you regularly use public transportation, or do you prefer private vehicles? Explain your answer.	a. Public Transportation b. Private Transportation c. Walking	a. 9 b. 5 c. 1
5. Have you ever made a conscious effort to utilize renewable energy sources, such as solar power or wind energy? If so, in what ways have you done so?	a. Lack of resources b. Use of solar power c. Traditional energy usage d. Using wind energy	a. 3 b. 9 c. 2 d. 1
6. What additional energy-saving habits do you incorporate into your daily life?	a. Plugging off appliances b. Using power banks c. Checking appliances efficiently d. Storing and saving water e. Use of solar power	a. 7 b. 3 c. 2 d. 2 e. 1

Table 2 presents the various common habits and practices among students regarding energy conservation.

In question 3, which investigates how frequently students switch off their appliances when they are not in use, (3) main themes emerged: energy conserving was the most common, with 11 mentions, followed by occasionally observing with 3 mentions, and not conserving with 1 mention.

For question 4, which inquired about the students' regular use of public or private transportation, (3) themes were also identified: public transportation was the most frequently mentioned, with 9 mentions, private transportation had 5 mentions, and walking was mentioned once.l

For question five (5) which seeks to explore whether students have made efforts to use other energy sources, there were four (4) common themes: use of solar power had the highest frequency as it had nine (9) mentions, having lack of resources were mentioned three (3) times, whilst traditional energy use had two (2) mentions and the use of wind energy had the lowest frequency with 1 mention.

Question six (6) asks about additional energy-saving habits observed by students on a daily basis. There were four (4) common themes: plugging off appliances had the highest frequency with seven (7) mentions, utilizing power banks had three (3) mentions, while checking appliances' efficiency and storing water both had the lowest frequencies with two (2) mentions each.

Table 3. Factors influencing students' perception and behaviors related to energy conservation

Question	Common themes	Frequency
7. What factors influence your perceptions about energy conservation? (Ex. Family, school, social media)	a. Family b. Social media c. News d. School e. Fire hazards	a. 8 b. 4 c. 2 d. 4 e. 1
8. Do you believe your school offers sufficient education on energy conservation? Why or Why not?	a. Improve b. No c. Comfort d. Yes e. Maybe f. Not enough	a. 6 b. 8 c. 1 d. 2 e. 7 f. 2
9. What challenges do you encounter when attempting to conserve energy?	a. People's un-awarenes s b. Necessary use of appliances c. Laziness	a. 5 b. 9 c. 1

Table 3 presents the general factors that influence students' overall perception and behavior towards energy conservation practices.

For question seven (7), which explores the factors influencing students' perceptions of energy conservation, five (5) common themes emerged. The most frequently mentioned factor was family, witheight (8) mentions. Social media and school both had four (4) mentions each, while news was mentioned twice (2), and fire hazards had one (1) mention.

In response to question eight (8), which asked whether students believed their school provides adequate education on energy conservation, six (6) common themes were identified. "No" was the most frequent response, with eight (8) mentions, followed by "Maybe" with seven (7) mentions. "Improve" was mentioned six (6) times, while "Yes" and "Not enough" each received two (2) mentions, and "Comfort" was mentioned once.

For question nine (9), which inquired about what challenges the students encounter when attempting to conserve energy, three (3) main themes emerged: necessary use of appliances had the highest frequency with nine (9) mentions, peoples unawareness with five (5) mentions, and laziness was mentioned once.

4. CONCLUSION AND RECOMMENDATION

The primary objective of this study is to evaluate the awareness of energy conservation among students at San Jose Academy. This research aims to promote the practices that contribute to sustainability both society and the environment.

The researchers explored the diverse perceptions of Grade 12 STEM students at San Jose Academy regarding energy conservation. Most students defined energy conservation as a practice aimed at saving energy efficiently without compromising the environment, according to the results of the findings. Additionally, unravelling the topic of energy conservation can enhance environmental awareness among students, which may also promote sustainability for future generations. These energy conservation measures can positively impact societal issues such as power outages and can be cost-effective in reducing electricity bills. Furthermore, energy conservation serves as an effective strategy for consuming energy wisely and responsibly, rather than wasting it in ways that could ultimately harm the environment. This study also helps combat environmental threats, such as global warming and climate change, which are crucial issues today. Energy conservation is pivotal, particularly in preserving the environment and taking urgent action to achieve sustainable development, according to the results of the findings from the respondents.

Regarding energy-saving habits and practices, the researchers found out that most of the students are aware of the importance of conserving energy by regularly turning off unattended appliances, which helps save both money and energy simultaneously. Meanwhile, public transportation is preferred by students for its convenience, as it emits fewer carbon emissions compared to private transportation. On the other hand, when it comes to students' thoughts on utilizing renewable energy sources, solar panels are the most commonly used option for energy conservation, as they convert natural resources—specifically the sunlight—into energy or electricity. These panels are widely used for conserving energy and reducing electricity bills. Incorporating these practices into students' daily lives can boost environmental awareness and promote a healthier environment for everyone.

Lastly, the factors that influence students' perceptions and behaviors regarding energy conservation primarily revolve around their social environment, including family, social media, news, and school. Fire hazards are also a significant consideration in energy conservation, as they often result from the overconsumption of electrical appliances. Furthermore, students believe that schools should offer efforts that integrate energy conservation into the curriculum. The more students engage in such activities, the more they develop and sharpen their awareness of energy conservation. However, challenges remain, such as the reliance on appliances for convenience, people's unawareness of energy conservation, and laziness. Therefore, these pressing concerns can serve as an eye-opener for improving students' awareness of ensuring the awareness of energy conservation effectively.

Regarding the findings related to the research problem and the research itself, the researchers strongly recommend that San Jose Academy must implement comprehensive educational programs focused on energy conservation. This will not only raise awareness but also equip students with practical knowledge to help reduce energy consumption. In order to motivate individuals to adopt energy-saving practices in their everyday routines, here some specific ways to attain these:

- By integrating simple, sustainable habits into their daily lives, individuals can contribute to a significant reduction in overall energy consumption.
- It is recommended that the school establish partnerships with local organizations and experts to further enhance the energy conservation program.
- Encouraging the school to integrate energy conservation topics into their curriculum and to incorporate environmental activities.

As for future researchers, studies on perceptions and practices of energy conservation could explore a broader range of factors influencing behaviors, such as socioeconomic background, curriculum effectiveness, and the impact of school-led initiatives. Longitudinal studies could assess whether students' energy-saving habits persist beyond high school. Furthermore, a comparative study involving students from various academic strands could be conducted to evaluate the prevalence of energy conservation

practices across different fields and to contrast these findings with the results of the current research.

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Enhancing Problem-Solving Skills of Grade 11 Students of San Jose Academy Through Peer Collaboration

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Abstract: Students from STEM and other strands are often challenged with applying learned concepts to actual mathematical or situational problems. To address this issue, peer collaboration, where selected groups work together, has become more common in schools. Enhancing problem-solving skills through peer collaboration is effective because it fosters teamwork, diverse perspectives, and critical thinking. In this study, the researchers aim to explore how peer collaboration influences the problem-solving skills of Grade 11 STEM students at San Jose Academy. This study may also influence STEM students' experiences and improvements while engaging in peer collaboration during problem-solving. Many students in STEM struggle with problem-solving due to reliance on memorization, lack of confidence, and difficulty applying learned concepts. Peer collaboration provides opportunities for students to exchange ideas, receive feedback, and develop strategies that enhance their analytical skills. This study employs a qualitative description approach, using purposive sampling to select fifteen (15) Grade 11 students. Data were gathered through structured interviews conducted in person and via Zoom. Findings indicate that peer collaboration positively enhances students' problem-solving abilities. Key benefits include peer assistance, exposure to diverse problem-solving approaches, and increased confidence. Students reported improved understanding of concepts, enhanced communication skills, and greater efficiency in tackling problems. Additionally, working collaboratively fosters teamwork and open-mindedness, helping students refine their critical thinking skills. The study highlights the significance of peer collaboration in enhancing problem-solving skills, which are essential for both academic success and real-world challenges. Educators can support this method by encouraging active participation, guiding discussions, and implementing structured peer learning activities to maximize its benefits.

Key Words: Problem-solving; peer collaboration; Grade 11 students

1. INTRODUCTION

1.1 Background of the Study

Oftentimes, students struggle to face conceptual problems that they may encounter with regards to academics. Challenges they may face include both mathematical and situational concepts that may be given during class. These tasks allow them to apply concepts and theories they learned across various subjects to practical and actual situations. Although students are able to learn and understand the topic in concept, most still struggle in problem-solving using their acquired knowledge. According to Cherry (2023), the five main obstacles in problem-solving are making assumptions, traditionally viewing problems, irrelevant or misleading information, and relying on past solutions. However, all of these problems can be minimized as peer collaboration includes the involvement of outside opinion, specifically from peers who have various ideas and ways of viewing.

Many students encounter difficulties when it comes to problem-solving due to various reasons. They may struggle when facing unfamiliar or complex scenarios, weakening their confidence. Students may also find difficulty in breaking down complex problems into manageable parts due to an overreliance on memorization or abstract concepts rather than conceptual understanding. They may struggle in determining which strategies to apply to the problems, which may lead to frustration and eventually abandoning the problem-solving process. Additionally, critical thinking and adaptability are skills that take time to develop for problem-solving. Therefore, students need proper techniques for the sake of their improvement in such abilities necessary in the current world.

Certain skills are developed in academic settings that can benefit students in their future careers and everyday life. Among these, problem-solving skills stand out as essential abilities that allow individuals to analyze a situation, identify issues, develop potential solutions, and implement an effective course of action. In an academic context, strong problem-solving skills allow students to tackle complex tasks, think critically, and connect learning across various subjects. In the real world, the ability to solve problems is highly valued by employers and is essential for navigating the challenges of daily life, from making informed decisions to overcoming obstacles in professional settings.

STEM problems share many common pedagogical principles despite differences in teaching strategies. For example, they present students with real-world problems and require them to propose well-constructed solutions, reinforcing the application of problem-solving skills in both academic and professional contexts (Jurdak, 2016). The format of project-based learning (PBL) can be useful in challenging students to apply problem-solving skills in meaningful ways, helping bridge the gap between theoretical knowledge and practical application (Karan, 2022). However, problem-solving abilities are difficult to hone compared to other technical skills, as they require experience over time. Additionally, most students struggle with identifying the problem and its corresponding solution.

At present, students often work together in pairs or groups to share knowledge, exchange ideas, and collectively solve problems; this is the concept of peer collaboration. This environment enables students to learn from each other's strengths, compensate for weaknesses, and engage in group brainstorming. According to Hesse et al. (2015), Collaboration involves managing the interactions and contributions of individuals, requiring effort in managing tasks and utilizing skills effectively. The benefits of peer collaboration are numerous: it fosters a sense of community, enhances communication skills, boosts motivation, and improves problem-solving abilities by exposing students to diverse perspectives. Furthermore, peer collaboration encourages active learning, as students become not only recipients of information but also contributors to the learning process.

With the relevance of problem-solving skills in today's world, but the weakness of students' skills, it is crucial to identify techniques to solve this issue, and peer collaboration is one of the ways. Collaborative learning fosters critical thinking and teamwork, encouraging students to comfortably share ideas and clarify through questioning. It also allows students to collectively address difficult problems, assisting each other to grow. The purpose of this study is to investigate how peer collaboration affects students' capacity for problem-solving at San Jose Academy. The study's conclusions can help teachers encourage cooperative learning techniques that improve student achievement and get them ready for new challenges.

1.1 Statement of the Objectives

In modern education, problem-solving abilities are crucial for students to handle both academic and real-world circumstances efficiently. Peer collaboration plays a vital role in said skills of students as it offers them a chance to learn from their peers comfortably and openly. The following questions aim to enhance the problem-solving skills of Grade 11 students of San Jose Academy. It explores the influence of peer collaboration on students' problem-solving skills. It identifies the challenges students may encounter and the strategies that may be executed.

1. How does peer collaboration influence students' ability to evaluate and improve their problem-solving abilities?
2. What challenges do students encounter when engaging in peer collaboration for problem-solving?
3. What strategies can be implemented to optimize peer collaboration in refining problem-solving skills?

1.2 Significance of the Study

This research aims to spread information that can be a basis for understanding how engagement in peer collaborations can further enhance the problem-solving skills of Grade 10 students in solving complex problems. This study can be beneficial to the following:

Students. This research helps students improve their problem-solving skills by informing them about the benefits of collaborating with their classmates, sharing ideas, and discussing solutions, therefore helping students build up their confidence, critical thinking, and communication.

Furthermore, this study can give students insights on how they can further improve their approach to solving problems.

Teachers. Teachers, not only in San Jose Academy, can benefit from this research by providing them with perceptions on how effectively students can solve complicated problems through peer collaboration. This will allow them to incorporate more group activities and develop techniques to help students improve their problem-solving skills through peer collaboration during school hours.

School. Schools may use this study as a foundation to focus on collaboration, synchronizing with the new curriculum focused on teamwork. The results of this research would help as a basis for incorporating newer and more effective curriculums that use peer collaboration in order to encourage students to develop their problem-solving abilities.

Future researchers. With the help of this research, future researchers of a similar topic can be guided with their studies as they may use the research as a source of information and support. Researchers may use the data and information of this study as evidence if it is related to their topic.

2. METHODOLOGY and RRL

2.1 Review of Related Literature

Throughout the years, intelligence has developed rapidly, developing from theoretical concepts to practical skills. This highlights the importance of problem-solving skills, especially in the 21st century where abilities are not only measured by learning in concept but also in various given situations. With this, many students still struggle in applying learnings in theory to actual problems, therefore this creates the need to strengthen problem-solving skills through different methods. Meanwhile, peer collaboration is the concept where students work together in pairs or groups in order to discuss, share ideas, and support each other to achieve a common goal. This study focuses on enhancing the problem-solving skills of Grade 11 students of San Jose Academy through peer collaboration.

2.1.1 Local Literature

Finding, analyzing, and resolving problems are just a few of the many abilities needed for problem-solving (Ramiro, 2024). As its name suggests, it is identifying the problem, examining the necessary solution, and implementing it. As stated in the study, from a mathematical point of view, it is identifying the number of sentences and recognizing the given and operations to be used in the problem-solution. Due to this complex process, students are often satisfactory in the pre-solving part but perform poorly on the problem-solution itself. In problem-solving, students are able to easily identify the given, what is asked, and the operation to be used; however, they struggle with combining all in the solving part of the solution.

According to Mance-Avila & Guzon (2020), enhancing the ability of students to solve problems is still a significant issue. To better grasp the current state of problem-solving in the nation, problem-solving methods into teaching practices. Additionally, examining how these educators cultivate problem-solving skills in their students and the interplay of these practices from lesson preparation to implementation can yield valuable insights into how these elements interact. Understanding these dynamics may lead to improvements in teaching methods and, in turn, enhance the learning of mathematics, especially in problem-solving skills.

Peer tutoring offers a valuable solution by providing each student with the individualized support that is often lacking in traditional classroom settings. Since teachers may not always have sufficient time to offer personalized attention, peer tutors play a crucial role in reviewing and reinforcing previously learned material, benefiting both the tutor and the learner. This reciprocal learning process not only deepens understanding but also creates an engaging and dynamic environment. Moreover, peer tutoring embodies the essence of peer collaboration by fostering an interactive, supportive atmosphere where learners actively contribute to each other's educational growth—making it an effective and enjoyable strategy for learning beyond formal educational institutions (Danga, 2022).

Peer collaboration in a classroom setting involves students working together in small groups to achieve shared learning goals inside the school classroom. They may socialize, discuss, and debate in real life in order to determine the correct answer to their problem. The practice enhances the students' learning engagement, study outcomes, and social skills. However, some students may feel discomfort or conflicts when working in groups, still, it improves their attitudes and motivation in doing schoolwork (Pajarillo-Aquino, 2019).

According to the study by Pajarillo-Aquino (2019), the technique of peer collaboration in classroom settings still faces challenges that may arise. Participation of students in such methods may have communication issues like

disagreements or conflicts and some students may lack participation due to dependency on their peers. Some may also prefer working individually, rather than in groups, and peer collaboration may force them unintentionally. However, its advantages far outweigh the issues that may arise. As stated by Pajarillo-Aquino (2019), peer collaboration provides students with various learning benefits such as increase of academic performance, enhancement of social skills and participation, and promotion of diverse perspectives about a particular topic.

2.1.2 Foreign Literature

Some researchers have highlighted that peer collaboration can significantly influence students' motivation, which ultimately impacts their academic performance. This influence is often stronger than the impact of parents or guardians, particularly among adolescents. As students collaborate with their peers, they may either feel motivated to perform well or become less engaged, depending on the dynamics of their group. Peer pressure can lead students to prioritize fitting in with their peers over academic success, affecting their effort and focus. Thus, while peer collaboration offers benefits, it also presents potential drawbacks that can hinder students' academic progress. Fragata & Limpot (2023).

Literacy skills in problem-solving are one of the essentialities to be acquired in order to successfully solve complex problems. Various techniques are portrayed in training and improving problem-solving skills. Such as the problem-based learning (PBL) approach; which is a technique that consists of instructional methods influencing students in engaging with real-life situations rather than just gaining information from lectures (Bungihan & Valdez, 2019). According to them, using PBL as a technique to improve the problem-solving skills of Grade 9 students is better than the non-PBL approach. This efficiently shows that the PBL technique is effective in enhancing the problem-solving skills of students, particularly in this case—in chemistry. This technique can be productively utilized as an individual and in other instances—such as through group collaboration.

The procedure of implementing a particular, new method to a specific problem with a set of conditions that the solver has not encountered before is a definition of the concept of problem-solving (Bihunova et al., 2024). In simpler terms, problem-solving is creating or utilizing the appropriate method in order to solve a newly encountered issue. Similarly, it defines problem-solving as "the ability to recognize and analyze difficult situations and to find suitable solutions." The article states that the skill is essential for the student's curriculum as it gives them the opportunity to learn personally by themselves in dealing with problems. Utilizing problem-solving skills also allows them to apply in real situations, their knowledge in concept.

On the other hand, abstract mathematics, a branch of mathematics, includes the creation of math problems, frameworks, and equations to enhance mathematical concepts for practical application in real-life situations. Mathematics is an advanced domain of study that encompasses abstract algebra, geometry, calculus, and various other abstract ideas. Abstract mathematics is valuable as it links various aspects of mathematics (Tao, 2022).

An essential element of mathematics is its instruction and acquisition. Globally, mathematics curriculums have incorporated an emphasis on both teaching problem-solving skills and delivering mathematics education through problem-solving approaches. Consequently, this topic has captured the attention of researchers in mathematics education since the inception of the discipline (Liljedahl & Santos-Trigo, 2019).

Real-world problem-solving is an activity people engage in daily. It demands adaptability, toughness, ingenuity, and a level of creativity. A key aspect of RWPS is that it entails ongoing engagement with the environment throughout the problem-solving process. In this process, the environment can be regarded as both a source of inspiration for innovative ideas and a means to enhance creative thinking. The researcher seeks to merge the pertinent literature on creativity and problem-solving with the fragmented and emerging research on learning influenced by perceptual experiences from real-world problems (Sarathy, 2018).

It is often that students encounter group activities, in which they collaborate by means of accomplishing tasks quicker. According to Irzawati (2023), in a group setting, each member has their strengths and weaknesses that can be maximized and minimized respectively through the team's support. Meaning, unique individuals have their weaknesses, but also have their strengths. Through group activities, individuals can have the opportunity of maximizing the full capability of their strength as they can use it continuously which, on the way, is trained. With their own weaknesses, the members who are advanced in the particular subject in which they struggle can teach them, support them along the way (Irzawati, 2023).

However, despite all the positive impacts of collaborative learning on the students' well-critical thinking for solving complex problems, there arose the cons of that concept. The very concern regarding peer collaboration among students is that the work distribution may not be distributed equally. This act can trigger the reliance of students on the effort of other members who are in charge of a task, and this results in possible conflict between all the members. Another negative result of peer collaborative learning is that amidst forum gathering with all the members to tackle ideas, possible debate, and argument may occur if several members cannot be open to new wild ideas which can also trigger conflict (Irzawati, 2023).

Research shows that peer collaboration can have positive effects, but there are also challenges that need to be considered before applying it in educational settings. If group work is not managed well, it can lead to conflicts, harm student relationships, and make teamwork less effective. A poorly organized peer collaboration system may create a negative class environment, leading to distrust, unhealthy competition, or students putting in less effort than they would on their own. Additionally, some students may feel uncomfortable working with peers due to concerns about fairness, personal biases, or unequal contributions. Others may worry that their group members will be too kind and avoid giving honest feedback, which can reduce the learning benefits of collaboration (Lerchenfeldt et al., 2019).

The Heuristic method is a technique in improving problem-solving skills. It is an approach that is heavily reliant on practical experience rather than the standard, and traditional manner. It centers on the act of investigating different formulas which can lead to an efficient solution coming from processes of trial, and error, self-discovery, and experience. According to Adebola, et al. (2024), Heuristic Problem-Solving strategies can aid students to become better problem-solvers. Based on the research on the effects of heuristic problem-solving strategies on students' achievement and retention, the findings show that the students who had exposure to the use of heuristic problem-solving methods had performed greater than the students who followed the traditional method. Their findings indicate the effectiveness of the use of heuristic methods in enhancing the problem-solving skills of students.

In other cases of subjects, namely mathematics, the use of the technique of bar model visualization shows effectiveness in accomplishing complex situations portrayed in the subject of math. It is a problem-solving technique that consists of breaking down mathematical processes into visual presentations including the use of bars. According to Abu, M. S., et al. (2018), their study indicates that to improve students' mathematical problem-solving skills, the bar model strategy could be effective. Their study of the effectiveness of the bar model visualization in enhancing problem-solving skills in mathematics reveals how efficient the use of bar model visualization is in solving complex mathematical equations, and problems.

Education values the significance of problem-solving skills and these abilities can be further enhanced through peer collaboration. Many studies emphasize that although students can simply grasp theoretical concepts, most of them struggle with application in real-world problems. Due to this, problem-based learning is more important than ever, and to improve it, peer tutoring plays a big role. Various research state that peer collaboration fosters engagement, critical thinking, and learning development. However, the technique should be moderated to minimize issues that may arise. On top of that, global studies suggest utilizing strategies and methods to further improve problem-solving skills through peer collaboration. Peer collaboration promotes learning motivation, adjustment to changes, and a deeper understanding of subjects, making it a valuable aid in education.

2.2 Methodology

2.2.1 Research Design

The researchers used the qualitative method to comprehend and analyze the collected non-numerical data to determine whether peer collaboration enhances the problem-solving skills of Grade 11 students or not. (Bhandari, 2020). Aligning with the method used, the descriptive approach was utilized with the intended objective of precisely describing the state of the chosen population and primarily seeking answers for "what" and "how" questions. All in all this design aims to explore the perspectives, experiences, and insights of the targeted population in order to understand how peer collaboration could enhance the problem-solving skills of Grade 11 STEM students.

2.2.2 Sampling Population

Due to the qualitative nature of this study, the researchers used the purposive sampling technique in gathering data. According to Heath (2023), purposive sampling is being used in research studies to choose a particular group of individuals for examination. This approach is suitable when the researcher clearly understands the traits or features they wish to investigate and aims to choose a sample that represents those traits, making it

frequently used in qualitative research. The total number of respondents will be fifteen (15) Grade 11 students. Since there are 9 sections, each will have at least one (1) respondent while others may have more to total fifteen (15) respondents.

2.2.3 Research Instrument

A set of six (6) interview questions was created by the researchers to be distributed either through Zoom as a questionnaire or face-to-face. The questions examined the influence of peer collaboration on the ability of students to evaluate and enhance their problem-solving abilities, along with potential challenges and strategies they may implement to optimize the method. Before conducting the interviews, Ms. Camille Perez, a Practical Research teacher at San Jose Academy, validated the questions to be used.

2.2.4 Data Gathering Procedure

To collect data within the limited timeframe, the researchers conducted two (2) types of interview choices, face-to-face and Zoom interviews with selected participants. Face-to-face interviews were held after class and during available break periods, while Zoom interviews were offered to those unable to meet in person. Before conducting any interviews, the researchers obtained informed consent from participants, explaining the study's purpose, the confidentiality measures in place, and their voluntary participation. The data gathering took place from February 18 to 19, 2025.

3. RESULTS AND DISCUSSION

To present the data gathered in the interview concisely and effectively, a table was used to present the answers of the respondents. Their common themes per question were identified and collected together depending on their connection. The tabular format includes the question, common themes of their answers, and code frequencies or how often each one was mentioned. Given the six (6) questions of the interview, similar questions are grouped on different tables. Additionally, only the themes mentioned at least more than 1 (one) are included in the format.

Table 1. Positive effects of peer collaboration on problem-solving skills of students.

Question		Common Themes		Code Frequencies
1. How does peer collaboration assist you in evaluating and improving your problem-solving abilities?	a. b. c. d. e. f.	Formulate Solutions Socialization Insights/Ideas Broaden Knowledge Perspectives Peer Assistance/Feedback	a. b. c. d. e. f.	4 5 8 5 5 13
2. What benefits do you gain from receiving different perspectives during peer collaboration for problem-solving?	a. b. c. d. e. f. g.	Different Approaches/Strategies Ideas/Knowledge Sharing Openness Bias Awareness Guidance and Support Efficiency Understanding Concepts	a. b. c. d. e. f. g.	6 6 2 2 2 3 3
3. What positive changes have you encountered with your approach in solving problems while utilizing peer collaboration?	a. b. c. d. e. f. g.	Open-mindedness New Ideas/Knowledge Increased Communication Problem-solving Efficiency Confidence Academic Improvement Better Understanding	a. b. c. d. e. f. g.	3 4 7 6 2 2 6

Table 1 showcases the questions that ask about the positive effects of peer collaboration on students' problem-solving skills. Each question has its common themes and the frequencies of each one.

On the first question, the most frequent response is "Peer Assistance/Feedback" given the question about the assistance of peer collaboration in evaluating and improving the students' problem-solving abilities. It is followed by "Insights/Ideas" with 8 mentions, "Socialization", "Broaden Knowledge", and "Perspectives" with 5 mentions each, and "Formulate Solutions" with 4 mentions.

The second question asks about the benefits of different perspectives on problem-solving. The results are dominated by "Different Approaches/Strategies" and "Ideas/Knowledge Sharing", both with 6 mentions. The next ones are "Efficiency" and "Understanding Concepts" tied with 3 mentions. Lastly, "Openness", "Bias Awareness", and "Guidance and Support" all have 2 mentions.

For the last question for the first table, it focused on the positive changes of peer collaboration on the students' approach to solving problems. It is dominated by "Increased Communication" with 7 mentions, afterward, "Problem-solving Efficiency" and "Better Understanding"

with 6. Following these, “New Ideas/Knowledge” with 4 and “Open-mindedness” with 3 mentions. Finally, “Confidence” and “Academic Improvement” both with 2 mentions each.

The extensive set of responses across all questions about the benefits of peer collaboration suggests that it has various ways of assisting in the evaluation and improvement for the abilities of students. It also proposes the benefits gained from the different perspectives in peer collaboration and establishes how it encourages positive changes in students’ approach to problem-solving.

Table 2. Negative effects of peer collaboration on problem-solving skills of students, including strategies and techniques used to counter.

Question	Common Themes	Code Frequencies
4. Are there negative changes to your problem-solving skills while implementing peer collaboration?	a. Conflicting Opinions/Answers b. Dependency On Others c. None	a. 3 b. 3 c. 5
5. What strategies or techniques in peer collaboration have you found most effective in reducing issues?	a. Open-mindedness b. Good Communication c. Teamwork d. Feedback and Reflection e. Collective Learning	a. 5 b. 8 c. 6 d. 5 e. 2
6. What should be avoided in practicing peer collaboration for problem-solving?	a. Closed-mindedness or Self-centeredness b. Miscommunication c. Conflict d. Ignoring Ideas e. Copying Answers f. Unclear Understanding	a. 4 b. 3 c. 3 d. 4 e. 4 f. 3

Table 2 displays the detrimental enhancements of peer collaboration on students' problem-solving abilities, along with countermeasures and tactics that may be used. Although all three questions received a vast array of answers, only the ones mentioned more than once were displayed.

The first question of the second table asked about the negative changes of peer collaboration on the problem-solving skills of students. It received many other answers including “Decreased Concentration” or “Inaccurate Information”, but there are only 3 repeated ones. The dominating answer is “None” with 5 mentions as students believe it has no detrimental effects on their abilities. While the other two with 3 mentions are “Conflicting Opinions/Answers” and “Dependency On Others”. The results indicate that although peer collaboration may not have a drawback to all, some may still have issues such as conflicts or over-reliance on their peers when it comes to solving.

Question five asking about strategies and techniques for reducing issues also received many themes, but only the constantly repeated results were covered. The major answer with 8 mentions is “Good Communication”, similarly followed by “Teamwork” with 6 mentions. The next answers are “Open-mindedness” and “Feedback and Reflection” with 5 mentions, and “Collective Learning” with 2 mentions. The numerous suggestions imply that there are various ways to ensure the effectiveness of peer collaboration which is mainly communication and mindset.

On the last question which is about what should be avoided in practicing peer collaboration, many terms are mentioned as well. The three most mentioned with 4 each are “Closed-mindedness or Self-centeredness”, “Ignoring Ideas”, and “Copying Answers”. They are tailed by another three with 3 mentions, “Miscommunication”, “Conflict”, and “Unclear Understanding”. Such results state that ineffective communication with peers and irresponsible answering consequently lessen the effectiveness of peer collaboration.

The most evident and recurring word across all questions is simple— communication. From providing assistance, and influencing positive and negative effects, to outlining benefits and suggesting strategies, it is clear that effective communication is the foundation of successful problem-solving through peer collaboration. The frequency of responses such as “Increased Communication,” “Good Communication,” and “Miscommunication” highlights its central role in shaping how students interact, share ideas, and address challenges collectively. If done correctly, it will be highly beneficial, but if utilized poorly, it may cause the worsening of problem-solving abilities.

4. CONCLUSION AND RECOMMENDATION

The central purpose of this research is to utilize peer collaboration to enhance the problem-solving skills of Grade 11 students of San Jose Academy. This study

also explores the extent to which peer collaboration influences students' critical thinking, engagement, and overall academic performance in problem-solving activities. It includes the data summary, conclusions from the research, and suggestions made concerning the study.

The researchers discovered that peer collaboration significantly contributes to the enhancement of San Jose Academy's Grade 11 students' problem-solving skills. One of the most notable influences of peer collaboration on students' ability to evaluate and improve their problem-solving abilities is that it allows for feedback from peers and the exchange of diverse ideas and perspectives which allows the students to explore multiple approaches to problem-solving. Many students reported that discussing problems with their peers helped them broaden their understanding and think more critically about possible solutions. Based on the frequency, it was shown as well that Grade 11 students' exposure to peer collaborations has further improved their communication skills which are rooted in the persevering interactions they are engaged in the group.

On the other hand, despite the benefits peer collaboration can offer, the collected information indicates minimal opposing impact of peer collaboration on the problem-solving skills of Grade 11 students from San Jose Academy. Based on the data gathered, the issues that students encounter most often are conflicts, the act of dependency, reliance, or copying other members' answers during the practice of peer collaboration. Other than those, most students report that they have not encountered any other detriments with peer collaboration.

To refine problem-solving skills through peer collaboration, the gathered data emphasizes good communication, open-mindedness, and teamwork. Initiating proper communication, aligning cooperation, and fostering an open mindset to welcome new ideas are essential techniques for effective collaboration. Additionally, providing peer feedback and engaging in reflection on the quality of work helps enhance the process. To avoid drawbacks, students recommend steering clear of closed-mindedness, disregarding others' ideas, and simply copying answers. Peer collaboration should be a balanced exchange of ideas, where all members contribute and actively listen to each other.

To sum it all up, the results show that the positive impact of peer collaboration on the problem-solving skills of Grade 11 students of San Jose Academy outweighs the minimal negative effects. Nevertheless, these negative effects may intensify over time, and to prevent this, proper communication, organized coordination, being open-minded to new ideas, and perspectives, and receiving negative or positive feedback well are to be practiced.

- Based on the concluded data, the researchers suggest that students should participate, reflect on the experience, and use peer feedback to improve group problem-solving responsibly. They should utilize techniques properly and rationally to maximize benefits. Additionally, they may be guided through the proper support of teachers and the school itself.

- For the refinement of learning, researchers recommend teachers encourage peer collaboration in the form of facilitated group work, providing an open space for sharing ideas. Through the assistance of teachers, the enlightenment of students with peer collaboration may be optimized to reduce issues that may occur. Challenges and hindrances may be easily controlled with the help of techniques and assistance teachers may provide.

- Grounded on the data gathered across the research conduction proper, the researchers advise San Jose Academy to integrate and include more activities optimizing the use of peer collaborations that would furthermore improve the cooperation, communication, open-mindedness, assistance, and the sharing of knowledge which lead to enhancing the intellect of students. They may also spread ideas and techniques throughout the school to optimize the process of peer collaboration.

- Lastly, future researchers may conduct studies that can help resolve the following issues observed. The researchers propose that they explore more about other potential challenges or factors that affect how students experience peer collaboration. Furthermore, future researchers should study more about the strategies and techniques on how they formulate their solutions while doing peer collaboration and possible repercussions to individual skills. With these, peer collaboration may be finally established as a means to enhance problem-solving skills.

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"Enhancing Problem-Solving Skills of Grade 11 Students of San Jose Academy Through Peer Collaboration"

Submitted by Andrea Lorraine D. Estrella, Alexander Joaquin Q. Inocencio, Llorylane Antoneth S. Lumantas, Jhon Euwen A. Pablo, and Eliza Kerstine Y. Villanueva in partial fulfillment of the requirements for Practical Research 1 for School Year 2024-2025.

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Perception of Senior High School STEM Students on Mobile Legends as a Medium For Teamwork

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Abstract: Teamwork is a crucial part of modern life. It is greatly sought after by people working in academic and professional settings. Thereafter, it is a critical skill worthy of investment, especially in terms of time and effort. On the other hand, Mobile Legends is a popular game, it is widely known in the community of the country, Philippines. This is particularly true for the students and younger population of the aforementioned country. Given those, the importance of teamwork and the prevalence of Mobile Legends promotes a possibility for the two to benefit from each other which would require a thorough investigation. This study, which aims to explore this possibility, added another condition, wherein it will use the perception of its participant to build upon the result, making it more grounded. As such, this paper aims to use the perception of its participants—Senior High School STEM students—to build a theory on Mobile Legends being a medium for teamwork. This research aims to also explore its effectiveness through the participants' perceived benefits and drawbacks. Moreover, these participants were gathered and selected through purposive sampling totaling at the count of fifteen (15). Further, using a qualitative approach, through interviews, data were collected from these participants. The study's findings point out the result being positive, that there is a positive perceived reaction of the participants on the use of Mobile Legends as a medium for teamwork through improved socialization, unity, and strategic thinking. However, it is also noted that Mobile Legends still contains inherent challenges that hinder its usage as such.

Key Words: Mobile Legends; Teamwork; Medium; Communication; Perception

1. INTRODUCTION

1.1 Background of the Study

Teamwork is a necessary skill for 21st-century people, especially those in academic and professional settings. It is a critical skill that sees usage in a wide range of situations, it is for everything that involves cooperation with others. It is not only crucial for its wide application but also due to its capability to improve communication, increase engagement among team members, and create a positive atmosphere among the members. Moreover, through joint efforts, team members can cover for each other with their differing views on a certain problem (Yale University, 2000). Therefore, it is important for everyone to learn and develop such skills for their various benefits, not only for themselves but also for others.

In addition, Mobile Legends: Bang Bang or Mobile Legends (ML) is a widely accepted and admired pastime among adolescents and young adults. It features 500 million and more in just the Google Play Store statistics (Moonton, 2016). The game's innate mechanics use teamwork as its foundation, requiring its players to communicate, collaborate, and strategize with each other to work. Additionally, its prevalence in society promotes its potential to be a tool for teamwork. Understanding how the game develops its players' sense of teamwork and subsequently, how they apply it, can provide insights about its possible benefits beyond the scope of entertainment which was the game's original purpose. This paper will explore this possibility through the perception of Senior High School (SHS) STEM students.

Given that, this paper will attempt to investigate Mobile Legends' effectiveness as a medium for teamwork. However, the game is not without limitations and challenges. It is famously known to cultivate a toxic environment due to its competitive nature where players may engage in or experience verbal abuse. Additionally, teamwork in the real world offers flexibility and often requires long-term cooperation which conflicts with the game's teamwork revolving around fast-paced decision-making processes and set roles. Yet, it still can develop the following aspects of teamwork or collaborative skills: group behavior, problem-solving abilities, and group cohesion.

Overall, this paper aims to offer insight into an accessible way of cultivating teamwork through a medium commonly known and engaged by the recent generations. In addition to that, it also offers entertainment rooted in the application's background as a widely renowned game while offering beneficial results. This entertainment might increase the engagement of people participating in the game allowing for a more effective way of enhancing teamwork. Furthermore, the perception of this paper's participants can help offer insights into whether this game can serve as a practical tool for teamwork or not. Moreover, according to Keith, M. J. et al., (2021), teams subjected to team video gaming treatment show an increase in productivity. This shows the possibility and potential of Mobile Legends, a mobile video game, to also increase productivity.

1.2 Statement of Objectives

The study aims to investigate the perception of SHS students on using Mobile Legends as a medium for teamwork under the Science, Technology, Engineering, and Mathematics (STEM) strand of Grade 11 and 12 Level. Specifically, the objective of this study is to recognize what opportunities and benefits they see with using Mobile Legends as a tool for teamwork. As well as to determine the role of Mobile Legends in the following aspects: group behavior, group problem-solving capabilities, and group cohesion. Lastly, the researchers aim to know the risks and limitations that Mobile Legends could bring when used as a method for teamwork. Moreover, it specifically seeks to answer the following questions:

1. What are the benefits and opportunities that Senior High School STEM students perceive regarding the use of Mobile Legends as a medium for teamwork?
2. How do the students perceive Mobile Legends' role in the growth of the following aspects of teamwork:

    2.1. group behavior;

    2.2. problem-solving capabilities as a group; and

    2.3. group cohesion?

3. What challenges or restrictions do students see in using Mobile Legends as a tool for teamwork?

1.3 Significance of the Study

This paper attempts to rationalize cultivating teamwork through Mobile Legends from the perspective of students. This study can help by offering a new alternative way of enhancing teamwork, identifying possible downsides, and promoting the use of games for educational purposes. Below is the list of beneficiaries that may see use in this research.

STUDENTS. Pupils will have the opportunity to learn and develop essential skills while enjoying the gameplay. Through strategic thinking and creativity, they can enhance problem-solving abilities engagingly and interactively.

TEACHERS. By incorporating games into learning, teachers can support skill development in students while keeping them entertained. This approach reduces stress by ensuring that activities align with students' interests, increasing participation and completion rates.

SCHOOL. Schools can use the research to enhance teamwork-based learning, improve student engagement, and develop balanced gaming policies.

FUTURE RESEARCHERS. This study provides valuable data that future researchers can utilize to bridge existing gaps in their research, offering insights that contribute to further academic exploration in the field.

COMPETITIVE GAMING ORGANIZATIONS & COACHES. Professional gaming teams, coaches, and training programs can use the study's findings to understand how teamwork skills in MLBB translate to real-life scenarios, improving team dynamics and strategies.

GAME DEVELOPERS. Game developers will benefit as positive reception towards their game will attract more players, increasing engagement and ultimately boosting their revenue.

2. METHODOLOGY AND RRL

2.1 Review Of Related Literature

Mobile Legends is a 5v5 multiplayer online battle arena (MOBA) game for iOS and Android, developed by Shanghai Moonton Technology and launched in 2016. Players choose from 92 heroes across six roles—tank, fighter, assassin, marksman, support, and mage—each with unique skills. The goal is to destroy the opponent's base, leveling up by defeating minions, turrets, and enemy heroes to earn in-game currency for stat-boosting items. Matches last around 10–15 minutes, shorter than PC MOBAs like Dota 2 and League of Legends. Support heroes play a vital role by healing or buffing allies to keep them strong in battle (Chua, 2019)

As the game gained popularity since the date it was released, Mobile Legends expanded the selection of playable heroes in the game. It has a vast list of characters each with their own unique abilities and playstyles. As of the latest update, patch 1.8.20, there are 120+ available heroes on the regular server, with more being tested on the advanced server for future release (Rossel, 2023). The expanding roster of Mobile Legend heroes enhances teamwork and communication, as Mobile Legends requires players to work together, players must choose complementary heroes, and communicate effectively. With the increasing number of heroes, deeper strategic play becomes essential.

Teamwork is an essential part of many video games, especially in multiplayer and cooperative settings. It requires coordination, strategic planning, and communication (Badatala et al., 2016, as cited in Keh Danilo, 2021). Collaborative gameplay promotes problem-solving skills, social interaction, and leadership development among players, making collaboration an essential component in both casual and competitive gaming environments. Moreover, the efficient utilization of teamwork can improve overall player performance and engagement, as successful collaboration often leads to achieving in-game objectives more efficiently. As video games evolve, the role of teamwork remains important in influencing player experiences and promoting cooperative abilities beyond the virtual environment.

Communication is essential for building a solid team foundation. Effective intercommunication enables each player to share information, make decisions, and plan strategies, thereby fostering interpersonal ties. Additionally, teamwork is required in order to win. Players must collaborate with one another; communication aids in planning, making the process of fulfilling objectives easier to achieve (Garcia et al., 2022). Assigning roles to each other promotes harmony and balance. This requires not only technical expertise but also the ability to successfully communicate and collaborate toward a common goal. The process of scheming and coordinating allows players to create social connections, giving multiplayer games a platform for collaboration and relationship-building.

Cooperation is crucial when playing online games because it not only improves your relationship but also fosters a sense of community among players. You can develop positive relationships with each other by simply chatting with one another. You can also meet new individuals and form bonds with them by communicating with the other players. This is supported by a 2023 study which stated that "cooperative games have been observed to foster communication and social interaction," (Farah, 2023). Furthermore, according to Badatala et al., (2016), "one aspect of many video games is teamwork." Through his research, he has experimented with the players through trials. Each trial he evaluated has truly tested one's skill and how their cooperative meta cognition would come in handy in such situations given to them.

According to Musick et al., (2021), they claimed that throughout the years they have played together, they have depended on one another's gaming experiences when playing their competitive games. In order to establish team cognition with strangers, they also integrate by comprehending their duties. Despite the fact that they were initially total strangers, they gradually improved by cooperating as a team and adjusting to each other's roles via mutual understanding. Furthermore, as the teams applied their prior experiences, the group's mutual understanding and communication not only strengthened them but also increased their wits.

As said by Marlow et al., (2016), "these proposed relationships are ultimately intended to uncover the manner in which game-based training can be leveraged to facilitate effective teamwork". Gaming can build and strengthen a person's friendship in addition to fostering togetherness and using appropriate behaviors. One's perspective on how to handle situations where teammates' behaviors are unfamiliar can be enhanced by training to compete in gaming tournaments, such as E-sports games like Mobile Legends. Additionally, as you meet new people in real life as well as on the battlefield, you can develop suggested relationships.

Moreover, according to a study published in 2021, "for both tasks, teams in the team video gaming

treatment increased their productivity significantly more" (Keith et al., 2021). As such, it can be said that Mobile Legends, which is a mobile game and is therefore a type of video game, can help in improving the team performance of groups. In addition, we can gather from this that games are indeed effective in improving teamwork with team productivity being emphasized in this.

Exposure to online games can lead to positive outcomes, but encountering unpleasant scenarios is inevitable. According to Oliverio (2024), toxic players face minimal repercussions, as punishments such as warnings or bans are easy to bypass, often by creating a new account or using an alternative one. The lack of strict consequences fails to discourage negative behavior, allowing toxicity to persist. Additionally, anonymity in online games, where players use usernames or aliases instead of their real identities, further fosters toxicity. Since players are not personally accountable for their actions, they may feel less restrained in engaging in harmful behaviors, knowing their real-world identity is protected. The combination of weak punishments and anonymity enables toxicity to spread within the online gaming community.

Adolescents' gaming addiction is greatly influenced by the emotional bonds they form with their peers. Nonetheless, this association is not direct, but rather mediated by societal stigma. This shows that social stigma influences the effect of peer connection on gaming addiction. Social stigma can result from bad judgments, discrimination, or exclusion from mainstream educational and social systems. When young teenagers feel judged or alienated by society, they may resort to video games as a coping method, using them to escape reality and find acceptance and belonging in online groups (Reyes et al., 2023).

According to a study by Garcia, K. et al., (2018), even if the impacts are not severe, students admit that playing online games has affected their academic performance. However, these detrimental impacts still need to be addressed and should not be disregarded. The problem is that pupils' academic performance may gradually deteriorate if they keep playing video games without appropriate moderation or assessment. Therefore, the study recommends that preventive measures or tactics be used to stop the situation from getting worse and assist students in responsibly managing their gaming addictions.

Based on these researches, using games as a medium for teamwork sees a benefit in the form of improved socialization through enhanced communication, problem-solving capabilities, and cohesion. The same concept applies to Mobile Legends as well due to its limitations of being online forcing its players to adapt to each other and communicate well with what they were given to perform adequately and solve problems. However, this limitation also serves as a drawback, allowing people to go anonymous and do as they please with little repercussions. Yet, it can also be seen as a sanctuary for some people with the same limitations, along with the anonymity of their virtual world. Moreover, this game with its background as being a famous and entertaining game can cause addiction, as such the use of the game must be controlled. Through inference, Mobile Legends is capable of being an effective medium for teamwork with various benefits rooted in socialization but hampered by glaring weaknesses such as the game being conducted online and addictive.

2.2 Methodology

2.2.1 Research Design

This paper employed a qualitative approach for this study. Furthermore, it used the research design of phenomenological research. From this approach and design, the research aimed to gather and efficiently analyze the perceptions of the students' perceived enhancement. To gather this data, the researcher collected the research participants using purposive sampling and interviewed them. Moreover, the analysis of these perceived enhancements was done through manual coding. In this, the responses were grouped upon similar themes.

2.2.2 Population Sampling

The target population of this study is the SHS STEM students. They were chosen by the researchers due to their various qualities of being academically thorough, adaptable, and fluent in computer literacy. These three combined make them suitable for this study. Moreover, being in the STEM strand left these students more exposed to technological pieces such as mobile games, allowing them to have a more meaningful insight regarding this paper. Further, the minimum number of participants to be selected from this population is fifteen (15). Moreover, these participants will be selected through purposive sampling.

2.2.3 Research Instrument

The research instrument that was implemented was an interview, ensuring that the quality of the data is rich and directly from the participants. This method allows for the gathering of personal opinions and in-depth evaluations, providing researchers with a more

comprehensive understanding of the subject matter. Conducting the on-site interview will thoroughly give the researchers more context and the authenticity of the data. Furthermore, the interviews were recorded, specifically, the audio of their responses reducing misinterpretation and allowing the researchers to revisit and thoroughly analyze the data. Lastly, the instrument that was used is a powerful tool that can be valuable for complex topics requiring detailed narratives and personal perspectives.

2.2.4 Data Gathering Procedure

In preparation for the collection of data, the following are the procedures that were utilized as a guide. Firstly, the chosen participants will get questionnaires that the researchers have prepared in advance. This is to ensure that everything proceeds as planned by the researchers. Then, the researchers will identify potential participants who meet the criteria, ensuring that those selected are suitable for the interview process. After this, the researchers will require the participants to sign a given consent form before they can conduct the interview one-on-one. As the researchers interview the following participants, they will make sure to keep the participants' responses confidential and private as they will only be used for research purposes. Additionally, these interviews will be recorded in audio format. Subsequently, the researchers will gather the required data and conduct interviews for their observations, and proceed to the initial coding process to identify key themes.

3. RESULTS AND DISCUSSION

To represent the data gathered from the interview, the researchers laid out the data in a tabular form, allowing for an easier time digesting this information.

Table 1. Perceived benefits

Question	Common Themes	Code Frequency
1. Following your perception, what benefits and opportunities do Mobile Legends bring when used as a medium for teamwork?	a. communication b. critical thinking c. temperance d. insight into skill e. rapport f. teamwork	a. 3 b. 3 c. 1 d. 1 e. 1 f. 6

Table 1 presents the students' perceived benefits in Mobile Legends as a tool for teamwork, in addition, it also grasps upon the opportunities it presents.

Question 1 explores the students' perception of the benefits and opportunities that Mobile Legends brings to improve teamwork skills. There are six (6) common themes: teamwork had the highest frequency at six (6) mentions, communication and critical thinking both with three (3) mentions, and lastly, temperance, insight into skills, and rapport, had the lowest frequency at one (1) mention.

Table 2. Perceived changes in the key aspects of teamwork

Question	Common Themes	Code Frequency
2. In what way can the change in group behavior be affected by Mobile Legends?	a. emotional aspect b. toxic environment c. unity	a. 7 b. 2 c. 6
3. In your perception, what is the role of Mobile Legends in the growth of a group's problem-solving capabilities?	a. communication b. strategies c. teamwork	a. 2 b. 6 c. 7

4. How does Mobile Legends contribute to group cohesion?	a.	building bonds	a.	3
	b.	negative growth	b.	1
	c.	socialization	c.	7
	d.	unity	d.	4

Table 2 showcases the changes that the student participants observe in the key aspects of teamwork (group behavior, group problem-solving capabilities, and group cohesion).

Question 2 asks what ways can Mobile Legends affect the changes in group behavior. There were three (3) common themes in total: emotional aspect had the highest frequency having seven (7) mentions, unity was second with six (6) mentions, and lastly, toxic environment only had two (2) mentions.

Question number 3 asks about the role of Mobile Legends in the growth of a group's problem-solving capabilities. There were three (3) common themes: teamwork with the most frequent mentions gaining seven (7) responses in total, followed by strategies being mentioned six (6) times, and lastly, communication being mentioned only two (2) times.

Question 4 is about how playing Mobile Legends can foster the growth of group cohesion. It contains four (4) common themes. The most frequent is socialization with a total of seven (7) mentions, unity with four (4) mentions, building bonds with three (3) mentions, and negative growth which was mentioned only once (1).

Table 3. Perceived limitations and risks

Question		Common Themes		Code Frequency
5. Would there be any limitations or negative risks in your perception of using Mobile Legends as a medium for teamwork, specifically in developing it?	a.	distraction	a.	3
	b.	less productive	b.	2
	c.	nature as a game	c.	1
	d.	screen time	d.	2
	e.	toxicity	e.	7

Lastly, table 3 presents the limitations and risks that the participants see in the usage of Mobile Legends as a medium for teamwork.

Question 5 explores the limitations and negative risks of using Mobile Legends as a medium for teamwork in the perception of the participants. There were (5) common themes in total: toxicity was the most frequently mentioned having seven (7) mentions, distraction with three (3) mentions, less productive and screen time both with two (2) mentions, and lastly, nature as a game with one (1) mention.

4. CONCLUSION AND RECOMMENDATION

The primary objective of this study is to determine the perception of Senior High School STEM students of San Jose Academy on the use of Mobile Legends as a tool for teamwork. The study also highlights its beneficial outcomes as well as the risks it brings.

The researchers found out that the participants of this study generally viewed Mobile Legends positively, emphasizing its role in bringing beneficial results and opportunities. It was recognized that the game benefits teamwork by fostering collaboration and problem-solving, making it a valuable tool for developing essential group skills. Even more than that, it also provides an opportunity concerning the strengthening of an individual's critical thinking and temperance or self-control. Moreover, through the game's shared objective, collaboration is reinforced, motivating others to work with each other due to the game's nature as a 5v5 game.

Following, it was analyzed that the following aspects of teamwork—group behavior, problem-solving capabilities, and group cohesion—were perceived as being affected by the use of Mobile Legend as a medium for teamwork. It was gathered that the game promotes strategic thinking, thereby improving group problem-solving capabilities, and allowing them to efficiently solve problems as the situation calls for it. The game also promotes group behavior through unity and emotional aspects—a positive group environment—but it has also been found to hinder it due to toxicity. Furthermore, it was gathered that building bonds were made easier through socialization, aided by the game, paving the way to unity and resulting in improved group cohesion. Nevertheless, it was noted that negative growth can still take place.

In addition, it was also found to be a source of risks that hinder its potential to be a catalyst for teamwork. Aside from these risks, the game also has

limitations that affect its potential as a teamwork tool. Participants highlighted concerns such as distraction, reduced productivity, excessive screen time, and the inherently competitive nature of the game, which can sometimes prioritize individual performance over collaboration. Additionally, the presence of toxicity within the gaming community can discourage positive interactions, making it more difficult for players to develop teamwork skills effectively. If players prioritized individual success over team dynamics, the game's potential to foster teamwork diminished significantly. Moreover, with its nature as a game of entertainment, Mobile Legends' addictive nature was found. This raises the concerns of some participants once again, citing that it may cause a decrease in productivity, along with some other effects.

Based on these findings, Mobile Legends was positively perceived by the participants in regards to its usage as a medium for teamwork. It brings benefits and opportunities such as improvements in collaboration, problem-solving, critical thinking, and temperance. Moreover, it specifically helps in the growth of these three aspects of teamwork: group behavior, group problem-solving capabilities, and group cohesion, albeit with some drawbacks. Furthermore, in the same context, the game posed the risks of being distracting and being capable of reducing productivity, as well as excessive screen time. Moreover, it has the limitation of being toxic and competitive.

Given the concluded result of the study, the researchers would recommend the use of Mobile Legends as a medium for teamwork, specifically, in developing it due to its various benefits. However, given its inherent risks, they should use it within a controlled environment. This allows for the reduction of the chance of contracting addiction and engagement with toxicity and; thereafter, the promotion of teamwork. Moreover, the controlled environment will be limited in the following ways: teammates, screen time, and schedule.

Furthermore, the researchers recommend the game to improve upon its game mechanics. This is particularly true towards making it more suited for team gameplay. To attain this condition, the following are the ways to achieve it:

- Through a penalty and reward system to discourage foul plays and toxicity.
- An enhanced communication system to promote communication between teammates and, subsequently, teamwork.
- More group objectives to foster overall collective performance.

Regarding future researchers, it is recommended to conduct an in-depth investigation into the long-term impact of Mobile Legends on teamwork, as well as explore strategies to reduce the risks that it presents. Additionally, further studies about SHS students from different academic strands are suggested to determine whether the findings of this study are specific to STEM students or applicable to the populace of students.

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The Faculty of the Senior High School Department, San Jose Academy accepts the Research Paper entitled:

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Effects of Openness to Experience on Consumers' Behavior Among Grade 12 Students of San Jose Academy

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Abstract: *This study investigates the impact of openness to experience on the purchasing behavior of Grade 12 students at San Jose Academy, focusing on how it influences their decision-making, brand preferences, willingness to try new products, and overall consumer behavior. A total of 25 students from each section were randomly selected as participants for this research, providing valuable insights. To collect comprehensive data, the researchers employed a quantitative research method using a Likert scale survey with a target sample size of 200 students to ensure robust and representative findings. The survey items were designed to effectively capture the main variables of interest and provide meaningful insights for the analysis. The analysis revealed several key findings. First, gender was found to have no significant impact on the respondents' openness to new products or brands, as both male and female students demonstrated equal engagement with new trends and products. Additionally, prior experience with a product emerged as a critical factor in shaping purchasing behavior. Positive experiences with a product significantly increase students' trust and confidence in trying the product again, thereby influencing repeat purchases. Moreover, peer influence was identified as another essential factor in shaping students' openness to different products, emphasizing the role of social interactions in shaping consumer preferences. These findings underscore the importance of understanding external influences on purchasing behavior. The insights gained from this study offer valuable implications for marketers and businesses seeking to engage effectively with young consumers.*

Keywords: Openness to experience, Consumer Behavior, Quantitative research, Purchasing behavior, and Liker-Scale

1. INTRODUCTION

This chapter presented the background of the Study, Statement of the Problem, Significance of the Study, Scope and Delimitation, Conceptual Framework, and Definition of terms.

1.1 Background of the Study

Marketing encompasses every part of a plan to turn a prospective consumer into a happy and satisfied customer. It includes everything from market research to advertising. According to Sydney, K. (2024), the goal of marketing is to convince a person that your product is worth investing in, establish brand loyalty, and increase overall sales. Generally speaking, this involves clearly explaining the product's benefits, creating a strong connection with the customers, and thus considering the consumers' personalities. Among the documented psychological factors in marketing literature, personality is used to influence consumers' purchasing decisions.

According to Soto, C. J., & Jackson, J. J. (2020), there are five primary personalities a person has, which are Openness to experience, Consciousness, Extraversion, Agreeableness, and Neuroticism known as OCEAN. The researchers opted to focus on one specific personality, known as Openness to experience. The personality trait that best reflects the lay concept of open-mindedness is "openness to experience," or simply "openness." Open people tend to be intellectually curious, creative, and imaginative (Luke Smillie, 2017). Individuals with a high level of openness to experience tend to achieve goals through the discovery of new opportunities and by using different methods.

Additionally, as stated by McCrae, R. R., and Greenberg, D. M. (2014), Openness is seen in the breadth, depth, and permeability of consciousness and the ongoing quest for new experiences and ideas. In essence, openness is about being on an ongoing quest for growth and enrichment. It is a dynamic, ever-evolving journey where one remains curious,

accepts new things and is eager to expand one's perspective.

Consumer behavior is the study of individuals, groups, and organizations that are associated with products that can be purchased. It influences a consumer's personality when buying a specific product or brand (Jisana, T. K., 2014). Consumer behavior is the mental and physical activities undertaken by household and business consumers that result in decisions and actions to pay for, purchase, and use products and services. (Sheth, 2014). Mentioned in their study that consumer behavior includes various activities and several roles that people hold as consumers.

Several studies have been conducted on consumers' behavior, however, there is a lack of information regarding the personality trait specifically, openness to experience effects on students. The researchers aim to identify the relationship between openness to experience and consumer behavior of grade 12 students of San Jose Academy.

1.2 Statement of the Problem

This study aims to assess the impact of the personality trait Openness to Experience on the consumer behavior of Grade 12 students at San Jose Academy. While there is increasing interest in the traits that shape adolescent consumer behavior, specific research on the role of personality traits, In particular, Openness to Experience remains limited among high school students. This gap is critical, as students are a key period for forming lasting consumer habits. Understanding how Openness to Experience influences consumer behavior during this developmental stage could provide valuable insights for marketers and educators alike.

Although past studies have thoroughly explored consumer behavior in adults, there is a noticeable lack of research on how traits like Openness to Experience influence consumer decisions in grade 12 students.

1. What is the Demographic Profile of the Respondents in terms of:

    1.1 Age

    1.2 Gender

2. How does prior experience with a certain product influence grade 12 students' purchasing behavior?

3. What effect does openness to new experiences have on grade 12 students' buying decisions?

4. How do peers' purchasing choices affect the grade 12 students' buying decisions?

1.3 Significance of the Study

The primary objective of this study is to find the effects of openness to experience on consumers' behavior. This study will benefit our society considering businesses are what propel our economy. This research will also be beneficial to the following:

Students - Students who plan to take business-related courses can gain a deeper understanding of their consumers' behaviors, especially their openness to new experiences, opinions, and products. This understanding can also serve as a guide for how to manage their future businesses.

Entrepreneurs - This research will benefit entrepreneurs as it can serve as a guide to further understanding their consumers' behaviors and needs, as well as how they can innovate and implement products on their target population.

Marketers - The results of this research can benefit marketers by deepening their understanding of how to promote and sell regarding their consumers' behavior on openness to experience.

Current Researchers - By conducting this inquiry, the researchers will be able to provide valuable insights and enhance their knowledge regarding the personalities of consumers, as well as generate a foundation for future researchers.

Future Researchers - The gathered information can serve as a guide and reference for data for future researchers who plan to conduct a similar study. This allows them to add to existing knowledge and deepen their understanding.

1.4 Scope and Delimitation

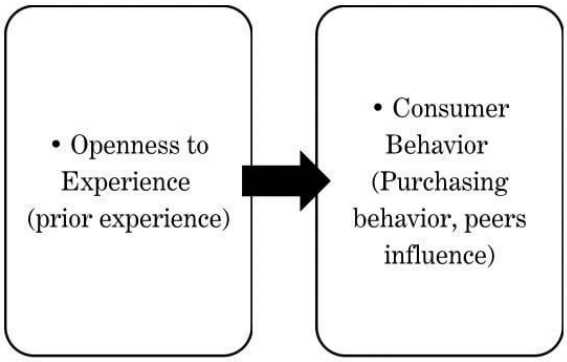
This study will focus on grade 12 students enrolled at San Jose Academy. This research will aim to gather data from 20 grade 12 students in each section (8 sections) to explore if students are open to experience or not. This study will employ statistical methods such as correlation analysis to examine the relationship between openness to experience and consumer behavior.

To explore this relationship, the study will utilize structured surveys designed to collect quantitative data. The use of Likert scales is critical, as it ensures the consistency and reliability of the data collected, allowing for more accurate analysis.

These surveys will employ a Likert Scale format, which will enable participants to express their level of agreement or disagreement with various statements related to both their personality traits and consumer behaviors.

1.5 Conceptual Framework

Based on the conceptual framework, the study seeks to identify the relationship between the two variables, openness to experience and consumers' behavior, particularly among grade 12 students of San Jose Academy, likewise, the researchers expect that openness to experience has a significant effect on consumers' behavior, therefore the following hypotheses were presented:



Null Hypothesis

A specific personality (openness to experience) affects the consumers' behavior of San Jose Academy Grade 12 students.

Alternative Hypothesis

A specific personality (openness to experience) does not affect the consumers' behavior of San Jose Academy Grade 12 students.

2. Review of Related Literature and Methodology

This chapter presented the Foreign Study, Foreign Literature, Local Study, and Local Literature, Research Design, Validity and Reliability, Research instrument, Sample Population, and Method of Data Analysis.

Foreign Study

According to Soto C. and Jackson J. (2020), this study investigates the five-factor model of personality, which classifies human personality into five main traits : extraversion, agreeableness, conscientiousness, neuroticism, and openness to experience. These traits provide a structure for understanding variations in behavior, emotions, and thinking across different situations. Each trait falls along a scale, with individuals exhibiting different levels of these characteristics, shaping how they relate to others, cope with stress, and engage with new experiences.

In particular, according to Barford, K.A., & Smillie, L. D. (2016), they defined the five personality into a much deeper understanding of it and found the relation between mixed emotions and the five basic personality domains.

This includes Extraversion, Agreeableness and Openness as positive factors, whereas Conscientiousness as a negative factor. Meanwhile, Neuroticism has mixed emotions having both negative and positive effects. But then “Open individuals have access to more thoughts, feelings, and impulses in awareness, and can maintain many of these simultaneously”, that is why it is the best trait that correlates with dispositional mixed emotions and will be vital to examine individuals' curiosity.

Based on Christensen, A. P. (2022), out of all the five major personality traits, openness to experience has been established as a fundamental factor of personality, this means that people who are open to experience are more flexible and receptive to all possibilities.

To explain it furthermore they are people who are creative, establish complex worldviews, and understand the depths of human experience meaning they don’t just see possibilities but also engage with them because of their curiosity. The personality trait "openness to experience," often associated with open mindedness, includes qualities like intellectual curiosity, creativity, and imagination. In a business context, individuals high in openness engage more deeply with challenges and opportunities (Smillie, L., 2017).

In addition, according to Christen, A.P., et al. (2018), Openness to experience is a trait that has two classifications: the first is the most commonly found in literature, which is intellectual and experiencing. On the other hand, the novel aspect is defined as being open-minded. This implication suggests that people who have a trait of being open to experience are more curious and diverse when it comes to trying something new.

Foreign Literature

Hence, Michael SW. Lee's (2022), they found out in their study that anti consumption research is crucial to inform businesses about consumer brand avoidance, which ties into the openness to experience trait. Companies that embrace openness may better understand and adapt to the diverse motivations behind anti-consumption, allowing them to innovate and adjust their strategies effectively.

Local Literature

Based on Quintelier, E. (2014), the study investigates the relationship between the big five personality traits and young people's engagement in political consumerism, such as ethical purchasing and boycotting.

It found that traits like openness to experience are closely linked to making politically motivated buying decisions, suggesting that personality influences the likelihood of engaging in consumer activism for social and environmental causes, this crucial information will be important for business activities to evaluate their strategies to engage with customers.

But then as stated by Jisana, T. K. (2014), a consumer is someone who makes decisions concerning purchase and the evaluation of products and services. Consumer behaviour reflects the totality of consumer’s decisions with respect to acquisition, consumption, and disposition of goods, services, time, and ideas by decision-making units.

According to Harmeling, C.M., et al. (2017), consumer engagement marketing is the main key element in a business in which people are motivated and empowered to buy a specific product hence, it is evident in the study that engaging with the business helps the customers to be curious to try products. Consumers' behavior is the study of people that are associated with an existing product, whereas consumers' behavior is defined as how an individual makes a decision to spend their money on resources (Jisana, T. K., 2014).

2.2 Research Design

The research focuses on the effects of students' openness to trying new or unfamiliar products. The study will utilize a quantitative descriptive design to provide thorough interpretations of the data. This approach allows for the exploration of relationships between openness to experience and consumer behavior among students. For effective data gathering, respondents will be given a Likert scale survey, as this method enables researchers to collect essential data, ensuring a strong examination of the relationship between openness to experience and consumer behavior.

2.3 Research Instrument

The research instrument that will be utilized during the conduction of the survey is Survey – Likert scale questionnaire approach. These surveys will employ a Likert Scale format, which will enable participants to express their level of agreement or disagreement with various statements related to both their personality traits and consumer behaviors.

Additionally, an informed consent form is provided to ensure adherence to the **Data Privacy Act of (RA 10173)** and secure the voluntary participation of participants. The respondents will be given a 14-item questionnaire that focuses regarding the following topics;

- Purchasing Behavior
- Openness to Experience
- Peers' Purchasing Influence

2.4 Sample Population

San Jose Academy grade 12 students in all subject areas were selected as the study's target group. The researchers used Slovin's formula to determine the appropriate number of respondents, guaranteeing that the sample would fairly represent the population. The calculation revealed that 200 San Jose Academy Senior High School students would be necessary as respondents. Likewise, the research will employ a simple random technique to distribute to respondents.

Slovin's formula:

$$n = \frac{N}{1+Ne^2}$$

n= ?
N= 390
e= 5%

2.5 Method of Data Analysis

After the survey, the gathered data will be given to researchers for interpretation; hence, after the computation is done, summarized information with numerical visualization will be utilized using the Jamovi application. Nevertheless, results will be interpreted, and the researchers shall provide short explanations as to whether a significant relationship exists using scale.

SCALE

4.01 - 5.00	**Strongly Agree**
3.01 - 4.00	**Agree**
2.01 - 3.00	**Neutral**
1.01 - 2.00	**Disagree**
0.01 - 1.00	**Strongly Disagree**

3. Results and Discussion

This chapter presents the findings of the research. The results are as follows:

Statements are as follows:

1. I consider myself open to new experiences	8. I am influenced by advertisements when making purchasing decisions
2. I am willing to try new products that I never heard before	9. I tend to buy products based on reviews and ratings
3. I am more likely to trust brands that I used before	10. I often buy products impulsively without much thought
4. I often purchase products based on my friends recommendation	11. I often compare prices before making a purchase
5. I think that trying new products help me stays with the current trends	12. My previous experience with a product significantly affects my decision to purchase it again
6. I enjoy discovering products that are not widely known	13. My prior experience with specific product has increased my perception of its value
7. I feel that exploring new products reflects my personality	14. I tend to buy products from online shop rather than physical stores

3.1 - Demographic Profile of Students in terms of: Age and Gender

Table 1.1 - Frequencies of age

age	Counts	% of Total	Cumulative %
16	3	1.5%	1.5%
17	114	57.0%	58.5%
18	73	36.5%	95.0%
19	7	3.5%	98.5%
20	3	1.5%	100.0%

The frequency analysis shows that the majority of the respondents were **17 years old (57.0%),** followed by **18-year-olds (36.5%), 19-year-olds (3.5%),** and lastly, **16-year-olds (1.5%)** and **20-year-olds (1.5%).**

Table 1.2 - Frequencies of gender

gender	Counts	% of Total	Cumulative %
female	116	58.0%	58.0%
male	84	42.0%	100.0%

The frequency analysis indicates that the majority of the respondents were **female (58.0%),** which is then followed by the **male (42.0%).**

3.2 - How does prior experience with a certain product influence grade 12 students' purchasing behavior?

Table 2.1 - Descriptives: Purchasing Behavior due to prior experience

	Mean	SD
s3	4.29	0.811
s12	4.22	0.784
s13	4.25	0.777

The table indicates that the respondents **strongly agree** with statement 3, with a mean of **4.29 (SD = 0.811).** Similarly, the respondents also **strongly agree** with statement 12, with a mean of **4.22 (SD = 0.784).** Nevertheless, respondents also **strongly agree** with statement 13, with a mean of **4.25 (SD = 0.777).**

3.3 What effect does openness to new experiences have on grade 12 students' buying decisions?

Table 3.1- Descriptives - *Effect of Openness to Experience on Students Buying Decisions*

	Mean	SD
s1	4.48	0.723
s2	3.94	0.935
s5	3.67	0.940
s7	3.75	1.051
s8	3.63	1.118
s9	4.25	0.877
s10	3.35	1.283
s11	4.26	0.898

The table indicates that the most prominent effect of openness to experience on students' buying decisions were statement 1 with a mean of **4.48 (SD = 0.723).** Indicating that the respondent **strongly agrees** with this statement.

3.4 How do peers' purchasing choices affect the grade 12 students' buying decisions?

Table 4.1 **-** Descriptives: Effect of Buying Decision Based on Peers' Purchasing Choice

	s4	s6	s14
Mean	3.85	3.80	3.81
Standard deviation	0.976	0.935	1.18

The table indicates that the respondents **agree** with statement 4, with a mean of **3.85 (SD = 0.976).** Similarly, the respondents also **agree** with statement 6, with a mean of **3.80 (SD = 0.935).** Nevertheless, respondents also **agree** with statement 14, with a mean of **3.81 (SD = 1.18).**

4. Summary of Findings, Conclusion, and Recommendation

This chapter presents a summary of findings, conclusions, and recommendations.

4.1 Summary of Findings

This study assessed the effects of openness to experience on the consumer behavior of grade 12 students at San Jose Academy. The following shows the results and findings:

1. Demographic Profile of Students in terms of: Age and Gender

The majority of the respondents were **females (58.0%)**, aged **17 years old (57.0%).**

2. **Purchasing Behavior due to prior experience**

The research findings indicate that prior experience significantly influences their purchasing behavior, particularly brand trust. This specific statement, **"I am more likely to trust brands that I used before"** received the highest mean score of **4.29,** with a standard deviation of **0.811**. This suggests that grade 12 students tend to develop a strong sense of trust towards brands they have engaged with and used before. The results underscore the critical role that prior experience plays in consumer trust and brand loyalty.

3. **Effect of Openness to Experience on Students Buying Decisions**

The gathered data reveal that the most prominent effect of openness to experience on students' buying decisions was statement one **"I consider myself open to new experiences",** with a mean of **4.48 (SD = 0.723).** Indicating that the respondent **strongly agrees** with this statement. Indicating that most of the students are open to trying new experiences, highlighting that they demonstrate a strong curiosity to trying different products.

4. **Effect of Buying Decision Based on Peers' Purchasing Choice**

The research findings reveal that the most influential factor in buying decisions related to peers' purchasing decisions is captured in statement four: **"I often purchase products based on my friends' recommendations."** This statement received the highest mean score of **3.85,** with a standard deviation of **0.976,** indicating a strong tendency among participants to make purchases influenced by their friends' suggestions. This highlights the importance of social influence in consumer behavior, suggesting that recommendations from peers play a crucial role in shaping purchasing decisions.

4.2 Conclusion

According to the gathered data through the summary of findings, this study signifies that openness to experience significantly affects the consumer behavior of grade 12 senior high school students at San Jose Academy. Therefore, the study accepted the **Null Hypothesis** that has been presented. However, it shows that age does not play a pivotal role in this study. Likewise, the findings suggest that students with higher levels of Openness to Experience are more likely to engage in diverse and innovative consumer behaviors.

Nevertheless, several conclusions can be drawn:

1. The findings reveal that regardless of age and gender, people demonstrate a similar level of engagement with new products, trends, and brands. Hence, students with higher Openness to Experience exhibit curiosity and willingness to explore diverse consumer options, making them more likely to engage with certain products.

2. This study emphasizes that **prior experience** with specific products significantly shapes consumer behavior among Grade 12 students at San Jose Academy. Students who have had positive experiences with certain products tend to show greater trust and confidence in making repeat purchases or trying new versions of those products. The **Openness to Experience** trait further amplifies this behavior, as students with a higher level of openness are more likely to explore new products within the same brand or category, driven by their past satisfaction.
3. Peer influence, combined with Openness to Experience, encourages students to explore new brands, products, and experiences, especially when recommended by their peers. Marketers seeking to target this demographic should consider leveraging social influence and peer recommendations in their advertising campaigns, as these factors significantly impact the purchasing decisions of students.

4.3 Recommendations

1. Additional Research: Continue researching additional personality traits like extraversion and conscientiousness. Examining these characteristics can give researchers a more comprehensive picture of how various characteristics influence students' purchasing decisions.

2. Educational Approach: Encourage teachers to develop teaching strategies that inspire students to be more curious and to have a wider range of interests. This could include projects or activities that connect students to various fields or experiences.

3. Mindful Consumption: Since social media has a significant influence on students, they need to be knowledgeable about the products they purchase. Organize seminars or workshops that teach students how to choose products based on their needs and long-term benefits, rather than just trends or peer influence.

5. Acknowledgement

The successful completion of this study has been rendered feasible due to important individuals who supported and mentored the researchers during the investigation. The following people deserve the researchers' sincere gratitude for broadening their perspectives and ideas during their research.

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Assessing the Influence of Verbal-Praises of Teachers towards ABM Senior High School students' Emotional Behavior at San Jose Academy

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This study delves into the influence of verbal-praises of teachers towards Senior High School students' emotional behavior, focusing on the compliments that came from teachers to help students focus on their tasks. Utilizing a quantitative research design, data was collected from students from ABM Strands in Senior High Students at San Jose Academy through surveys. Results indicate that students feel they do not often receive verbal-praises from the teachers, however verbal-praises does have an influence in a students' emotional behavior in terms of communication and self-esteem

1. Introduction

This chapter is about the background of the study, the objectives of this research, significance of the study, scope and delimitation of the study, conceptual framework, and definition of terms.

1.1 Background of the study

According to Aaron Sorenson (2020), compliments that came from teachers help students to focus on their task. The goal of verbal-praises is to encourage students to strive to do their best as well as help them focus on the given task. The use of verbal-praises will help students to develop a positive out-look in life and start a chain effect for that student to support other students. Verbal-praise from teachers is a powerful tool that can help students focus on their tasks, develop a positive outlook on life, and inspire them to support others. Thus consistently offering praise that is sincere, teachers can create an environment where students are motivated to do their best and where positive behaviors are reinforced and multiplied.

Emotional behavior of a student can heavily affect their motivation to learn something as well as their ability to tackle challenges. According to Amanda Morin (2024). The correct kind of praise can change a student's behavior as well as affect their attitudes about learning, students to be appreciated by their teachers. When students feel the support of teachers they are more likely to do their best on the task at hand. The emotional behavior of a student is deeply connected with their academic performance. By using the correct kind of praise and creating a supportive learning environment, teachers can help students develop the emotional well-being that is needed to tackle challenges in their educational journey.

According to Behavioral theorists, students are affected by environmental stimuli to which they are exposed to. (Feldman, 2012) B. F. Skinner called this phenomenon, "operant conditioning". This is a form of learning in which responses are strengthened or weakened by its association with positive or negative consequences. Therefore, a student is willing to work harder in school if he or she receives good grades. Students who are given motivational words and incentives to proceed with a specific task they are willing to do their best, using motivational words and incentives can give students a goal to strive for.

1.2 Statement of the Objectives

This study aims to investigate the Influence between the frequency and quality of verbal-praises received by ABM Senior High school students:

This study aims to answer the

following: Research Questions :

1. What is the Demographic Profile of the Respondents in Terms of :

1.1 Gender

1.2 Age

2. What are the verbal-praises that are commonly received by San Jose Academy Students'?

3. How does verbal-praises influence a ABM Senior High school Students' Emotional Behavior in terms of:

a. Communication
b. Self-Esteem

1.3 Significance of the Study

This study is significant because it examines the impact of teachers' verbal-praises on the emotional behavior of a Senior High School student, providing insights that could enhance educational practices and promote a more positive school environment. This study will benefit the following:

San Jose Academy - it will benefit from this research as this can implement more effective strategies to foster a more supportive learning school environment, leading to improved student well-being.

Teachers - Teachers will benefit from this study by gaining a knowledge of the role that verbal-praises play in a students' emotional behavior and this also helps improve student and teacher relationship.

Students - will benefit from this study by understanding how verbal praise can encourage and motivate students, educators can adopt more effective teaching strategies that enhance student engagement and academic performance. Additionally, this research provides insights into the psychological benefits of recognition and positive reinforcement, which can improve students' confidence, self-efficacy, and overall attitude toward learning.

Parents - Parents will be able to understand that verbal-praises can positively impact a child's emotional behavior and well-being. By understanding this, parents can encourage their child to do stuff that scares them by using verbal-praises.

Future Researchers - Data gathered from this research can benefit Future Researchers who are considering expanding or give their insights on this particular topic. This will serve as a reference for their research.

1.4 Scope and Delimitation

Our research aims to determine the influence of verbal praise from teachers on the emotional behavior of ABM Senior High school Students at San Jose Academy for the 2024-2025 academic year. Data collection will be conducted with five (32) randomly selected ABM Senior High school Students per each section. Every student will receive the same questionnaires, and they will be asked to voluntarily participate in the use of surveys, focusing specifically on their emotional responses to verbal praise received from their teachers.

This research has limitations as it specifically investigates the influence of verbal praise from teachers on ABM Senior High school Students' emotional behavior and its potential impact on academic quizzes at San Jose Academy. The study does not examine other factors that may affect academic outcomes. Due to the participant availability and privacy issues, participation may be limited. Despite these limitations, the study can still effectively demonstrate and present sufficient information. Additionally the way of gathering respondents, the researchers used the random sampling method.

1.5 Conceptual Framework

Dependent Variable	Independent Variable
Emotional Behavior >Communication >Self-Esteem	Verbal-Praises >A type of praise that is orally stated towards people.

The conceptual framework of this study seeks to understand the influence of verbal-praises of teachers on Senior High School students' emotional behavior at San Jose Academy. We seek to understand the relationship between the two variables and how one positively or negatively impacts the other. In some instances, teachers' praises have little to no effect on a student's emotional behavior; however, this is not always the case, especially as students reach the middle and later years of adolescence, wherein they are more prone to act and react based on their current emotions and feelings.

Based on the conceptual framework the following hypothesis were presented:

Alternative Hypothesis

Verbal-praises that come from teachers have an influence on a Senior High School students' emotional behavior.

Null Hypothesis

Verbal-praises that came from teachers have no influence on a Senior High School students' emotional behavior.

1.6 Definition of Terms

Praise - Expression of approval, commendation, or admiration.

Verbal-Praise - Expression of approval done through vocalization.

Emotional Behavior - The expression of feelings through actions, communicating an underlying, unmet need.

Well-Being - A contented state of being happy and healthy and prosperous.

Encourage - To inspire with hope, courage, or confidence.

Motivation - An internal state that propels individuals to engage in goal directed behavior

Self-Esteem - Pride in oneself

Confidence - Belief in the effectiveness of one's own abilities or in one's favorable acceptance by others

2. Review of Related Literature and Methodology

This chapter tackles Local and Foreign Literature that provides support to our research.

2.1 Review of Related Literature

The Science Teachers' Communication Behavior in Relation to Students' Attitude and Performance (Local Literature).

Good communication between teachers and students is important for creating a positive classroom environment and helping students succeed. When teachers communicate well, they can better understand students' needs and provide the right support. Both verbal and nonverbal communication play a key role in building relationships and improving learning. Positive communication helps strengthen these relationships, while poor communication can lead to misunderstandings. Looked at how science teachers' communication affects students' attitudes and performance. The study found that teachers were rated highly in different communication styles, like encouraging, praising, and nonverbal behaviors. Most students had a positive attitude toward science and performed well. However, only nonverbal and understanding communication behaviors had a strong impact on students' attitudes. The study suggests that teachers should focus on using friendly and supportive communication, encourage class participation, provide clear instructions, and give students problem-solving activities to help them learn better. It also recommends studying other factors, like students' personal traits and teachers' skills, to improve learning further. (ME Sierto, 2023)

Effectiveness of Verbal-Praise in Primary School Class (Foreign Literature).

Verbal praise in primary school settings can significantly influence student behavior, but its effects are often short-lived and emotional rather than lasting. When using verbal praise it is to reinforce behavior, teachers should highlight its potential to contribute to students' long-term development. The importance of exploring how praise affects discipline and self-motivation. Effective praise includes both affirmation of students' efforts and expectations for their future achievements. When feedback is positive and constructive, students are more likely to feel motivated and engaged in their academics. Zhang, Shiyuan; Du, Xinrong; et. al,. (2021).

Power of an effective Praise Foreign Literature).

The right kind of praise can significantly address behavioral challenges and improve student's' attitudes towards learning. When teachers express a deep appreciation for their students' efforts, it fosters a sense of validation and motivation. Students are more likely to strive for success when they feel that their teachers are proud of their achievements. This appreciation not only boosts their motivation but also reinforces a desire to engage more with their assignments and academics. As students experience this positive reinforcement, their emotional behavior tends to become more constructive. They are more willing to take on challenges, participate actively in class, and collaborate with peers. Amanda Morin. (2024).

Early Childhood Educators Use of Praise (Foreign Literature)

This study investigates the use and acceptability of praise among early childhood teachers, highlighting the importance of training in behavior management strategies. It reveals that although these teachers acknowledge the value of praise, they do not utilize it very often in practice, indicating a need for more focused training for the use of praises. The findings emphasize the necessity of equipping teachers with the skills to implement effective praises, which can enhance student behavior and reduce risks of school failure. (Flores. T F., Evans, M. D., Et. al., 2024).

Specific use of praise of Student Behavior (Foreign Literature).

Modifying general education teachers' verbal behaviors by reinforcing different statements that promoted specific praise over general praise. As a result, teachers increased their specific praise for student behaviors. Notably, changes started to become more apparent after the reinforcement intervention ended. Approaching students through the use of specific praises suggests that differentially reinforcing verbal behavior can be a more effective strategy for enhancing teacher behavior than direct instructions or targeting the behavior itself. Neef, N. A., Kranak, M., Shapiro, et. Al (2022).

2.2. Methodology

This section presents the research methods to gather and obtain data.

2.3 Research Design

The research will be focusing on the influence of verbal-praises to a students' mental health. This study will make use of the quantitative descriptive methodology to provide thorough interpretation of the data given. Using this type of approach will help explore the connection of verbal-praises to a student's emotional behavior

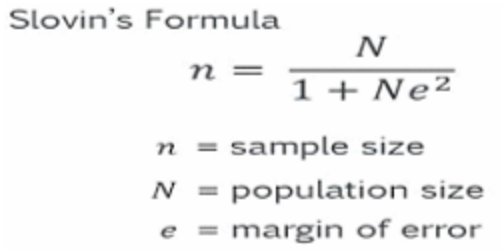
The data gathered from this research will be used to spread awareness of what are the influences of verbal-praises to students' mental behavior and how we should verbal-praise carefully as it might negatively impact a students' mental behavior.

To gather the data needed, the researchers will be asking for permission to the Teacher and Principal. This is to give the researchers the required step to begin our survey

2.4 Sample Population

San Jose Academy ABM Senior High school Students (Grade 11, 12) are the research's targeted group. To achieve the appropriate number of respondents, the researchers will use the slovin's formula to equally present all grade levels.

The calculation resulted in 128 ABM Senior High school Students at San Jose Academy, this is the number of students that is needed to complete this research study.



2.5 Research Instrument

The research instrument that the research used was a 4 point likert scale to measure respondents' opinions, attitudes, and more. Likert scale is a response method where respondents can easily answer questions in five levels of agreement. By allowing respondents to answer questions on their own time and in a private setting, likert scale offers an effective and reliable means of collecting valuable insights and information from diverse students in ABM Senior High school from San Jose Academy.

The sampling method used is survey, more specifically the likert scale. The respondents will be given a fifteen (15) items questionnaire that focuses on their experiences of being verbally praised and how it influenced their Emotional Behavior

2.6 Method of Data Analysis

The researchers will make use of descriptive analysis to know the influence of verbal-praises towards Emotional Behavior. The data will be based around the rating scale of 1-4. Descriptive Statistics will be used to gain the average rating of verbal-praises towards mental behavior. To measure the influence of verbal-praises towards mental behavior. The degree levels of verbal-praises in a students' emotional behavior and how it will affect them in terms of Self-Esteem and Communication. Once the data from the survey is gathered, the

researchers will interpret the data gathered through the use of Jamovi Descriptive Analysis.

POINT	SCALE	INTERPRETATION
4	3.01 - 4.00	Strongly Agree
3	2.01 - 3.00	Agree
2	1.01 - 2.00	Disagree
1	0.01 - 1.00	Strongly Disagree

3. Results and Discussion

This chapter presents the aftermath of the data gathered from all 128 respondents, with the table of results.

3.1GENDER

Frequencies of Gender

Gender	Counts	% of Total	Cumulative %
F	83	64.8 %	64.8 %
M	45	35.2 %	100.0 %

The table shows that 64.8% of the respondents are female (83 individuals), while 35.2% are male (45 individuals). This indicates a higher participation rate among female respondents.

3.2 AGE

Frequencies of Age

Age	Counts	% of Total	Cumulative %
16	45	35.2 %	35.2 %
17	55	43.0 %	78.1 %
18	26	20.3 %	98.4 %
19	1	0.8 %	99.2 %
20	1	0.8 %	100.0 %

In this table, most of the respondents are 17 years old (43.0%), followed by 16-year-olds (35.2%) and 18-year-olds (20.3%). Only a few are 19 and 20 years old, both at (0.8%). This shows that the survey mostly includes younger senior high school students.

3.3 COMMON VERBAL-PRAISE

VP1 refers to praise for their skills and talents, VP2 means compliments on their work, VP3 translates to recognition of their efforts, and VP4 is other forms of verbal-praise.

Frequencies of Common verbal praise

Common verbal praise	Counts	% of Total	Cumulative %
VP1	44	26.7 %	26.7 %
VP2	52	31.5 %	58.2 %
VP3	44	26.7 %	84.8 %
VP4	25	15.2 %	100.0 %

The table shows that most respondents liked getting compliments on their work (31.5%), followed by praise for their skills and talent and recognition of their efforts (both 26.7%). This means students react well to both praise. Other types of praise are less significant (15.2%), showing that students prefer specific praise related to their achievements.

3.4 Consistency of Students' receiving Verbal-Praise

Descriptives

	Mean	SD
Q1	2.87	0.77

This table presents the Average/Mean of the answers of the respondents in the context of their consistency of being verbally-praised by their subject advisers, wherein the respondents "Disagree" that they often receive verbal-praises from their subject advisers by having a Mean value above 2.00 but below 3.00. Additionally, the Standard deviation of the question is 0.77.

3.5 Communication

Descriptives

	Mean	SD
Q3	3.19	0.73
Q4	3.15	0.68
Q8	3.48	0.65
Q11	3.04	0.76
Ave. of Communication	3.21	0.53

This table indicates the Average/Mean of the answers of the respondents which, most of the questions having a Mean value above 3.00, meaning that most of our respondents "Agree" that Verbal-praise affects a students' ability to communicate better with other people. Additionally, the average Standard deviation of

the questions relating to a students ability to communicate comes out to be 0.53.

3.6 Self-Esteem

Descriptives

	Mean	SD
Q2	3.40	0.691
Q5	3.23	0.701
Q6	3.27	0.598
Q7	3.40	0.725
Q9	3.12	0.706
Q10	3.25	0.664
Q12	3.13	0.714
Q13	3.23	0.693
Q14	3.13	0.714
Q15	3.12	0.717
Ave. Of Self-Esteem	3.20	0.480

This table indicates the Average/Mean of the answers of the respondents which, most of the questions having a Mean value above 3.00, meaning that most of our respondents “Agree” that Verbal-praise affects a students’ self-esteem. Additionally, the average Standard deviation of the questions relating to a students ability to communicate comes out to be 0.480.

4. Summary of Findings, Conclusion, and Recommendations

This chapter presents the conclusion and summary of the research.

4.1. Summary of findings

Here is the summary of all the data that we have gathered from the surveys: Summary of findings Here is the summary of all the data that we have gathered from the surveys:

Demographic Profile

Summary of characteristics of the respondents age and gender:

- Gender, 64.8% of our respondents' identify their gender as female, while the other 35.2% identify themselves as males.

- Age, the age bracket of our respondents were between ages 17 up to 20 years old, with 43% of our respondents being 17 years old, 35.2% of our respondents being 16 years old, 20.3% of our respondents being 18 years old, and a few are at the age of 19 years old or 20 years old with both having a percentage of 0.8%.

Common Verbal-Praise

Verbal-praises that teachers throw out towards students who are doing/did a great job.

- The most common verbal-praise that students receive from their teachers with 32% students' receive compliments about their work, followed by praising their skills and talents, as well as recognition for their efforts, and students also receive other forms of verbal-praises that we did not account for.

Consistency of Students' receiving Verbal-Praise

- Most of our respondents rarely receive Verbal-praise from their subject advisers.

Verbal-Praise influencing:

A. **Communication**
   - Most of the respondents Agreed on that Verbal-Praise influences a students ability to communicate with other people.

B. **Self-Esteem**
   - Most of the respondents Agreed on the basis of Verbal-Praise influencing a students' self-esteem.

4.2. Conclusion

Our research highlights the significant influence of verbal-praise on students' emotional behavior. The findings indicate that students respond most positively to compliments on their work, as well as praise for their skills, talent, and efforts. This suggests that specific and achievement-related praise is more influential than general praise.

Additionally, the data revealed that verbal-praise positively affects students' communication skills, as most respondents agree that it helps them interact better with others. Similarly, verbal-praise contributes to students' self-esteem, reinforcing its role in emotional behavior. With the mean values above 3.00 and a relatively low standard deviation, the results suggest a consistency of agreement among respondents regarding the influence of verbal-praise on students' emotional behavior.

However, the findings also indicate that students feel they do not often receive verbal praise from their subject advisers. The mean value for this aspect falls between 2.00 and 3.00, suggesting that respondents generally disagree with the idea that they frequently receive

verbal-praises from their subject advisers. Additionally, the standard deviation of 0.77 reflects some variation in responses, indicating that while some students may experience regular verbal praise, others do not. This suggests a need for educators to incorporate more consistent verbal praise to enhance students' emotional development. In conclusion our hypothesis comes out to be Verbal-praises that come from teachers have an influence on a Senior High School students' emotional behavior.

4.3 Recommendation

- Exploring the side of non-verbal praise affecting emotional behavior.
- Using a pre-test and a post-test style of data gathering analysis.
- Exploring other parts of emotional behavior, such as body language, satisfaction, efficiency,...etc.
- Find individuals who are often verbally-praised by teachers .
- Verbal-praises that students' receive but from the teacher's perspective.
- Expanding this research to be more informative.

5. Acknowledgement

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6. References

This Chapter presents all the Review of Related Literature used throughout the research, that served as supporting points and a guidance.

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The Impact of Study Time on Academic Requirements Among Senior High School Accountancy, Business, and Management Students at San Jose Academy

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Abstract: This study investigates the impact of study time on the completion of academic requirements among senior high school ABM students at San Jose Academy. It aims to determine whether a significant relationship exists between study time and completion of academic requirements. Using a quantitative-correlational design, data were collected using a random sampling method from 128 Grade 11 and 12 ABM students through a structured survey. Statistical analysis using Jamovi revealed that most students spent less than five hours studying during and after class hours. Correlation matrix showed a weak positive correlation between study time and completion of academic requirements, but the relationship was not statistically significant. This suggests that factors such as study habits, time management, and external support may influence academic success more than the duration of study time. The findings led to the rejection of the alternative hypothesis, confirming the null hypothesis that no significant relationship exists between study time and completion of academic requirements. Recommendations include improving study strategies, enhancing time management skills, and fostering a supportive academic environment for ABM students.

Key Words: Accountancy Business, and Management (ABM) Strand; Study Time; and Academic Requirements

1. INTRODUCTION

This chapter presents the introduction of the paper, and it includes the background of the study, statement of the problem, significance of the study, scope and delimitation, conceptual framework, and definition of terms.

1.1 Background of the Study

San Jose Academy is recognized for its demanding academic programs and high standards in the fields of accountancy, business, and management (ABM). Additionally, the institution is renowned for its commitment to providing exceptional education and preparing students with the essential skills to prepare them for the professional world. Briant (2020) states that students are required to meet the academic requirements established by the school to support their development and success in their chosen disciplines.

In recent years, concerns have arisen regarding senior high school students in the accountancy, business, and management (ABM) track, specifically their ability to meet academic requirements. Reports indicate that some students struggle to complete their academic requirements, potentially due to the amount of time they dedicate to studying. According to Tetteh (2017), there is a positive correlation between study time and academic success, with students who spend more time on academic work tending to meet requirements more consistently. Given the increasing demands of the ABM curriculum, it is important to explore how effectively students allocate their study time to manage academic requirements alongside other responsibilities.

With the growing importance of producing competent and properly trained graduates in the business world, there is a keen need to understand how study time relates to the completion of academic requirements. (Razali et al., 2018).

The academic requirement, on the other hand, according to the University of Wisconsin, refers to the various activities, projects, assessments, and examinations that the students have to undertake to prove that they have understood and mastered the subjects that they enrolled in. In the context of senior high school education, specifically in the Accountancy, Business, and Management (ABM) strand, it is a set of pre-requirements to consider in order to help the students develop skills in the areas of analysis, management, and problem-solving. Moreover, academic requirements can range from written assignments and reports to oral presentations, projects, quizzes, and major examinations (Measuring Student Learning | Center for Teaching Innovation, n.d.).

This research investigates the length of time devoted to study and its effect on the students' ability to achieve the academic requirements set by the San Jose Academy. In this regard, the study strives to provide

relevant input that could help develop plans and strategies for developing optimal study time and also, in the process, help ensure the success of ABM students both academically and professionally.

1.2 Statement of the Problem

This study aims to examine the impact of study time on the completion of academic requirements of senior high school students in the Accountancy, Business, and Management (ABM) strand at San Jose Academy. Despite the demanding curriculum and high academic standards of the institution, some students struggle to meet academic requirements effectively, raising concerns about whether the amount of time dedicated to studying is sufficient.

The present study seeks to answer the following inquiries:

1. What is the demographic profile of the respondents in terms of:
   1.1. Age
   1.2 Gender
   1.3 Grade level
2. What is the highest percentage of study time dedicated by senior high school ABM students at San Jose Academy during regular class hours and after class hours?
3. Is there a significant correlation between the amount of study time and the successful completion of academic requirements?
4. How does study time impact the ability of ABM students to complete specific academic requirements, such as:
   4.1 Assignments/Projects
5. What strategies can be recommended to optimize study time for ABM students to enhance the completion of their academic requirements at San Jose Academy?

1.3 Significance of the Study

This study is significant for several stakeholders, including students, educators, and administrators at San Jose Academy.

Students, the findings of this study will therefore help the ABM students realize the importance of effective time management in their school life. By determining the length of time to study that best suits their academic needs, it is expected that they can develop better study habits, which in turn will lead to improved management of academic requirements.

Educators can use the insights gained from this study to tailor their teaching strategies and offer guidance on effective study techniques. Understanding the impact of study time on students' completion of academic requirements can also help educators identify students who may need additional support or resources.

Administrators, the outcomes of this study can potentially steer policy decisions regarding curriculum development, workloads, and student support services. The findings can be used by education managers to create an environment that is supportive of academic success yet allows students to balance their studies with other aspects of their lives.

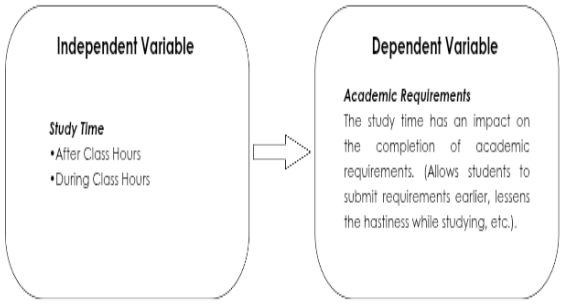
Future researchers, this study seeks to develop the existing body of literature on the relationship between the length of study time and completion of academic requirements, particularly among Senior High School students in the ABM strand. It is also expected that this research could serve as a foundational reference for future studies in this area, which may lead to further investigation and verification of the findings.

1.4 Scope and Delimitation

The present study investigates whether the study time affects the completion of academic requirements of students in the Accountancy, Business, and Management strand of the class in San Jose Academy, Senior High School. Specifically, it investigates how various lengths of time utilized for studying both within and outside the classroom impact the capability of these students to meet their different academic requirements. The study techniques or methods will not be included in the analysis to keep the focus on study time only. Moreover, a random sampling method will be utilized to gather data from the respondents. Consequently, all the respondents will be equally divided per section. The sections are as follows: 12 - St. Peter Faber, 12 - St. Bernardine, 11 - St. Matthew, 11 - Jude.

Furthermore, the teaching methods, curriculum contents, and external influences like family support, peer influence, etc. will be excluded. It is only included in the study of the senior high school students in the ABM strand at San Jose Academy, thus making other strands and grade levels ignored.

1.5 Conceptual Framework



The conceptual framework highlights the relationship between study time and the completion of academic requirements among ABM students. Study time is divided into regular class hours and after-class hours, while academic requirements include assignments and projects. Data will be collected through surveys, then analyzed to explore how different study time allocations impact academic performance. The study aims to provide recommendations for optimizing study time to improve the completion of academic requirements.

Alternative Hypothesis

- There is a significant relationship between study time and the completion of academic requirements of senior high school ABM students at San Jose Academy.

Null Hypothesis

- There is no significant relationship between study time and the completion of academic requirements of senior high school ABM students at San Jose Academy.

2. REVIEW OF RELATED LITERATURES AND METHODOLOGY

This chapter presents the twenty-one (21) related literature that aims to solidify the research, as well as the research design, research instrument, sample population, and method of data analysis.

2.1 Review of Related Literatures

Foreign

Tetteh (2017) found a positive correlation between study time and academic success, with students who allocate more time to their studies often performing better. Razali et al. (2018) further explored how academic workload influences study time, noting that as demands increase, students struggle to find sufficient time, negatively affecting their performance. Crowther and Briant (2020) emphasized the importance of self-discipline in managing study hours, while Nguyen (2019) highlighted the difficulty of balancing heavy academic loads in demanding programs like the ABM strand, leading to insufficient study time and academic challenges. Turner and Jackson (2017) similarly reported that efficient time management practices enable high-achieving students to balance study with other academic tasks. Harris and Scott (2019) examined how school policies impact study time, finding that flexible schedules and balanced workloads improve students' ability to manage study hours effectively. Alvaro and Greene (2017) explored gender differences in study time, concluding that female students often dedicate more time to their studies, although time management remains critical for all. Garcia and Mendoza (2021) analyzed the fragmentation of study time due to academic load, while Jensen (2018) confirmed that increased study time directly correlates with better performance, particularly in complex courses like those in the ABM strand. Martin and Lewis (2020) found that closely scheduled exams prompt cramming, leading to lower performance, whereas well-managed study time over longer periods yields better results. Roberts (2020) echoed the importance of strategic time allocation in meeting academic requirements. Kim and Lee (2019) discussed how the school environment, such as access to quiet spaces, influences the consistency of study habits and overall outcomes.

Local

Torres and Mendoza (2020) investigated the relationship between time management and academic achievement in public schools in Quezon City, finding that students who effectively divided their time between academic requirements and extracurricular activities consistently achieved higher grades. The study advocates for the integration of time management training in the school curriculum to improve student outcomes. This study highlights the importance of time management in academic success, showing that students who balance academic and extracurricular activities tend to achieve better grades. It supports the research by emphasizing how effective time management can positively influence students' ability to meet academic requirements and improve overall performance.

Foreign

Academic requirements, as defined by the University of Wisconsin (n.d.), assess mastery and skill development, especially in the ABM strand. Smith and Johnson (2021) said that these requirements are crucial indicators of student learning and readiness for future careers. However, Thompson et al. (2019) identified that they can be both beneficial and stressful, with time management and resource access being key challenges. Brown and Kim (2018) emphasized the academic requirements foster critical thinking and communication skills, which are essential for ABM students' success. Lee (2020) found that well-structured requirements boost student engagement, and Williams and Carter (2019) stressed that clear guidance helps manage these requirements effectively. Jenkins (2018) highlighted that successful completion of academic requirements predicts overall success, and positive perceptions of tasks improve completion rates and outcomes. This review of related literature underscores the significance of academic requirements in the ABM strand, emphasizing the role of time management, resources, and clear guidance in successfully meeting these demands. It directly supports the study by highlighting how study time influences students' ability to manage and complete academic tasks effectively.

Local

Villanueva and Cruz (2021) examined how students in senior high schools across the Philippines perceive academic requirements and found that students who view these requirements as opportunities for learning, rather than mere obligations, tend to complete them more effectively, leading to better academic outcomes. The study highlights the importance of setting clear and motivating academic goals for students. Similarly, Garcia (2017) explored the academic pressures faced by ABM students in private high schools in Metro Manila and discovered that many students feel overwhelmed by the volume of academic

requirements, which hampers their ability to allocate sufficient study time. The study concluded that better guidance from teachers and a more balanced academic load could enhance student performance. This review of related literature highlights how students' perceptions of academic requirements impact their ability to complete tasks effectively. It supports the study by emphasizing the role of clear goals and guidance in managing academic pressures, particularly in helping students allocate sufficient study time and improve performance.

2.2. Research Design

This study uses a quantitative-correlation research design to seek and comprehend the connection between study time and the completion of academic requirements among senior high school accounting, business, and management (ABM) students at San Jose Academy. The aim of this research is to investigate how study time impacts the completion of academic requirements for ABM students. Researchers will analyze if there is a positive, negative, or no correlation between the variables by gathering data on both of them.

This will be identified if the data that will be collected in the future leads to more study time leading to better academic results, if less study time results in poorer performance, or if there is no apparent connection between the two.

2.3. Research Instrument

The primary research instrument is a survey questionnaire consisting of twelve (12) questions, specifically developed to gather data on study habits, time management, and academic performance among ABM students. The questions cover aspects like study duration, completion rates of assignments and projects, perceived difficulty of academic requirements, and students' time management challenges. Additionally, Likert-scale is utilized to determine the level of agreement or disagreement of the respondents to the statements. An informed consent form is also included, ensuring compliance with the Data Privacy Act (RA 10173) and obtaining participants' voluntary participation.

2.4 Sample Population

The sample consists of Grade 11 and 12 students enrolled in the ABM strand at San Jose Academy. Out of a total population of 189 students, a sample size of 128 was determined using Slovin's formula with a 5% margin of error, ensuring a representative sample that reflects the characteristics of the target population. These 128 respondents will be divided into four (4) total sections, which will result in thirty-two (32) respondents per section.

Slovin's Formula

$$n = \frac{N}{1 + Ne^2}$$

n = sample size
N = population size
e = margin of error

2.5. Method of Data Analysis

Data collected through the survey questionnaires was analyzed using descriptive statistics, correlational matrix, and frequencies to summarize respondents' demographic information and study habits. Additionally, Jamovi was utilized to examine the relationship between study time and the completion of academic requirements. Results were interpreted to determine whether a significant relationship exists and to suggest strategies for optimizing study time among ABM students at San Jose Academy.

POINT	SCALE	INTERPRETATION
4	3.01 - 4.00	Strongly Agree
3	2.01 - 3.00	Agree
2	1.01 - 2.00	Disagree
1	0.01 - 1.00	Strongly Disagree

CHAPTER 3: RESULTS AND DISCUSSIONS

This chapter presents the findings of the research. The results are as follows:

3.1 : *Demographic Profile*

Frequencies of age

age	Counts	% of Total	Cumulative %
16	43	33.6%	33.6%
17	54	42.2%	75.8%
18	30	23.4%	99.2%
19	1	0.8%	100.0%

The frequency analysis indicates that the majority of respondents are 17 years old (42.2%), followed by 16-year-olds (33.6%), 18-year-olds (23.4%), and 19-year-olds (0.8%). Most respondents (99.2%) are between 16 and 18 years old.

Frequencies of Gender

Gender	Counts	% of Total	Cumulative %
F	84	65.6%	65.6%
M	41	32.0%	97.7%
P	3	2.3%	100.0%

The table shows that the majority were female (65.6%), while 32% were male, and 2.3% preferred not to disclose their gender.

Frequencies of Grade Level

Grade Level	Counts	% of Total	Cumulative %
11	64	50.0%	50.0%
12	64	50.0%	100.0%

The frequency analysis shows that the respondents are evenly split between Grade 11 and Grade 12, each comprising 50% of the total.

3.2 What is the percentage study time of students during and after class hours?

Frequencies of during class hours

#of hours during class hours	Counts	% of Total	Cumulative %
11-15 hours	11	8.6%	8.6%
16-20 hours	2	1.6%	10.2%
5-10 hours	53	41.4%	51.6%
less than 5 hours	59	46.1%	97.7%
more than 20	3	2.3%	100.0%

The table reported 46.1% of students studying for less than 5 hours, 41.4% studied between 5-10 hours, while only 2.3% exceeded 20 hours of study.

Frequencies of after class hours

after class hours	Counts	% of Total	Cumulative %
11-15 hours	2	1.6%	1.6%
16-20 hours	2	1.6%	3.1%
5-10 hours	23	18.0%	21.1%
less than 1 hour	2	1.6%	22.7%
less than 5 hours	97	75.8%	98.4%
more than 20	2	1.6%	100.0%

This table shows a significant 75.8% of respondents studied for less than 5 hours, highlighting limited study time spent on after classes.

3.3 Correlation Between Study Time and Completion of Academic Requirements

Correlation Matrix

		completion of AR	#of hours during class
completion of AR	Spearman's rho	—	
	df	—	
	p-value	—	
#of hours during class	Spearman's rho	0.051	—
	df	126	—
	p-value	0.569	—

Completion of academic requirements and the amount of hours during class were moderately positively correlated, r(128) =.051, and were not significant (p =.569).

Correlation Matrix

		completion of AR	after class
completion of AR	Spearman's rho	—	
	df	—	
	p-value	—	
after class	Spearman's rho	0.147	—
	df	126	—
	p-value	0.098	—

Completion of academic requirements and the amount of hours after class hours were weakly positively correlated, r(128) =.147, and were not significant (p =.098).

These findings suggest that study time, whether during or after class, has little direct impact on the ability of students to meet their academic requirements. This could imply that factors beyond study time, such as study methods or external support, play a significant role.

Descriptives

	The time I allocate for studying is enough to complete my academic requirements.
N	128
Mean	2.88
Standard deviation	0.671

The table shows that the mean response is **2.88**, indicating that the respondents generally **disagree**. Therefore, there is a need for the respondents to increase their study time to accomplish their academic requirements.

3.4 Impact of Study Time on Assignments and Projects

Correlation Matrix

		#of hours during class	I always complete assignment on time
#of hours during class	Spearman's rho	—	
	df	—	
	p-value	—	
I always complete assignment on time	Spearman's rho	0.125	—
	df	126	—
	p-value	0.161	—

Statement 1 "**I always complete assignments on time**", and the number of hours during class hours were weakly positively correlated or had no relationship, r(128) = .125, and were not significant (p =.161).

Correlation Matrix

		#of hours after class	I always complete assignment on time
#of hours after class	Spearman's rho	—	0.023
	df	—	126
	p-value	—	0.793
I always complete assignment on time	Spearman's rho		—
	df		—
	p-value		—

Statement 1 "**I always complete assignments on time"**, and the number of hours after class had no relationship, r(128) = .023, and were not significant (p =.793).

Correlation Matrix

		#of hours during class	I always submit projects before the deadline
#of horus during class	Spearman's rho	—	
	df	—	
	p-value	—	
I always submit projects before the deadline	Spearman's rho	0.152	—
	df	126	—
	p-value	0.087	—

Statement 2 "**I always submit projects before the deadline"**, and the number of hours during class hours were weakly positively correlated or had no relationship, r(128) = .152, and were not significant (p =.087).

Correlation Matrix

		#of hours after class	I always submit projects before the deadline
#of hours after class	Spearman's rho	—	
	df	—	
	p-value	—	
I always submit projects before deadline	Spearman's rho	0.046	—
	df	126	—
	p-value	0.603	—

Statement 2 "**I always submit projects before the deadline "**, and the number of hours after class hours were weakly positively correlated or had no relationship, r(128) = .046, and were not significant (p =.603).

Therefore, No significant correlation was found between study time (during or after class) and the timely completion of assignments. Similar weak correlations suggest that study time does not reliably predict students' ability to submit projects before deadlines.

3.5 Strategies to Optimize Study Time to Complete Academic Requirements

Descriptives

	N	Mean	SD
(S7) I find it easier to focus on studying during weekends compared to weekdays.	128	2.47	0.832
(S8) I always review my notes or study materials after class.	128	3.54	0.639
(S9) Studying in a quiet environment helps me complete academic	128	2.72	0.832

requirements more efficiently.			
(S10) I prioritize studying for exams over completing assignments.	128	2.58	0.977

The respondents strongly agree that they review their study materials after class (mean = 3.54). They agree that studying in a quiet environment helps them complete academic requirements more efficiently (mean = 2.72) and that they prioritize studying for exams over completing assignments (mean = 2.58). However, they also agree, though to a lesser extent, that it is easier to focus on studying during weekends than on weekdays (mean = 2.47).

CHAPTER 4: SUMMARY OF FINDINGS, RECOMMENDATIONS, AND CONCLUSION

This chapter presents the summary of findings, conclusions drawn from the results, and recommendations based on the study's outcomes.

5.1 Summary of Findings

This study examined the impact of study time on the completion of academic requirements among senior high school ABM students at San Jose Academy. The key findings are summarized as follows:

1. The findings revealed that students dedicate varying amounts of time to their studies, with most respondents allocated only less than 5 hours during and after class; however, study time alone was found to have no significant impact on the completion of academic requirements.
2. The weak correlation of study time and completion of academic requirements suggests that other factors, such as effective study habits, learning environment, and external motivation, might play more pivotal roles in students' academic success. This result aligns with findings from Garcia (2022), who emphasized the role of self-discipline and motivation in academic achievement beyond mere study hours.
3. Although the respondents generally perceive that their allotted study time is insufficient to meet academic requirements, the data shows no significant relationship between study time and academic performance. This suggests that factors such as study quality, time management, or external motivation might play a more crucial role.
4. The respondents generally agree that reviewing their notes or study materials after class (M = 3.54) helps them complete academic requirements more efficiently, as indicated by the "Strongly Agree" interpretation on the scale. Similarly, they tend to agree (M = 2.47) that focusing on studying during weekends is easier compared to weekdays. Moreover, studying in a quiet environment received an "Agree" rating (M = 2.72), showing moderate effectiveness in helping them meet academic deadlines. Additionally, prioritizing studying for exams over completing assignments (M = 2.58) also falls within the "Agree" range but indicates a slight struggle to balance both tasks effectively.

5.2 Recommendations

1. **Develop better time management strategies.** Create personalized study schedules, balancing both academic responsibilities and personal life. Prioritize tasks based on deadlines and difficulty levels, ensuring that enough time is allocated for complex assignments and projects. Engage in study groups or peer-learning sessions to enhance productivity and share effective study habits. Lastly, review the study materials or notes to complete the academic requirements faster and effectively.
2. **Set specific, measurable, achievable, relevant, and time-bound (SMART) goals for their study habits**. Provide clear instructions and manageable deadlines for assignments and projects to help students plan their study time effectively.
3. **Develop and improve school policies**. Promote balanced workloads and avoid overburdening students with overlapping deadlines. Implement support systems, such as academic counseling, to help students struggling with time management.
4. **Explore additional factors that might influence academic performance.** Such as teaching strategies, extracurricular involvement, or socio-economic background. Conduct longitudinal studies to assess the long-term effects of study time on academic success.
5. **Gap for Future Research.** A notable gap revealed by this study is the contrast between students' perceptions and the actual data. While respondents feel that their study time is insufficient, statistical findings suggest otherwise. Future researchers should investigate the underlying reasons for this disconnect, such as the influence of personal

motivation, stress levels, or external pressures. Additionally, longitudinal research could provide insights into how these perceptions evolve over time and their impact on long-term academic outcomes, as emphasized by Delgado (2023).

6. **For Enrichment of Research Paper.** To enhance the depth and scope of the study, future research should incorporate qualitative methods, such as interviews or focus group discussions, to gain deeper insights into students' study habits and perceptions. Expanding the sample size and including other academic strands beyond ABM can provide a more comprehensive understanding of how study time influences academic performance across different contexts. Additionally, analyzing the role of external factors like family support, access to learning resources, and mental health could offer a more holistic view of academic success determinants.

5.3 Conclusion

This study explored the impact of study time on the completion of academic requirements among senior high school ABM students at San Jose Academy. The conclusions are as follows:

1. Students generally dedicate less than 5 hours to studying both during and after class hours, highlighting insufficient time management practices.
2. Although study time had a weak to moderate positive correlation with academic performance, it was not a significant predictor of assignment and project completion.
3. While students perceived their study time as insufficient, the results indicated that the actual impact of study time on completing academic requirements was minimal. This finding aligns with Mendoza's (2021) study, which emphasized that the quality of study habits outweighs the quantity of hours spent studying.
4. Lastly, reviewing the notes or study materials often help in completing the academic requirements much faster.

In conclusion, the study rejects the alternative hypothesis and confirms the null hypothesis—there is no significant relationship between study time and the completion of academic requirements among the respondents. Other factors—such as effective study strategies, external support, and school resources—are likely more critical. A holistic approach to academic support is recommended.

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Career Aspirations vs. Peer Influence: A Comparative Analysis of Accountancy, Business, and Management Students' Strand Choice at San Jose Academy

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Abstract: This study aims to investigate whether the Accountancy, Business, and Management (ABM) students at San Jose Academy select their strand based on career aspirations or peer influence. Career aspirations are defined as students choosing the ABM strand because it aligns with their dream careers, while peer influence is characterized by students selecting the strand due to peer pressure and the influence of their social circles. This study examines which factor has the most significant impact on students and how the results can guide them in their educational journey, both in the present and future. The researchers present a deeper understanding of the topic, along with relevant suggestions and recommendations. This descriptive quantitative study explores numerical data gathered from questionnaires distributed to a sample population. The findings indicate that career aspirations have a stronger impact on students than peer influence, reflecting that most students are guided correctly. The results showed that the difference between the two factors' impacts is significant, with students' decisions being greatly influenced by their career aspirations. The majority of students believe that the ABM strand will provide them with the skills needed for their future careers and will bring greater personal satisfaction. However, peer influence still cannot be overlooked, as some students feel more motivated when collaborating with friends, although this choice might affect their future satisfaction. Recognizing the significance of both factors underscores the need for balanced support and guidance in students' decision-making processes to avoid implications for their future. Overall, the results highlight the importance of acknowledging both factors in students' decision-making to make their educational journey more enjoyable and impactful.

Key Words: ABM students; Career Aspirations; Peer influence; Impact; Decision-making

1. INTRODUCTION

This chapter describes in detail the background of the study, statement of the problem, hypothesis, significance of the study, scope and delimitation, definition of terms and the conceptual framework of the study.

1.1 Background of the Study

As students had completed their last year of Junior High School, they went through a tough decision of choosing the right academic strand they would pursue at the Senior High School (SHS) level. This decision was a critical part of the incoming SHS students' lives as these academic strands will help them narrow down the potential college and career paths they would take (Mapua College, 2021). Making the right choice was essential as it will affect their performance not just in SHS life, but beyond it as well. With this, it was important for students to know their own capabilities and understand the things they were passionate about and were willing to pursue in order to make a well-informed choice.

In the context of choosing the Accountancy, Business, and Management (ABM) academic strand, students had to be equipped with knowledge and skills related to business, finance, and entrepreneurship. Students also opted to choose the ABM strand due to their genuine interest in business-related fields such as careers like accountants, managers, or entrepreneurs.

However, despite knowing the importance of choosing the right academic strand like choosing ABM, others still struggled in making informed choices. Some students experienced shifting strands in the middle of the semester, while others enrolled in college courses that were not related to their chosen

track or their ideal dream career. These results were due to the limited understanding of the motivations behind the process of choosing between available academic strands.

According to Quintos et. al, (2022), peer pressure ranked among the most common reasons given by students for not selecting a college course that fit their strand when it came to choosing the appropriate course. Moreover, according to the study of Moneba and Malbas (December, 2019), peer pressure played a significant role in the track preference of Grade 10 students. With that, it was highly possible that the students' chosen strand resulted from "peer influence," or the influence of their classmates.

According to Harappa (2020), peer influence referred to the effects that friends or social groups might have on an individual's choices, attitudes, or behaviors. This influence, which encouraged behavior in line with the group's expectations or norms, could be either positive or negative. Teenagers often formed strong attachments to their friends, leading them to align their decisions with those of their peers. Due to that, students may have chosen an academic strand that did not align with their career aspirations and enhanced skills and talents, potentially affecting their future opportunities, productivity, and happiness with their job. "Career aspirations" referred to a person's long-term professional objectives and aspirations, which included the desired accomplishments and personal progress they wanted during their path, according to the article from Together Team (2023). Peer pressure, on the other hand, was defined as the influence from friends of one group (Harappa, 2020).

This study aimed to investigate whether students selected the Accountancy, Business, and Management (ABM) strand based on personal career aspirations or due to peer influence. The research focused exclusively on students from the ABM strand at San Jose Academy. Understanding the motivations behind students' choices would help determine the proportion of students who chose the ABM strand based on career aspirations versus peer influence.

The findings of this research study would provide insights into the motivations behind students' academic decisions, helping to create awareness among students, parents, and educational institutions about the role and impact of these motivations. More importantly, this study aimed to contribute to the development of more informed and supportive educational guidance practices.

1.2 Statement of the Problem

This study aims to investigate whether the students are selecting the ABM strand due to career aspirations rather than peer influence. The study addresses the following questions:

1. What is the demographic profile of the respondents in terms of:

1.1 Age
1.2 Sex
1.3 Grade Level and Section

2. What are the primary career aspirations of Accountancy, Business, and Management (ABM) students at San Jose Academy?
3. What is the most significant choice of the ABM strand among students?

a) career aspirations
b) peer influence

4. Is there a significant difference between the impact of career aspirations and peer influence on the choice of ABM students?

1.3 Hypothesis

Null Hypothesis (H0): There is no significant difference between the number of ABM students who chose their strand due to career aspirations and those who chose it due to peer influence. Therefore, the majority of college course choices that students make are not significantly influenced by either career aspirations or peer influence.

Alternative Hypothesis (H1): There is a significant difference between the number of ABM students who chose their strand due to career aspirations and those who chose it due to peer influence. Therefore, the majority of college course choices that students make are significantly influenced either by career aspirations or peer influence.

The study tests the null hypothesis that there is no significant difference between the number of ABM students who chose their strand due to career aspirations and those who chose it due to peer influence. Once results support this hypothesis, this means that the majority of college course choices that students make are not significantly influenced by either career aspirations or peer influence. However, the data reveals that the results do not support the null hypothesis. Instead, the findings align more closely with the alternative hypothesis, which posits

that there is a significant difference between the number of ABM students who chose their strand due to career aspirations and those who chose it due to peer influence. Therefore, the majority of college course choices that students make are significantly influenced by either career aspirations or peer influence.

1.4 Significance of the study

This study will be beneficial to the following.

Students. For them to be aware of the possible influences in choosing their academic path that will help them make informed choices.

Parents. To raise awareness among parents about the impact of peer influence on students' decisions. This will help them better assist and guide students to make informed choices.

Teachers. By understanding the factors influencing students' choices, educators can tailor their guidance programs to better support students in making choices.

San Jose Academy. For them to use as a basis in improving their system of enrolling and education. Properly giving awareness to students of the importance of making wise and informed decisions in choosing the right strand.

Government/Agencies/Organizations. For them to use as a guide in creating policies that will target the development of current educational programs to address the specific needs and challenges faced by students.

Future Researchers. For them to use the findings of this study as a reference to further understand the motivations behind ABM student strand choice and develop a way to help students address the challenges faced in making informed choice.

1.5 Scope and Delimitation

This research compared and examined the proportion of students who chose the Accountancy, Business, and Management (ABM) strand due to peer influence rather than career aspirations. The distribution of surveys was solely for San Jose Academy ABM students. The researchers applied Slovin's formula to determine the population sample size. There were no further restrictions or criteria for the respondents as long as the respondents fit the study's focus demographic. Any group falling outside of this category was not investigated. Surveys served as the main data source for this project, which employed a quantitative research design method.

The method is a purposive sampling method. A purposive sampling method is a type of non-probability sampling strategies that involves choosing units for researchers' samples based on their possession of specific qualities. In other words, purposive sampling selects units "on purpose" (Nikolopoulou 2022).

The researchers set different criteria to select participants. The criteria are as follows:

- ABM students at San Jose Academy
- Female or Male

1.6 Conceptual Framework

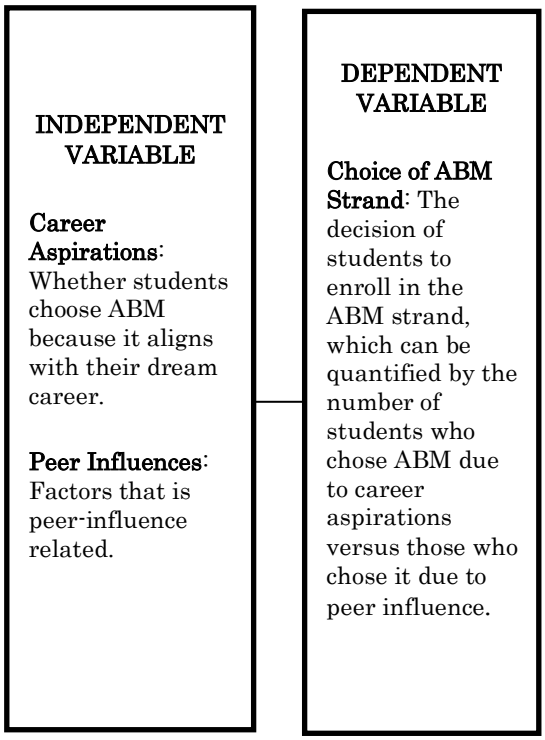


Figure1. A Schematic diagram showing the relationship between the independent and dependent variables.

1.7 Definition of Terms

The following are operationally defined:

ABM Strand. The ABM strand stands for Accountancy, Business, and Management. It's a high

school track for students who want to learn about business, finance, and accounting, helping them prepare for college and future jobs in these fields.

Career Aspirations. The long-term goals and dreams someone has for their job or profession in the near future. They reflect what a person hopes to achieve in their career, based on their interests and skills.

Peer Influence. Peer influence is how friends or people of the same age affect someone's thoughts and actions. It can make a person change their behavior to fit in or be accepted by their group.

Peer Pressure. Peer pressure is when friends or people of the same age push someone to do something, often to fit in or be liked. This can lead to making choices they wouldn't normally make, and it can be good or bad.

San Jose Academy. A private institution that educates students.

Senior High School. Grade 11 and 12 learners.

2. REVIEW OF RELATED LITERATURE

This chapter contains the literature and studies, local and foreign that is related to the researchers' topic. This would serve as a supplementary element that will deepen the understanding about the study. It presents a comprehensive review of literature related to the factors influencing students' choices in selecting the Accountancy, Business, and Management (ABM) strand. The review is organized into two main sections: career aspirations and peer influence. This chapter aims to provide a theoretical foundation for understanding the motivations behind students' strand choices at San Jose Academy.

Career Aspirations

Career aspirations refer to a person's long-term professional objectives and aspirations, which include the desired accomplishments and personal progress they want during their path and ambitions that an individual's aim to achieve in their future careers. These aspirations are often shaped by personal interests, values, and perceived opportunities in the job market (Together Team, 2023).

In the context of choosing Accountancy, Business and Management (ABM) academic strand, students opt to choose ABM strand due to their genuine interest in business related fields such as careers like accountants, auditor, IT project manager, business/finance analysis, and entrepreneur (CITT Philippines).

The Role of Career Aspirations in Educational Choices

Local Literature:

According to Kilag, O.K.T. et al. (2023), students' decisions were heavily influenced by their perceptions of their career aspirations as they were more inclined to select academic tracks they think would result in better job opportunities. Students' selections for tracks were also impacted by their own interests and abilities; they also opt to choose a path connected with their passion and hobbies. Students who have clear career aspirations are more likely to choose educational paths that align with their long-term career goals.

This study of Kilag highlights the importance of choosing educational paths that align with the students' future job opportunities and personal interest. It is a local literature exploring educational choices and career aspirations among students in the Philippines.

It is important to remember that the future of a student can depend on their decision on college courses. Personal interest and strengths are the two important parts of this decision, making it align with their wanted profession. In choosing ABM as a strand, students must have at least one of the following factors; aspiring to have a business, inclined with the subject Mathematics, aspiring to jobs like accountant, auditor, finance, managing, and entrepreneurship (Ogbinada, et al.).

This study of Ogbinada emphasizes that personal interest and strengths plays an important role when making a decision of choosing an educational path. This literature is local, focusing on the factors influencing educational decisions in the Philippines.

Peer Influence

Foreign Literature:

According to the article of Harappa (2020), peer influence refers to the effects that friends or social groups may have on an individual's choices, attitudes, or behaviors. This influence, which encourages behavior in line with the group's expectations or norms, can be either positive or negative. Teenagers often form strong attachments to their friends, leading them to align their decisions with those of their peers. Due to that, students may choose an academic strand that does not align with their career aspirations and enhanced skills and talents, potentially affecting their future opportunities, productivity and happiness with their job.

This study of Harappa emphasizes that peer influence can either positively or negatively impact a students' decision. This literature is foreign, providing a broad overview of peer influence applicable to various contexts, including educational choices.

Local Literature:

According to the study of Alentijo et al. (2020), peers affect the student's choice of strand. If a learner's friend decides to take a course unrelated to the learner's want, it is highly likely that the learner will shift course to be together with that friend. This situation is a dilemma, especially for these students, because their decision might greatly affect their future performance since it is not based on their interests.

The study indicates that a student's choice of strand can be unrelated to their personal interest because of peer influence that could affect their future performance. It is a local literature, examining the specific influences on educational decisions among Filipino students.

The Role of Peer Influence on Educational Choices

Local Literature:

According to Quintos et al., (2022), one of the main goals of the Senior High School curriculum is to prepare students for their future careers and allow them to be ready to face any obstacles that will block their paths to success. In order to achieve this, their SHS academic strand must align with the course they have to pursue in college. Nonetheless, there is a clear circumstance wherein students enroll in college courses unrelated to their Senior High School strand with peer pressure or the influence of their peers as one of the topmost reasons cited by students who did not take college courses align with their strand. This indicates that peer influence plays a crucial role in the decision-making of students.

This study of Quintos is about the importance of choosing the right strand and the effect of peer influence on students' decision making. It is a local literature, focusing on the educational system in the Philippines.

Moneba and Malbas (December, 2019), also found that peer pressure plays a significant role in the track preference of Grade 10 students. With that, it is highly possible that the students chosen strand resulted from "peer influence", instead of their personal interest.

This study of Moneba and Malbas emphasizes the significant role of peer pressure in the choices of grade 10 students. This literature is local, examining peer influence in the Philippine educational context.

Comparative Analysis Career Aspirations and Peer Influence in Strand Choice

Foreign Literature:

According to Rabadah (2016), a series of questionnaires was used to examine the factors that influence students' choice of accounting; these questions are related to factors such as the reputation of the university, personal interest, aspired job, family members, and peers. The findings of the study revealed that family members and peers are significantly related to the student's choice of accounting as a major, while the rest of the factors do not significantly influence student choice.

The study of Rabadah proves that peers and family members are the most significant factor of students' decision making. This literature of Rabadah is foreign, exploring factors influencing career choices in an international context.

Local Literature:

On the other hand, according to Morales et al. (2023), learners were greatly influenced in

choosing their Senior High School strand by their interest, especially in job opportunities. The study revealed that students' choices were only somewhat influenced by their parents and peers.

This study of Morales emphasizes that personal interest and job opportunities are primary motivators for students' educational choices and not peers and families. This literature is local, focusing on the factors influencing educational decisions in the Philippines.

Both of the literatures showcase a clear difference, highlighting the diverse factors influencing students' educational choices in different contexts. The contrasting findings emphasize the complexity and variability of decision-making processes among students, making it more apparent the need to properly investigate these influences further.

Impact of Making Uninformed Choices

Local Literature:

Focusing on the expectations of others might lead students to miss out on chances that truly correspond with their goals because they are attempting to live up to or satisfy those expectations. Sociologists believe that a person's choice of careers is mostly determined by the conditions and expectations of the social view to which he belongs (Friesen cited in Research Clue, 2023).

This study from Research Clue emphasizes that sociologists believe that career choices are influenced by the surrounding expectations.

Being unable to follow a correct decision for an individual career choice may affect the overall journey because of the lack of interest. In addition, the individual could miss out on fulfilling his/her potential and passions, which can impact the overall well-being and life satisfaction. If students select a competency, not align with their interests and abilities, there will most likely be failures such as not being able to follow their learning expectation or finding it challenging to participate in any activities because it is not developing their abilities and skills (Putra, 2019; cited in Pujilestari et al., 2021).

This study emphasizes that uninformed decisions of educational path can greatly affect future performances.

Synthesis

This research is similar to other researches as they both focus on the factors affecting the choice of students in terms of academic strand. Both researchers seek to get a deeper understanding of the particular problem.

On the other hand, this research differs from other research as it seeks to identify the proportion of students who chose their strand based on aligning it with their career aspiration or due to peer influence. It seeks to find what factor influences students the most. Its respondents also focus on ABM students in San Jose Academy. With that, this study which has more specifications will be able to solved that gap that existing literatures has as most of the studies available have either focuses on general career choices or the influence of peers in different settings.

This research will provide a comparative analysis between ABM students' strand choice based on career aspirations versus peer influence.

3. METHODOLOGY

This chapter describes in detail the research methodology and specific methods that have been adopted in this study. This chapter includes research design, research locale, sample population, participants selection, research instrument, data gathering procedure and data analysis method.

3.1 Research Design

The researchers choose the Descriptive Quantitative Research Design to use in this study.

According to Voxco (2021), the goal of a descriptive study design is to describe a phenomena, circumstance, or population.

On the other hand, according to Dalisay & Ramos (2022,p.6) A quantitative research study aims to comprehend and analyze numerical data to form conclusions from samples drawn in a population. The methods include extracting data from scales and instruments where a numerical rating is needed. This kind of study allows a researcher to predict the future behavior of a phenomenon based on the existing data.

3.2 Research Locale

The study was conducted at San Jose Academy, which was located at M. Naval St. San Jose, Navotas City. This locality had a total population of 1,472 students; however, only 189 of these students fell under the criteria of the study, which were ABM students. This student body was divided by 2 levels and 4 sections; 94 students were from the grade 11 level, while 95 students were from the grade 12 level.

3.3 Sample Population

In order to get the sample population of the study, the researchers applied Slovin's formula.

Slovin's formula is calculated as:
$n = N / (1 + Ne^2)$
where;

n- Sample size needed
N- Population size
e- Acceptable margin of error

The population size of the study is a total of 189 students, while the acceptable margin of error is only 5%. This indicates that the sample population is 128 students divided by 4 sections, which will get 32 respondents per section of ABM students.

The sample population solution is:

$n = N / (1 + Ne^2)$
$n = 189 / (1 + 189(0.05^2))$
$n = 189 / (1 +189(0.0025))$
$n = 189 / 1.4725$
$n = 128$

3.4 Participants Selection

The method that the researchers used in this study is a purposive sampling method.

A purposive sampling method is a type of non-probability sampling strategies that involves choosing units for researchers' samples based on their possession of specific qualities. In other words, purposive sampling selects units "on purpose" (Nikolopoulou 2022).

The researchers set different criteria to select participants. The criteria are as follows:

- ABM students at San Jose Academy
- Female or Male

3.5 Research Instrument

The instrument that is used by the researchers to collect important data in the study was a questionnaire survey with a checklist that will be conducted by distributing the printed copies of the questionnaires to the respondents. The researchers created questions and statements to be a measure of the overall result that answers the purpose of the study. Career Aspirations vs. Peer Influence: A Comparative Analysis of Accountancy, Business, and Management Students' Strand Choice at San Jose Academy was the subject of the survey questionnaire.

To further improve the study, the researchers will use the following instruments:

Questionnaires

The prepared questionnaire ensures that the age, sex, section and level of the respondents will be known. It also contains statements to be checked based on this level (5-Strongly Agree, 4-Agree, 4- 2-Disagree, 1-Strongly Disagree) that will provide the answers for the study's statement of the problem.

Preparation

The questionnaires were researched and developed based on the problems presented by the researchers in Chapter I and the information gathered in the study of the relevant literature. The questionnaires were divided into three parts: the first part was to determine the demographic profile of the respondents; the second part consisted of a question to determine the primary career aspiration of the respondents; and the third part consisted of statements that determined the average number of students choosing the ABM strand based on career aspiration vs. peer influence.

Administration

The questionnaire is distributed to one hundred twenty-eight (128) student respondents divided into four (4) sections of the ABM students. The respondents will answer the questionnaire in five (5) to ten (10) minutes.

3.6 Data Gathering Procedure

Prior to administering the survey, a request letter had to be written. With that, the researchers sent a formal letter to the school head of San Jose Academy asking for permission to conduct a survey with the ABM students. If the letter was accepted and

approved, the researchers subsequently personally gave the survey questionnaires with an informed consent letter to the chosen respondents. This letter contained a reassurance to the respondents that all the information collected would be confidential and used solely for the research paper. Participants were given time to respond, and they were reminded that the collection of the survey was on the same day. The researchers also requested the respondents to answer with all honesty. After data gathering, the researchers applied the statistical treatment to be used with the study. No incentives were offered for participating in the research survey.

3.7 Data Analysis Method

After collecting the needed data results from the respondents, all the collected data will be interpreted and analyzed with the use of the **table, mean, scale, ranking** and **p-value**.

Table. This will be used to compare the percentage of different demographic profiles of the respondents, their dream careers, and their responses to the rating scale questionnaires, from the first to the last part of the questionnaire.

Mean. This will be used in the third part of the questionnaire to find out the mean score of each statement. This analysis will be conducted using the Jamovi application for descriptive statistics.

Scale. The scale will be used as the basis for interpreting the total points obtained for each question in the third part of the questionnaire.

Score	Interpretation
4.01 – 5	Strongly Agree
3.01 – 4	Agree
2.01 – 3	Neutral
1.01 – 2	Disagree
0.01 – 1	Strongly Disagree

Ranking. The researchers will find the highest and lowest score computed on each question answered by the respondents.

P-value. This will be used to interpret the last part of the statement of the problem to determine whether there is a significant difference between the impact of career aspirations and peer influence. This analysis will be performed using the paired samples t-test in the Jamovi application, which is an ideal method for comparing two related groups with the same set of respondents and test the null hypothesis.

- p-value less than .005 = significant difference
- p-value higher than .005 = no significant difference

4. PRESENTATION, ANALYSIS AND INTERPRETATION OF DATA

The primary objective of this research is to determine whether career aspiration or peer pressure has more influence to ABM students' motivations in choosing their strand.

This chapter presents the data collected from the respondents who participated in the survey. These data were meticulously organized from the one hundred twenty-eight (128) respondents of the study. The researchers prepared fifteen (15) survey questions, which will also be discussed according to the results of their responses.

More specifically, this section seeks to answer the following question;

1. What is the demographic profile of the respondents in terms of:
   1.1Age
   1.2Sex
   1.3Grade Level and Section
2. What are the primary career aspirations of Accountancy, Business, and Management (ABM) students at San Jose Academy?
3. What is the most significant choice of the ABM strand among students?
   a. career aspirations
   b. peer influence
4. Is there a significant difference between the impact of career aspirations and peer influence on the choice of ABM students?

Part 1

Demographic Profile of the Respondents

a) Age

Frequencies of AGE

AGE	Counts	% of Total	Cumulative %
15	3	2.3 %	2.3 %
16	53	41.4 %	43.8 %
17	59	46.1 %	89.8 %
18	11	8.6 %	98.4 %
19	2	1.6 %	100.0 %

Table 1

b) Sex

Frequencies of SEX

SEX	Counts	% of Total	Cumulative %
Female	89	69.5 %	69.5 %
Male	39	30.5 %	100.0 %

Table 2

c) Grade Level and Section

Frequencies of LEVEL

LEVEL	Counts	% of Total	Cumulative %
11	64	50.0 %	50.0 %
12	64	50.0 %	100.0 %

Table 3

Frequencies of SECTION

SECTION	Counts	% of Total	Cumulative %
Matthew	32	25.0 %	25.0 %
Jude	32	25.0 %	50.0 %
Bernardine	32	25.0 %	75.0 %
Peter	32	25.0 %	100.0 %

Table 4

Interpretation

Based on the results, the majority of the respondents, representing (46.1%) are aged 17. This is followed by (41.4 %) of the respondents who are aged 16. The least represented age groups are 15 and 19, each comprising only (2.3%) and (1.6%) of the respondents. This distribution indicates that the majority of the survey participants are in the age range typically associated with Senior High School students, with a predominant concentration in the ages of 16 and 17.

The results also reveal a notable gender disparity among the respondents. A significant majority, (69.5%), are female, whereas (30.5%) are male. This gender distribution suggests that female students are more represented in the survey sample.

In terms of the number of respondents per section and grade level, the data shows that each section and level received an equal proportion of respondents, with each section accounting for (25%) of the total respondents. This balanced distribution ensures that the sample is evenly represented across different sections, allowing for a fair comparison and analysis of responses.

Part 2

Primary Dream Career of ABM Students at San Jose Academy

Frequencies of CAREER

CAREER	Counts	% of Total	Cumulative %
Business Management	13	10.2 %	10.2 %
Entrepreneur	31	24.2 %	34.4 %
Finance/Accounting	42	32.8 %	67.2 %
Human Resources	4	3.1 %	70.3 %
Other	38	29.7 %	100.0 %

Table 5

The primary dream career choices of the ABM students with a (32.8%) vote from respondents indicate a strong preference for Finance/Accounting that is under the courses aligned with the ABM strand. After finance/accounting, it is followed by the choice “other” with (29.7%) vote, this means that the second most majority of students choices for their career dream is not aligned with the strand they have taken. This is followed by the career choice Entrepreneur with (24.2%) vote, Business Management with (10.2%) vote and lastly Human Resources with (3.1%) vote.

This pattern suggests a significant number of students may be exploring diverse career paths outside their designated strand. But fortunately, the majority of students are still on the right track of strand since their dream career is aligned with their chosen

Part 3

A. Career Aspiration Motivations

Descriptives

Career Aspirations	N	Mean	SD	Interpretation
I chose the ABM strand because it aligns with my dream career.	128	3.94	1.063	Agree
I chose the ABM strand because of the career opportunities it offers.	128	4.09	0.823	Strongly Agree
I chose the ABM strand because I believe it will be easier to find a job in this field.	128	3.80	0.814	Agree
I have a clear career goal that I want to achieve by studying the ABM strand.	128	3.86	0.986	Agree
I believe that the ABM strand will provide me with the skills needed for my future career.	128	4.13	0.959	Strongly Agree
My career aspirations were the main reason for choosing the ABM strand.	128	3.96	1.007	Agree
I believe that following my career aspirations will lead to greater personal satisfaction.	128	4.13	0.845	Strongly Agree

Table 6

The descriptive statistics reveal that students enrolled in the ABM strand generally agree that their choice is influenced by multiple career-related factors. The statement with the highest mean score (4.13) for both "I believe that the ABM strand will provide me with the skills needed for my future career" and "I believe that following my career aspirations will lead to greater personal satisfaction" indicates a strong agreement (**"strongly agree"**) among students regarding the alignment of the ABM strand with their skill acquisition and personal satisfaction.

The statement with the middle mean score of 3.96 is "My career aspirations were the main reason for choosing the ABM strand," suggesting that many students **"agree"** with this statement.

On the other hand, the career-related factor influencing students' choices that received the lowest mean score of 3.80 is "I chose the ABM strand because I believe it will be easier to find a job in this field." This suggests that students **"agree"** that the ABM strand will bring many career opportunities, but it is not the most compelling reason for their choice compared to skill acquisition and personal satisfaction.

B. Peer Influence Motivations

Descriptives

Peer Influence	N	Mean	SD	Interpretation
I chose the ABM strand because my peers told me that it is suited to my skills.	128	2.77	1.152	Neutral
My peers' opinions are important to me when making decisions about my education.	128	2.84	1.228	Neutral
I chose the ABM strand because it is popular among my friends.	128	2.20	0.983	Neutral
I chose the ABM strand because I was inspired by my peers' career achievements.	128	2.74	1.179	Neutral
I chose the ABM strand because I feel more motivated with the idea of studying and collaborating together with my peers.	128	3.05	1.132	Agree
Peer influence was a significant factor in my decision to choose the ABM strand.	128	2.77	1.194	Neutral
I would have chosen a different strand if not for the influence of my peers.	128	2.53	1.310	Neutral

Table 7

The descriptive statistics reveal that students enrolled in the ABM strand are generally neutral that their choice is influenced by multiple peer-related factors. The statement with the highest mean score (3.05) for "I chose the ABM strand because I feel more motivated with the idea of studying and collaborating together with my peers" indicates an agreement (**"agree"**) among students regarding the choice of the ABM strand being influenced by peer factors.

The statements with the middle mean score of 2.77 for both "I chose the ABM strand because my peers told me that it is suited to my skills" and "Peer influence was a significant factor in my decision to choose the ABM strand" suggest that many students are **"neutral"** with these statements, indicating that they neither agree nor disagree with these peer-related factors.

On the other hand, the peer-related factor influencing students' choices that received the lowest mean score of 2.20 is "I chose the ABM strand because it is popular among my friends." This suggests that students are **"neutral"** about the idea that the ABM strand's popularity among their peers influenced their choice. Additionally, the points lean more towards disagreement with the statement, indicating that it is not the most compelling reason for their choice compared to other factors.

Part 4

Difference Between the Impact of Career Aspirations and Peer Influence

Paired Samples T-Test

Descriptives

	N	Mean	SD
Career Aspiration	128	3.99	0.695
Peer Influence	128	2.70	0.842

Table 8

Paired Samples T-Test

			statistic	df	p
Career Aspiration	Peer Influence	Student's t	14.2	127	<.001

Note. H_a $\mu_{Measure\ 1\ -\ Measure\ 2} \neq 0$

Table 9

Based on the results of the paired sample t-test in comparison for both factors—career aspiration and peer influence—the p-value (less than .001) indicates that there is a significant difference in the impact of career aspiration and peer influence on the choice of the ABM strand by students. The mean score of 3.99 for career aspirations suggests that students **"agree"** that career aspirations influence their decision-making. On the other hand, the mean score of 2.70 for peer influence indicates that students are **"neutral"** about this factor.

5. SUMMARY, CONCLUSION, AND RECOMMENDATIONS

This study aims to investigate whether students select the Accountancy, Business, and Management (ABM) strand based on personal career aspirations or due to peer influence through a survey conducted with selected respondents. The initiation of this study stemmed from the researchers' desire to find answers to the study's objectives, gather data on the topic, and discover recommendations and information. The researchers used survey questionnaires to collect the accurate data needed for the research.

The survey was conducted with one- hundred twenty-eight (128) selected students who are ABM students at San Jose Academy. The students who became respondents in this study were chosen using purposive sampling. The collected data to support the research were clearly presented and analyzed.

After several steps or processes, the researchers formulated a summary, conclusions about the results or findings, and some recommendations for improvement and to help provide more valuable information for the students, readers, and researchers involved in this study.

5.1 Summary

In achieving the objectives of this research, the issues presented in the first chapter have been addressed and proven. These have been sequentially arranged and presented:

1. Based on the results, the respondents are predominantly students aged 17 years old, accounting for 46.1% of the sample, followed by 16-year-olds who make up 41.4 % of the respondents. The majority of respondents are female, comprising 69.5% of the sample, while 30.5% are male. These figures come from a balanced distribution of ABM students at San Jose Academy Senior High School level, with 25% of respondents from each section (St. Jude, St. Matther, St. Bernardine, and St. Peter).

2. The statistical analysis results reveal that the primary career aspirations of ABM students at San Jose Academy are in Finance/Accounting, followed by other career choices outside the ABM field. The next most popular aspirations are to become entrepreneur, pursue Business Management, and lastly, Human Resource Management.

3. The survey results indicate that career aspirations have a greater impact on students' decision-making. The most influential statement for the respondents was that they believe that ABM strand will provide them with the skills needed for their future career and by following their career aspirations will lead to greater personal satisfaction, both getting that highest mean score of 4.13 which is strongly agreeing. This is followed by the belief that their own career aspirations were the main reason for choosing the ABM strand, getting 3.96 mean score which is agree. The least impactful statement, with the lowest mean score of 3.80 that is interpreted as agreeing, was that they chose the ABM strand because they believe it will be easier to find a job in that field. Regarding peer influence, the statement with the highest agreement was that they felt more motivated by studying and collaborating with their peers, with 3.05 mean score. This is followed by other peer-related influences that only got a mean score ranging from 2.20 to 2.84 whereas students are neutral with the influences or they neither agree or disagree with it. The statement with the most likely disagree from respondents was that they chose the ABM strand because it is popular among their friends.

4. The responses indicate that both career aspirations and peer influence are significant factors in choosing the ABM strand. However, career aspirations appear to have a stronger impact overall. The data shows that while many students consider their peers' opinions, a substantial portion makes decisions based on their personal career goals and the belief that the ABM strand will provide the necessary skills and opportunities for their future. The p-value (less than .001) indicates that there is a significant difference on the impact between career aspirations and peer influence on the choice of strand of the ABM students.

5.2 Conclusions

Based on the presented and proven data, the following conclusions were drawn by the researchers:

1. In conclusion, this study provided valuable insights about the demographic profile of the respondents, their dream career in the future days, the most influential factor for their chosen strand as an ABM student and the difference of the impact of career aspirations and peer influence on their choices. The respondents, primary consisting of female respondents and students with an age of 17 coming from all ABM section in Senior High School have shared their own experiences in terms of their educational journey.

2. The primary career aspirations of the ABM students were found to be Finance/ Accounting, reflecting their ambitions and future goals in the field of their chosen strand which is Accountancy, Business and Management. However, upon checking clearly, the percentage of students who have indicated that their primary aspirations were not under the field of ABM strand are quite closely on par, this reflects that many of the students are also not guided correctly in terms of the right educational path that aligns with their future goals. These findings are supported by the study of Kilag, O.K.T. et al. (2023) wherein the study emphasizes that students' career aspirations have a stronger impact on their decision-making, particularly because they believed that the ABM strand would provide them with the necessary skills for their future careers. This reflects their desire for careers within the ABM field. Conversely, the study by Alentijo et al. (2020) highlights that peer influence can lead students to choose strands not aligned with their personal interests, underscoring the importance of supporting students in making informed decisions based on their career aspirations.

3. While both career aspirations and peer influence are a significant factor in the student's strand choice, career aspirations are significantly higher in terms of its impact on the student's decision making. This indicates that students prioritize long term career goals and potential job opportunities, but still peer influence also plays an important role in their decision-making. To support this, according to Kilag, O.K.T. et al. (2023), students' decisions were heavily influenced by their perceptions of their career aspirations as they were more inclined to select academic tracks, they think would result in better job opportunities. Students' selections for tracks were also impacted by their own interests and abilities; they also opt to choose a path connected with their passion and hobbies. This study highlights the importance of choosing educational paths that align with the students' future job opportunities and personal interest. Furthermore, Harappa (2020) mentions that peer influence can either positively or negatively impact a student's decision, which aligns with the finding that peer influence also plays an important role in students' decision-making.

4. The statistical analysis revealed that, career influence had a stronger influence on their decision-making especially because they believed that the ABM strand will provide them with the skills they needed for their future career and can provide them with greater personal satisfaction reflecting their want for works under the field of ABM strand coming from the results of their votes. On the other hand, peer influence mostly gets neutral votes emphasizing the significant difference of these two factors impact. However, peer influence still cannot be overlooked especially that majority of them is feeling more motivated with the idea of studying and collaborating together with their friends. Recognizing the close impact of these two factors underscores the need for a balanced approach in supporting students' decision making. Additionally, while peer influence is not the predominant factor, acknowledging its presence can help in creating a more supportive and balanced learning environment. This result is also supported by the study of Kilag, O.K.T. et al. (2023) wherein it is found out that students' career aspirations have a stronger impact on their decision-making, particularly because they believed that the ABM strand would provide them with the necessary skills for their future careers. This reflects their desire for careers within the ABM field. However, the study by Alentijo et al. (2020) highlights that peer influence can lead students to choose strands not aligned with their personal interests, a proof of the need to better guide and support students in their decision making especially when peer influence is associated as their decisions will greatly impact their future job satisfaction.

5.3 Recommendations

Based on the findings of this study and the conclusions drawn, the researchers humbly recommend the following:

Students: Continuously monitor your decisions, especially regarding the educational path you will take, as these decisions will affect your future ambitions and satisfaction. Be aware of the factors that have a significant influence on you to ensure you are making informed decisions.

Parents: Parents must be more educated on the importance of monitoring their children's educational paths to prevent future regret regarding the education journey they have taken. Parents should provide guidance and support to their children in order for them to lean towards the right path for their future goals and ambitions.

Teachers: Encourage students to engage in a variety of activities that will help them discover their skills, talents, and interests, which are crucial for making important decisions such as choosing the right educational path that aligns with their abilities.

San Jose Academy: The findings of this study underscore the importance of supporting students in aligning their educational paths with their future goals. San Jose Academy should create programs that enhance students' knowledge about career opportunities in each strand. Additionally, the school should organize various activities to help students develop their skills and discover their interests. The school should also avoid allowing students to change their initial strand choice without a valid reason to prevent negative outcomes.

Government/Agencies/Organizations: Increase access to career-related programs for students struggling to decide which career is best suited for their skills and ambitions. Also, provide programs related to factors influencing students' decision-making to help them navigate and avoid the negative impacts of these factors.

Future Researchers: Conduct further research on other external factors such as family pressure and societal expectations. This will help identify the most influential factors on students' decision-making, enabling them to manage these impacts better. Future

researchers can also provide solutions on how to mitigate the negative effects of these factors on students.

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The Relationship Between the Levels of Impulsive Online Buying and Financial Status Among Senior High School Students in San Jose Academy

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Abstract: Impulsive buying is a common consumer behavior and it is driven by several factors, including financial status. However, the correlation between impulsive online buying and financial status is still unclear, particularly among adolescents. This study examines the relationship between the levels of impulsive online buying and financial status of the Senior High School students in San Jose Academy. A quantitative research design was employed in the study, surveying 268 respondents. Spearman's correlation matrix was utilized to identify the relationship of the two variables. The findings suggest a negative correlation between the levels of impulsive online buying and financial status. This means that financial status alone is not a strong predictor of impulsive buying. However, the negative correlation was not significant. In conclusion, the study implies that impulsive online buying is not dependent on financial status, rather, it is driven by other external and psychological factors such as negative emotions, peer pressure, and online promotion and advertisement. Further studies about these factors with a balanced distribution of respondents should be conducted to provide stronger statistical evidence.

Key Words: Impulsive Buying; Impulsive Online Buying; Financial Status; Senior High School students; Consumer Behavior

1. INTRODUCTION

This chapter introduces the main idea of the study and its purpose. This includes the background of the study, statement of the problem, significance of the study, scope and delimitation, conceptual framework, and definition of terms.

1.1 Background of the Study

Nowadays, the integration of technology in different industries, including the business industry can be observed. The growth of online selling platforms and the use of e-wallets have transformed traditional ways of shopping into a more convenient and comfortable mode of transaction. Sellers can sell items with less worries about operating expenses and use marketing strategies such as limited-time offers, discount coupons and free delivery coupons, while consumers can buy items at the comfort of their own home with minimal

efforts. The ease of transaction brought by the modernization have triggered impulsive buying behaviors among consumers.

Impulsive buying refers to spontaneous, unplanned, and unintentional purchases without much consideration for it or its after-effects. It is generally caused by an impulsive, sudden, powerful, and irresistible urge to purchase something (Beatty & Ferrel, 1998; Zheng et al., 2019). The concept of impulsive buying has changed over the years. According to Suthar and Vaidya (2024), it was first defined in the "DuPont Consumer Buying Habits Study" conducted between 1945 and 1965, as a stimulative response leading to unplanned purchases. In 1995, Dennis W. Rook and Robert J. Fisher developed the Impulsive Buying Scale, consisting of nine questions on a five-point Likert scale, designed to measure consumer's engagement in impulsive buying. The research findings validated the existence of impulsive buying behavior in consumers. In today's context, under consumer psychology, impulsive buying is defined as a multidimensional construct that encompasses behavioral, emotional, and cognitive components (Xiao & Nicholson, 2013; Amos et al., 2014; Chan et al., 2017; Iyer et al., 2020). This contemporary notion understands that the process occurs because of psychological elements.

Past studies about different factors of impulsive buying discovered that negative emotions, peer pressure, online promotion and advertisement, and a lack of financial literacy are frequently the causes of impulsive purchases. Financial status could also be a motivating factor of impulsive buying. According to Suher and Hoyer (2020), the availability of money is a significant motivator for unplanned purchases. People with higher financial status may care less about their expenditures because they do not worry about running out of money. These are similar to the findings of Pradhan (2026), which states that those who are financially well-off are more likely to have impulsive buying behaviors compared to those who are not financially sound.

This study aims to examine the correlation of impulsive online buying levels and financial status of the Senior High School Students in San Jose Academy. Although past studies have examined the correlation of impulsive buying and financial status, they tend to focus on adults or on a wide range of respondents. There is a lack of study that focuses on adolescents' engagement in impulsive buying, particularly in the concept of online shopping. Furthermore, given that they are in their developmental stage, this age group is considered to be the most vulnerable to the mentioned factors: peer pressure, negative emotions, online promotion and advertisements, and lack of financial literacy. Students who are under stress or driven by their emotions are more likely to engage in impulsive purchases; turning impulsive buying into a coping mechanism. Moreover, as social media and influencer culture continue to grow, students may find

themselves making impulsive purchases due to peer pressure in order to keep up with friends, prominent individuals they like online, or trends.

Understanding students' impulsive buying tendencies in connection to their financial status is essential , especially because this issue can negatively affect their financial health. Additionally, raising awareness about their spending habits at an early stage is important in equipping them with financial responsibility in the long run. This study specifically aims to ascertain whether a person's financial complexity influences their impulsive buying habits or not because other factors may play a further role in this behavior.

1.2 Statement of the Problem

This study seeks to determine the relationship of impulsive buying and financial status of the Senior High School students in San Jose Academy.

Specifically, this study seeks answers to the following questions:

1. What is the demographic profile of the respondents in terms of:
   1.1. Age
   1.2. Gender
   1.3. Strand
   1.4 Socio-economic Status

2. Which online shopping platform is frequently used by the respondents?

3. To what extent are the respondents engaged in impulsive buying?

4. What is the relationship between impulsive online buying behavior and the financial condition of the respondents?

5. From among the identified factors (negative emotions, lack of financial literacy, peer pressure, and online promotion and advertisement), which has the strongest correlation to impulsive online buying?

6. Is there a significant difference in the level of impulsive buying among students in low income, middle class, and high income households?

1.3 Significance of the Study

The purpose of this study is to determine the correlation between impulsive buying and financial status among teenagers, as well as determinants of impulsive purchasing which will be beneficial in raising awareness about consumer behavior. In line with this, this study will be beneficial to the following:

Students. They will be able to regulate and prevent impulsive purchases by what triggers them and how to use the money saved for more essentials like food, necessities, school supplies, and educational costs. This study will also give awareness to the students in terms of financial condition and how they should regulate their spending behaviors.

Parents. Furthermore, to be aware of the factors that influence their child's impulsive purchases, parents will also be able to control and educate their child by using money properly to prevent impulsive purchases.

Online sellers. Understanding the relationship between impulsive buying and the financial status of SHS students, as well as how students respond to different pricing strategies, allows sellers to adjust their pricing models to reduce the price of their products and offer great opportunities such as discounts and promotions that encourage students to buy what they want while also saving money. This allows both students and sellers to attain their targeted outcomes.

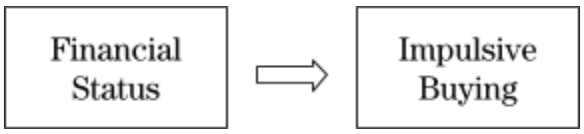
School. By using the findings of this study to increase the understanding of the student's financial behavior, the school can implement school programs to improve financial literacy among students.

Future researchers. This study will be vastly beneficial to future researchers who will further explore the correlational study between impulsive buying and financial status of the students, as the results of this study could be used as references.

1.4 Scope and Delimitation

Finding the level of impulsive purchasing behavior among respondents from various socio-economic backgrounds and determining the correlation between the two (2) variables are the main goals of this study. It also seeks for explanations for their link by examining factors affecting such behavior. A survey will be administered by the researchers to senior high school students in grades 11 and 12 from all four (4) academic stands at San Jose Academy in Navotas City. The sample size of the population will be determined by the researchers using Slovin's formula; any population that does not fall into this category will not be included in the study. The respondents will be chosen at random and without regard to any predetermined standards. This research will be carried out over the school year 2024–2025. It confines the language employed to English, which will act as the medium for the entire study. Quantitative research design shall be applied with surveys as a primary source of data collection.

1.5 Conceptual Framework



Independent Variable Dependent Variable

The conceptual framework is an IV-DV model that illustrates the independent and dependent variables in the study and how one variable might affect the other.

The two variables are examined in the study to identify if there is a correlation between impulsive buying and financial status. The independent variable is the respondents' financial status, which varies among students. This study aims to see the difference in impulsive buying levels of students from different socio-economic backgrounds, which will require the researchers to control the different financial statuses to see their potential effect on impulsive buying. The dependent variable is the respondents' impulsive buying level as its value may depend on the changes in the independent variable. However, since the study will only be identifying its correlation. It is not yet proven that financial status actually affects impulsive buying.

1.6 Statement of Hypotheses

Alternative Hypothesis

There is a significant negative correlation between impulsive buying and financial condition of the Senior High School Students in San Jose Academy

Null Hypothesis

There is no significant correlation between impulsive buying and financial condition of the Senior High School Students in San Jose Academy

2. METHODOLOGY AND REVIEW OF RELATED LITERATURE

The focus of this chapter is to synthesize related literature to deepen the understanding of the occurrence of impulsive buying among teenagers and its correlation to their financial condition, as well as to identify the underlying factors that trigger their impulsive behavior.

2.1 REVIEW OF RELATED LITERATURE

Impulsive Buying

Foreign Literature

A study by Krjat and Raigad (2024) described impulsive buying to be spontaneous in nature. It goes beyond the traditional concept of consumer behavior wherein they thoughtfully consider each purchase based on the product's perceived value, necessity or utility. Rather, it entails giving in to temporary cravings and indulging in pleasurable or emotional satisfaction. Such behaviors show spontaneity and lack of planning leading to impulsive purchases. As studies define impulsive buying as making unplanned purchases with lack of reflection, it comes with great consequences including financial stress, disturbances to regular decision-making procedures, emotional pain or dissatisfaction over things bought on impulse, forming illogical habits that prioritize instant rewards, and accumulation of pointless objects in living areas (MindHelp, 2024).

A study by University of Missouri (2015, indicates that there are three main characteristics of impulsive buyers: (1) The desire for instant gratification, which describes the pleasure they feel at first after buying a product impulsively but it was soon replaced by the feeling of guilt for giving into the temptation and buying an unnecessary product, however, they continue to engage in such behaviors because of the rewarding feeling that comes with it; (2) lack of self control, which pertains to the buyer's failure to counter the powerful urges of impulsive buying behaviors. It is supported by multiple studies revealing the negative correlation of self control and impulsive buying. (3) the desire to impress people, where impulsive buyers buy products only to fit in with peers or to be seen as someone with a high social status. In other words, Impulsive buyers care about their image so they tend to buy items that will boost their self esteem around their peers even though it may be unnecessary.

While both studies highlight the consequences of impulsive buying, they differ in their emphasis. Krjat and Raigad (2024) provide a broader psychological perspective on the spontaneity of purchasing, whereas the University of Missouri (2015) focuses more on specific behavioral tendencies. This suggests that impulsive buying is influenced by both

internal psychological factors and external social pressures.

Financial Literacy and Impulsive Buying

Local and Foreign Literature

According to Philippine National Bank (PNB), financial literacy refers to a person's financial knowledge. An individual considered as financially literate is empowered to establish financial objectives, make reasonable budgets, control debt, and gradually increase wealth. Moreover, a study conducted by Albari (2018), indicates that financial literacy measures the ability of a person to comprehend financial matters and make right decisions in accordance with the situation.

Multiple studies have investigated the correlation of financial literacy and impulsive buying. A study by Arifin et al. (2020), states that the higher the financial literacy an individual has, the lower the impulsive buying tendency. This study suggests that having sufficient financial literacy promotes informed decision-making and lessens the tendency toward impulsive purchases. However, Huwang (2024) notes that financial literacy education is often neglected in households where parents avoid discussing financial matters with their child, concerning that they might engage in part-time work. The lack of discussion about the topic may contribute to adolescents' limited understanding of financial responsibility which leads to impulsive buying.

Interestingly, while financial literacy is generally expected to mitigate impulsive buying, a study by Francisco et al. (2022) found that Senior High School students at the University of Immaculate Conception in Davao City possessed high financial literacy but still exhibited impulsive buying behaviors. This aligns with the findings of Ningtyas and Vania (2022), who argue that financial literacy does not moderate online impulsive buying in Gen-Z consumers influenced by materialism. The contradiction between these studies suggests that financial literacy alone may not be sufficient to curb impulsive buying, especially when psychological and social factors such as materialism and peer influence are at play.

Peer Pressure and Impulsive Buying

Foreign Literature

According to Brown (2020), peer pressure is the influence of an individual's social group to conform to certain norms, behaviors, or values. It is the feeling that one must do the same things other people their age do in order to gain recognition and respect from peers. Peer pressure may contribute to impulsive buying behaviors when an individual purchases products in order to fit in or to avoid missing out even when they don't really have interest in the product. According to Hariyanto et al. (2024), peer pressure can be seen when an individual is afraid to skip an opportunity others are seizing, such as trending items, limited time offers, and exclusive products. It comes with a sense of anxiety and urgency to keep up

Studies suggest that teenagers with lower self-esteem are more susceptible to peer pressure and may conform to group expectations through impulsive buying. The research of Hariyanto et al. (2024) builds on Brown's (2020) findings by emphasizing the role of social comparison and anxiety in purchasing decisions. These studies

collectively highlight the psychological vulnerability of adolescents, suggesting that interventions to enhance self-esteem and critical thinking may help reduce peer-influenced impulsive buying.

Negative Emotions and Impulsive Buying

Foreign Literature

A study by Wang et al., (2022) states that negative emotions are described by the feeling of hopelessness, anxiety, and depression. Impulsive purchases, as mentioned, give instant pleasure to consumers. Prolonged and frequent impulsive purchase, may be an attempt to escape or reduce unpleasant affective circumstances such as sadness and low self-esteem. Due to the emergence of electronic commerce, purchasing items became instant, offering immediate gratification and sense of relief to the consumer. Negative emotions are a possible emotional trigger for rash purchasing decisions. As stated in numerous studies, negative emotions have greater influence on impulsive buying as compared to positive emotions.

While multiple studies confirm the link between negative emotions and impulsive buying, some emphasize the role of digital commerce in exacerbating this behavior. The convenience and immediacy of online shopping platforms allow consumers to act on impulsive urges with minimal effort. This reinforces the argument that impulsive buying is not solely a financial issue but also a psychological one, necessitating emotional regulation strategies to mitigate its impact.

Online Advertisements and Impulsive Buying

Local Literature

A study conducted in San Jose Academy in the year 2023 by Bajos et al. found that there is a direct relationship between digital marketing and impulsive buying. The results of the study showed that there are high chances of engaging in impulsive buying every time a respondent encounters an online advertisement. They found out that social media, video, and content marketing are considered to be the most effective online advertising among the students of San Jose Academy as these trigger them to buy products impulsively. These findings aligns with the global findings that online advertisements encourage customers to buy items impulsively.

Correlation of Financial Condition and Impulsive Buying

Local and Foreign Literature

As stated by Lehmann et al. (2019), impulsive buying behavior is a sudden purchase that prevents the person from producing thoughtful consideration, resulting in a disregard for their alternatives and future implications. Several studies examine the relationship between demographic, personality, and attitudinal variables and money attitudes (Fenton‐O'Creevy & Furnham, 2019). It found that younger females and those with higher household incomes were likelier to buy impulsively. In addition to this, Suher and Hoyer (2020) point out that having money on hand is a big incentive for impulsive purchases. This shows that wealthy consumers could feel more empowered to make immediate decisions

without considering its possible implications.

However, the study of D. Azul et al. (2023) inquires about financial well-being and impulsive purchasing habits among young professionals. In terms of financial well-being, the majority of their respondents have medium high financial status, while in terms of their impulsive buying levels, they only scored low to medium which implies that they can control their finances, stick to their budget, and eventually overcome their financial setbacks.

Impulsive Buying Among Adolescence

Local and Foreign Literature

According to the study of Shayan (2024), adolescents have a strong desire to explore and discover things that will help them develop a sense of self. An individual can identify their personal preferences and values better if they experience it first hand. Such behavior leads them to impulsive buying since they test out new products from time to time.

Furthermore, it was stated in the similar study that teenagers' physical traits affect their level of intellectual interest. Because their brains are changing dramatically, especially in the dopamine region, which is involved in reward processing and decision-making. The significance of dopamine in prefrontal cortex development shows that the prefrontal circuit changes during adolescence, promoting adaptive actions in adulthood. Their adaptability is superior to adults due to their openness to trying new things and conforming to trends.

Summary

The literature reviewed indicates a multifaceted relationship between financial condition and impulsive buying. While financial well-being may influence purchasing behavior, psychological and social factors such as peer pressure, emotional regulation, and advertising strategies play equally significant roles. Notably, despite high financial literacy, adolescents may still engage in impulsive buying due to external influences and cognitive development factors.

Given the limited research on the specific correlation between financial condition and impulsive buying among adolescents, further studies should focus on this demographic. Addressing gaps in understanding could lead to more effective financial education programs that incorporate emotional and behavioral components alongside traditional financial management principles.

2.2 METHODOLOGY

This chapter describes the research method and procedures, techniques and sources of data that helped the researchers for future data gatherings. It includes the research design, sample population, research instrument, and method of data analysis.

RESEARCH DESIGN

The study follows a quantitative approach as it examines a large group of respondents with survey questionnaires as its main data collection method. Statistical analysis shall be utilized to provide more valuable insights as it offers straightforward

answers. The study specifically employs a correlational research design to identify the relationship of the levels of impulsive online buying and financial condition as well as the different factors (financial literacy, peer pressure, negative emotions, and online advertisements and promotion) and to have a comparison between the levels of impulsive online buying and different socioeconomic status.

SAMPLE POPULATION

In this study, the researchers utilized Slovin's formula to get the sample size from the total population of Grade 11 and 12 Senior High School students in San Jose Academy across all four academic strands (ABM, GA, HUMSS, and STEM) . The total population is equivalent to 808 students and the sample size is equivalent to 268 students. The researchers used stratified sampling to determine the sample size per section or the individual stratum sample size which is illustrated in the table below:

Section	*Popula -tion*	*Percen -tage*	*Sample Size*
St. Matthew	46	5.69	15
St. Jude	47	5.82	16
St. Francis	46	5.69	15
St. Isidore	48	5.94	15
St. Carlo	46	5.69	15
St. Francis of Assisi	47	5.82	16
St. Luke	47	5.82	16
St. Patrick	46	5.69	15
St. Thomas	45	5.57	15
St. Bernardine	47	5.82	16
St. Peter Faber	49	6.06	16
St. Jerome	37	4.58	12
St. La Salle	53	6.56	18
St. Agatha	54	6.68	18
St. Anselm	54	6.68	18
St. Clare	48	5.94	16
St. Peregrine	48	5.94	16
Total			268

3.3 RESEARCH INSTRUMENT

The instrument that will be used to collect data is survey questionnaire for it is the fastest way to gather data within a large sample size.

The researchers constructed the survey questionnaires based on their readings and in alignment with the statement of the problem. The researchers prepared a survey questionnaire which consisted of a 4-point likert scale with 21 items. It includes Rooke and Fisher’s impulsive buying scale that measures the levels of impulsive buying a consumer may possess. However, the researchers modified the questions related to online buying. Additionally, from a nine-item 5-point likert scale, it became a 4-point likert scale with the same number of items. Furthermore, three items were dedicated to measure each of the identified factors (financial literacy, peer pressure, negative emotions, and online advertisement and promotions). It also includes items related to the respondents demographic

profile, such as name (optional), age, gender, grade and section, and socio-economic status.

For validation purposes, copies of the survey questionnaire and research paper were given to a Statistics teacher in San Jose Academy. After the validation, the researchers interviewed the teacher. He was asked if the questions were aligned to the statement of the problem; if it measures what it intends to measure; if it is grammatically correct; if the number of items were sufficient to obtain accurate data; if all questions were not biased or repetitive. Afterwards, the items from the survey questionnaire were revised for clarity and definiteness.

To gather data, printed copies of the questionnaire were then distributed personally to the respondents.

METHOD OF DATA ANALYSIS

The following methods and statistical treatment were used to analyze and interpret the data that will be gathered from the respondents of the study.

1. Slovin's Formula

This formula was used by the researchers to identify the number of samples needed based from the total population of Senior High School students in San Jose Academy

Slovin's Formula:

$$n = N / (1+Ne^2)$$

Where:

n = sample size (268)
N = population (808)
e = margin of error (5%)

2. Simple Percentage

The percentage of the population per section from the total population is calculated. This will help the researchers in identifying the sample size per section.

Formula for simple percentage:

$$P = S / n (100)$$

Where:

P = percentage(%)
S = stratum size
n = sample size
100 = Constant multiplier

3. Individual stratum sample size

This tool was utilized by the researchers to identify the number of samples needed per section based on the sample size.

Formula for individual stratum sample size:

$$s = P(n)$$

Where:

s = individual stratum sample size
P = percentage of the stratum size
n = sample size

4. Frequency distribution, mean, and standard deviation.

Using Jamovi application, the Frequency distribution, mean, and standard deviation will be automatically computed from the dataset.

5. Weighted mean

This statistical tool will be used to compute the weight of the responses from the questionnaires answered by the respondents during data gathering.

The researchers used the Jamovi application to compute the weighted mean in the dataset.

The following are the interpretation for the weighted mean:

Weighted Mean	Corresponding Remarks
1.1 - 1.74	Strongly Disagree
1.75 - 2.49	Disagree
2.50 - 3.24	Agree
3.25 - 4.00	Strongly Agree

6. Likert Scale

The following likert scale serves as guide for data interpretation

Scale	Weighted Mean	Corresponding Remarks
4	3.25 - 4.00	Highly Engaged
3	2.50 - 3.24	Moderately Engaged
2	1.75 - 2.49	Slightly Engaged
1	1.1 - 1.74	Not at All Engaged

7. Shapiro-Wilk Test

With the use of Jamovi application, Shapiro-Wilk Test was employed to check the distribution of data. The results indicated the appropriate statistical treatment to be used.

8. Spearman's Correlation

Using the Jamovi application, Spearman's correlation was used to examine the relationship between impulsive online buying and financial status, as well as to assess which factor has the strongest correlation to impulsive online buying.

9. One-way ANOVA (Non-Parametric)

Using the Jamovi application, One-way ANOVA will be used to see the differences in the levels of impulsive online buying when compared to different socioeconomic status.

4. RESULTS AND DISCUSSION

1. What is the demographic profile of the respondents in terms of:

1.1. Age

Table 1.1
Frequencies of Age

Age	Counts	% of Total	Cumulative %
15	3	1.1 %	1.1 %
16	94	35.1 %	36.2 %
17	121	45.1 %	81.3 %
18	49	18.3 %	99.6 %
19	1	0.4 %	100.0 %

According to Table 1.1, the majority of respondents are 17 years old (N=121, 45.1%), followed by 16-year-olds, who make up the second largest group (N=94, 35.1%), and 18-year-olds which is the third largest group of respondents (N= 49, 18.3%).

1.2. Gender

Table 1.2
Frequencies of Gender

Gender	Counts	% of Total	Cumulative %
F	179	66.8 %	66.8 %
M	89	33.2 %	100.0 %

Based on Table 1.2, there are 179 (66.8%) female respondents. Meanwhile, there are 89 (33.2%) male respondents.

1.3. Strand

Table 1.3
Frequencies of Strand

Strand	Counts	% of Total	Cumulative %
ABM	63	23.5 %	23.5 %
GA	12	4.5 %	28.0 %
HUMSS	48	17.9 %	45.9 %
STEM	145	54.1 %	100.0 %

Based on Table 1.3, most of the respondents are STEM students (N=145, 54.1%).

1.4 Socioeconomic Status

Table 1.4
Frequencies of SES

Ses	Counts	% of Total	Cumulative %
High	53	19.8 %	19.8 %
Low	175	65.3 %	85.1 %
Middle	40	14.9 %	100.0 %

Based on Table 1.4, the majority of the respondents who participated in the study belong to the low income class (N =175, 65.3%).

2. Which online shopping platform is frequently used by the respondents?

Table 2
Frequencies of Online Shopping Applications

App	Counts	% of Total	Cumulative %
Lazada	18	6.7 %	6.7 %
Nike	1	0.4 %	7.1 %
Shein	16	6.0 %	13.1 %
Shopee	132	49.3 %	62.3 %
Tiktok	101	37.7 %	100.0 %

Based on Table 2, Shopee is the most frequently used online shopping platform by the respondents (N=132, 49.3%).

3. To what extent are the respondents engaged in impulsive buying?

Table 3
Average Impulsive Buying Levels

	Impulsive Buying
Mean	2.65
Standard deviation	0.633

With a mean score of 2.65 (SD=0.633) the result states that the respondents are moderately engaged in impulsive buying.

4. What is the relationship between impulsive online buying behavior and the financial status of the respondents?

Table 4
Correlation Matrix

		SES	Impulsive Buying
Ses	Spearman's rho	—	
	df	—	
	p-value	—	
IB	Spearman's rho	-0.099	—
	df	266	—
	p-value	0.107	—

Impulsive buying and financial status were strongly negatively correlated, r(266)= -.099, and were not significant *(p<.107)*.

5. Is there a significant difference in the level of impulsive buying among students in low income, middle class, and high income households?

Table 5.1
Differences in Impulsive Buying Levels Among Financial Statuses

	SES	Impulsive Buying
Mean	High	2.89
	Low	2.56
	Middle	2.74
Standard deviation	High	0.625
	Low	0.620
	Middle	0.619

The average impulsive buying score of students with high financial status is 2.89 *(SD=.625)*, ranking first among other financial statuses, followed by students from middle income households who have an average impulsive buying score of 2.74 (SD=.619), while students with low financial status has an average impulsive buying score of .256 (SD=.620), ranking the lowest. Despite the slight differences in scores, the average impulsive buying scores of each financial status states that they are all moderately engaged in impulsive buying regardless of the differences in socio-economic backgrounds.

Table 5.2

One-Way Anova (Non-Parametric)

Kruskal-Wallis

	χ^2	df	p
Impulsive Buying	11.5	2	0.003

Dwass-Steel-Critchlow-Fligner pairwise comparisons

Pairwise comparisons - IB

		W	p
High	Low	-4.60	0.003
High	Middle	-1.81	0.405
Low	Middle	2.18	0.270

There was a statistically significant difference among impulsive buying levels grouped according to SES as determined by one-way ANOVA x^2 (2)= 11.5 *p=.003*. Pairwise comparisons revealed the following results. Those from high SES have significantly higher impulsive buying levels compared to those from low SES *(p=.003)*. Those from high SES have higher impulsive buying levels compared to those from middle SES *(p=.405)*. Those from low SES have lower impulsive buying levels compared to those from middle SES *(p=.270)*.

6. From among the identified factors, which has the strongest correlation to impulsive online buying?

Table 6

Correlation Matrix

		IB	NE	FL	PP	AD
IB	Spearman's rho	—				
	df	—				
	p-value	—				
NE	Spearman's rho	0.594	—			
	df	266	—			
	p-value	< .001	—			
FL	Spearman's rho	0.045	0.165	—		
	df	266	266	—		
	p-value	0.467	0.007	—		
PP	Spearman's rho	0.488	0.471	-0.021	—	
	df	266	266	266	—	
	p-value	< .001	< .001	0.731	—	
AD	Spearman's rho	0.544	0.452	-0.075	0.473	—
	df	266	266	266	266	—
	p-value	< .001	< .001	0.223	< .001	—

Legend:

IB	Impulsive Buying
NE	Negative Emotions
FL	Financial Literacy
PP	Peer Pressure
AD	Online Promotion and Advertisements

Impulsive buying and negative emotions were moderately positively correlated, r(266)= .594, and were significant *(p<.001)*.

Impulsive buying and financial literacy were strongly negatively correlated r(266)= .045, and were not significant *(p=.467)*.

Impulsive buying and peer pressure were moderately positively correlated r(266)= .488, and were significant *(p<.001)*.

Impulsive buying and Online promotion and advertisement were moderately positively correlated r(266)= .544, and were significant *(p<.001)*.

5. SUMMARY OF FINDINGS, CONCLUSION, AND RECOMMENDATIONS

This chapter includes the study's summarization of findings, conclusion and recommendations

5.1 Summary of Findings

The findings of the study were summarized in relation to the statement of the problem in Chapter 1.

SOP1: What is the profile of respondents in terms of Strand, Age, Gender, and Average monthly income?

The survey results indicate that the majority of respondents are from the Science, Technology, Engineering, and Mathematics (STEM) strand. Most respondents are 17 years old, and there is a larger female representation among the participants. Additionally, the majority of the respondents belong to low socio-economic status. These findings suggest a young, mainly female demographic with limited financial resources.

SOP2: Which online shopping platform is frequently used by the respondents?

According to Frequency Table, Shopee is the most frequently used online shopping platform by the respondents. The data indicates that Shopee received the highest usage rating among the five shopping platforms evaluated.

SOP3: To what extent are the respondents engaged in impulsive buying?

According to the mean score of impulsive buying of the respondents, the findings show that they buy on impulse moderately. The results state that all respondents, regardless of their financial status, are moderately engaged in such consumer behavior.

SOP4: What is the correlation between impulsive buying behavior and the financial status of the respondents?

According to the results of the Spearman Correlation test, the findings of the research suggest a negative correlation between impulsive buying and financial status of the Senior High School Students in San Jose Academy but it was not significant. The slight differences in the impulsive buying scores from the different socio-economic statuses reveal its negative correlation. However, it lacks statistical evidence to confidently say that there is a negative correlation due to the unequal group sizes. It is evident that the vast majority of the respondents come from low income households while only a small portion comes from middle to high financial status.

SOP5: From among the identified factors, which has the strongest correlation to impulsive online buying?

With the use of Spearman Correlation, the study found that negative emotions have the strongest correlation to impulsive buying compared to other factors examined in the study. It was found to have a moderate positive correlation and was significant. Online promotion and advertisement also has a significant positive correlation, as well as peer pressure. On the other hand, the study states that financial literacy has a negative correlation to impulsive buying and was not significant. Furthermore, the correlation matrix also found a significant correlation across other factors. Online promotion and advertisements were found to have a moderate positive correlation to peer pressure and negative emotions.

SOP6: Is there a significant difference in the level of impulsive buying among students with high, medium, and low financial status?

According to the mean scores and Kruskal-Wallis Test, there were significant differences in impulsive purchasing behavior among students of varying financial statuses: high, medium, and low. Students with low financial status made significantly fewer impulsive purchases than their high financial status peers. Similarly, low financial status students also purchased fewer items impulsively compared to those with medium financial status. In addition, high financial status students tended to make more impulsive purchases than medium financial status students.

5.2 Conclusion

This study aimed to identify the relationship between impulsive buying and financial status of the Senior High School students in San Jose Academy. The findings suggest a negative correlation between the levels of impulsive online purchases and financial status of the respondents, stating that financial status does not significantly influence impulsive purchases, as respondents across all socio-economic backgrounds are moderately engaged in

impulsive online buying. This means that impulsive online buying is driven by other psychological and external factors.

Negative emotions, compared to other factors, had the strongest correlation to impulsive buying. Thus, stating that students think buying items at the spur of the moment gives instant relief to the stress, anxiety, or sadness that they are currently feeling for such consumer behavior results in instant gratification. Peer pressure and online promotion and advertisement is also a significant motivator of impulsive online purchases. Furthermore, the respondents possess high financial literacy scores. However, despite having financial literacy, the students still engage in impulsive buying. Additionally, the findings state that Online promotion and advertisement may also influence peer pressure and negative emotions.

Furthermore, despite the majority of the respondents' moderate engagement in impulsive buying, there was a significant difference in the impulsive online buying levels of the students with different financial statuses. The study suggests that those from high socio-economic backgrounds are more engaged in impulsive buying, followed by students from middle class families, while students from low income households ranked the lowest. The results imply that the students with high financial status have greater access to gadgets and the internet than those from lower socio-economic backgrounds. Their exposure to social media and online shopping platforms trigger their impulsive online buying behaviors. The significant moderate positive correlation of Online promotion and Advertisements to peer pressure and negative emotions suggest that the students with high financial status' frequent exposure to social media is also a motivating factor of peer pressure and negative emotions which explains why they are the group of students who are more engaged in impulsive buying.

Finally, the results of the study revealed that the online shopping platform, Shopee, is the most frequently used application by the respondents who were found to be engaged in impulsive buying. This implies that special features in the app such as personalized recommendations, limited-time offers, and vouchers, as well as the ease of transactions and a wide range of options, trigger impulsive buying behavior among the respondents.

5.3 Recommendations

Students are recommended to be more mindful of their consumer behavior to lessen the occurrence of impulsive buying for it can also affect their financial health. Furthermore, they are suggested to assess their current emotions before buying an item. They may take a moment to reflect about the product's value and importance before purchasing.

Parents are encouraged to enlighten their children about their financial condition and give assistance on how they should be

spending their allowances. They may also involve their child in their household budgeting to help them shape future financial decisions or be wise in terms of financial matters at an early age.

Online Sellers may utilize online promotion and advertisements to increase sales. However, they should also consider the customers by including the products' perceived advantages and disadvantages in the product description. This will help lessen the students' impulsive buying. In return, they will gain customers' satisfaction which helps them earn their trust and loyalty.

Schools may conduct seminars and mandatory financial literacy programs with a focus on resolving online impulsive purchases and give tips and advice on how they can budget their daily allowances. They may also tackle topics with regards to how students can manage negative emotions without resorting to impulsive buying. Additionally, providing tips on how they can be a wiser online shopper may help them lessen their impulsive buying tendencies.

Future Researchers are recommended to conduct the study with a balanced number of respondents with different financial statuses to ensure statistical significance in the correlation of the two variables. It is also recommended to conduct further studies about the effects of impulsive buying to customer satisfaction to assess impulsive buying's aftermath.

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A Correlational Study : Investigate the Relationship between Daily School Allowance and Daily School Expenses of Grade 12 Students at San Jose Academy

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ABSTRACT

This research study was conducted to uncover and explore the association between daily school allowance and daily school expenses among grade 12 students at San Jose Academy. Furthermore, the researchers assess if the students' daily allowance is still sufficient to cover their daily school expenses by administering a survey questionnaire created by the researchers. The researchers therefore gathered information that would serve as the foundation for their study. The researchers thoroughly review all of the data received from the survey questionnaires. The information that was received from the respondents was shown using tables to make it more easily presented.The researchers gave a survey questionnaire to 197 students in grade 12 senior high school. To create quantitative questionnaires, the researchers utilized a checklist method to evenly divide the items and a random sampling method to quickly choose respondents, furthermore, the researchers employed a checklist method to create survey questionnaires, which could be valuable for gathering useful and reliable data from respondents. Considering the process outlined by the researchers in this chapter, the collected data was given together with a summary, conclusions, and the researchers' recommendations. The study's findings revealed that the daily school allowance and daily school expenses were strongly correlated, implying that the respondents' allowance and expenses were related. This finding led to the conclusion of further investigating the effects of allowances on each student's spending, determining the causes that caused the students to spend more money, investigating the role of peer pressure and other factors on students' tendency to overspend, and conducting additional research on the significance of allowances in daily spending by distributing flyers and administering pre and post-tests. which can aid our study in further investigating its gaps.

1. Introduction

This chapter consist of background of the study, statement of objectives, significance of the study, scope and delimitation, conceptual framework, and hypothesis

1.1 Background of the Study

Currently, students prefer to have their allowance, whether it is weekly or monthly. School allowance refers to finance for students when they are in school. Allowance plays a significant role in every student, especially when they are buying school requirements in a particular subject (Raman, 2020). Furthermore, allowances are consistent funds for students to help with their basic needs (Dpd, 2023). Since allowance is a primary source of students' money, most students rely on it. According to Lake (2020) and GoHenry (2023), allowances promote financial independence for students. Moreover, based on Dpd (2023), parents provide their children with allowances to impart knowledge about budgeting money.

On the other hand, daily school expenses are those that students must cover on their own, especially if the school expenses are unexpected or required. Students prefer to handle their finances by themselves as it helps them to know to handle their savings, allowances, and scholarship assistance. students ' daily expenses do not resolve solely around school obligations. This daily school expense includes meals, resources, and many other items. Allowances are relevant for students as their prime income for their daily school expenses.

Understanding the principles of accurately handling their allowances will have a remarkable positive impact on them. Thus, identifying the relationship of school allowance and daily school

expenses would help students to develop better thinking on where they should allocate their allowances.

It will eventually make them learn to use the limited money they have wisely, along with how to make savings and budget (Saravanan & Devakinan, 2014). The purpose of this study is to deter

school allowance affects students' daily school expenses. Furthermore, the study will focus on study gaps, such as how students budget their school funds and their food budget. This study might be useful in determining the effects of school allowances on students' daily school expenses.

1.2 Statement of the Problem

1. What is the profile of the respondents in terms of the following personal factors

    1.1 Age

    1.2 Gender

    1.3 Socioeconomic status

2. Is there a relationship between School Allowance and Daily School Expenses?

3. How do daily expenses affect the overall contentment with students allowance?

4. Does a higher allowance lead to higher daily spending or greater savings?

5. Does daily school allowance still sufficient to cover students' everyday expenses?

1.3 Statement of objectives

The goal of this study is to investigate the link between school allowance and daily school expenses of grade 12 students at San Jose Academy. This study will investigate how daily school allowance affects students' daily school expenses. Investigate pupils' spending habits. This study will look into the relationship of daily school allowances on daily school expenses. This study intends to: (a) Examine the relationship between daily school allowance and daily school expenses. (b) Determine the students' daily school expenses. (c) Investigating the spending habits of the students.

The research seeks to give useful information about the relationship of school allowance and daily school expenses. As well as determining if there is relation between these two variables.

1.4 Significance of the Study

This study seeks to investigate the relation between Daily School Allowance and Daily School Expenses on Grade 12 students at San Jose Academy,

For the Students - this study aims to provide a prior knowledge about the relationship of daily school allowance and daily school expenses for the students.

For the Parents - this study can help the parents to budget their money when it comes to providing an allowance for their child.

For the Future Researchers - this research will serve as a reference for the researchers who plan to make related studies for Daily School Allowance and Daily School Expenses.

For San Jose Academy - The study can directly benefit the school. As it helps the students to better understand how they allocate their allowances.

For the Community - The community will benefit from this study's understanding of the relationship between school allowance and daily school expenses. They will also learn how to help children budget their school allowances and finances.

1.5 Scope and Delimitation

This study focuses on investigating the school allowance and daily school expenses relationship. The respondents will be solely grade 12 students from San Jose Academy. The purpose of this study is to determine the link between the school allowance and daily school expenses. The data will be gathered from 197 randomized grade 12 students. This study will not proceed to an unrelated topic of research. Furthermore, this study will use a survey questionnaire and a quantitative method.

However, it is crucial to recognize limitations. This study may require more time to complete, as it may be necessary to collect demographic information on the students, notably their age and gender, as well as socioeconomic status. Additionally, due to the limited number of respondents. Furthermore, the study focuses exclusively on randomized grade 12 students at San Jose Academy, this study is just for grade 12 students and does not include insights from other grade levels. These limitations emphasize the importance of exerting

caution when interpreting and applying the outcomes of the study.

Conceptual Framework

Independent Variable	Dependent Variable
Daily School Allowance * Whether the students' allowance was sufficient to cover the expenses.	**Daily School Expenses** * Do the current allowances of the students have a relationship towards daily allowances? Does higher allowance lead to higher amount expenses for each student?

Hypothesis

Alternative Hypothesis : There is a relationship between daily school allowance and daily school expenses.

Null Hypothesis : There is no relationship between daily school allowance and daily school expenses.

II. Review Related Literature

This chapter offers a review of the literature and investigations based on the researchers' in-depth exploration. The literature and studies presented in this chapter discuss the various ideas for school allowance and daily school expenses. This will serve as a guide for the researchers' as they create the study.

2.1 School Allowance

Local Literature

According to Banquerigo et. al. (2024), most students still do not have a source of income other than their allowance. As a result, they often rely on their school allowances to purchase school supplies. According to Abawag et al. (2019), pupils were given a monthly or daily allowance to pay their school expenses. Allowance is crucial for all students, especially when purchasing school supplies in a specific subject. It is crucial for students to have a school allowance because it is the only money that may cover their necessities at school; parents provide an allowance based on their socioeconomic status (Raman, 2020).

According to Dpd (2023), an allowance is a specific amount of money given to an individual regularly to assist in covering their necessary expenses. Allowance can be utilized for purchasing a variety of materials, including food and other necessities. These days, most parents provide their children with an allowance. For every student, allowance now serves as a necessity. They must be enlightened to be financially responsible, a responsibility that an individual must be accountable for to save, budget, and wisely spend their money for crucial purposes (Bonggaoen, et al., 2021).

As per Dimaala, et al. (2019), students tend to spend their allowance on personal needs, academic purposes, and transportation. Allowances are consistent funds for students to help with basic needs (Dpd, 2023).

2.2 Daily School Expenses

Foreign Literature

According to Ahista & Fikri (2024), students frequently have challenges through handling their money, when it comes to their daily expenses. Based on Rifani, et. al. (2024), daily expenses are described as a collection of costs incurred to produce or get a variety of things. Students pursuing their studies are frequently confronted with a variety of money management issues and concerns. Students usually face income and cost limitations, making financial management difficult. According to Sinha & Viswanathan (2024), students tend to take out loans to cover their daily expenses in school. One of the largest expenses for students is their daily food (Ruha, 2023).

According to Girardin (2023), an expense is any money spent on something. Such as, food, clothing, academic expenses, and more. As per Baum et al., (2023), students' affordability of expenses revolves around students' ability to pay for expenses and other essential requirements. However, there are significant costs that students must meet, such as food, housing, and other living expenses, which contribute to student

debt. According to Yuliza (2024), students typically live away from their parents, requiring them to cover their own expenses such as food, loading, book fees, and transportation. According to Nurul (2023), many current students live independently in rented apartments or dorms and manage their daily expenses on their own utilising scholarships money or monthly allowances from their parents.

III. Research Methodology

This chapter consists of a research design, research instrument, sample population, and method of data analysis.

3.1 Research Design

This study will employ a descriptive-correlational approach to better investigate students' allowance and spending. The data will be acquired using a survey questionnaire to assess each grade 12 students' satisfaction with their allowance and daily school expenses. The purpose of quantitative research is to analyze and measure the aforementioned variables. This form of research design will assist the researchers in effectively navigating the relationship of daily school allowance and daily school expenses.

3.2 Research Instrument

This study will employ a survey questionnaire to investigate the link between school allowance and daily school expenses among randomly selected grade 12 students based on their empirical data. The survey will begin by gathering data demographic information, including age, gender, and socioeconomic status.

3.3 Sample Population

This study's sample population will comprise San Jose Academy's grade 12 pupils. The researchers employed Slovin's formula to precisely calculate the required respondents for this investigation. Given a total population of 390 grade 12 students and a 5% margin of error (0.05), this survey required 197 respondents.

To ensure accurate data, the researchers used a random sampling procedure.

Furthermore, the researchers will select grade 12 students at random, which means that anyone can be chosen for this study. The researchers' goal with this random sampling strategy is to get reliable and valid data.

3.4 Method of Data Analysis

For this study, a collection was analyzed using a Javomi application, researchers' will use a quantitative research method about the A Correlational Study : Investigating the Relationship between Daily School Allowance and Daily School Expenses of Grade 12 Students at San Jose Academy. A quantitative based on a study it's numerical data that need to gather from the researchers' respondents 197 random students from Senior High School in San Jose Academy were selected as respondents in the research. To conduct this survey questionnaire researchers' will use a checklist method to determine each student's choice.

IV. RESULT AND DISCUSSION

This chapter consists of a research bar graph from survey questionnaire and interpretation of data.

Figure 1 :

The gender of the respondents

Frequencies of gender

gender	Counts	% of Total	Cumulative %
female	128	65.0%	65.0%
male	69	35.0%	100.0%

According to data acquired by the researchers among 197 senior high respondents, 65% were female and 35% were male.

Furthermore, according to the data, the majority of respondents were females who completed the survey form provided by the researchers.

Figure 2 :

Age of the respondents

Frequencies of age

age	Counts	% of Total	Cumulative %

17	129	65.5%	65.5%
18	63	32.0%	97.5%
19	5	2.5%	100.0%

According to the data gathered by the researchers from 197 senior high respondents, 65.5% were seventeen (17) years old, 32% were eighteen (18), and 2.5% were nineteen (19) years old.

The statistics presented indicated that the respondents' highest age was 17 years old, which was based on their responses to the survey questionnaire.

Figure 3 :

Socioeconomic Status of the respondents

Frequencies of ses

ses	Counts	% of Total	Cumulative %
lower	84	42.6%	42.6%
lower-middle	61	31.0%	73.6%
middle	39	19.8%	93.4%
upper	13	6.6%	100.0%

According to the study, 42.6% have between 20,000 and 44,000 per month. While 31% have between 45,000 and 77,000 every month. Furthermore, 19.8% had between 78,000 and 100,000 every month. Finally, 6.6% had between 110,000 and 130,000 each month.

According to the data acquired, the majority of respondents had between 20,000 and 44,000 per month, placing them in the lowest income bracket

Figure 4

Is there a relationship between School Allowance and Daily School Expenses?

Correlation Matrix

		Q1	Q10
Q1	**Pearson's r**	—	
	df	—	
	p-value	—	
Q10	**Pearson's r**	0.771	—
	df	195	—
	p-value	<.001	—

According to the data, daily school allowance and daily school expenses are strongly positively correlated (195) and were significant (p<.001). The table presented 0.771 which strongly positively correlates the daily school allowance and daily school allowance of grade 12 students.

Figure 5 :

How do daily expenses affect the overall contentment with students allowance?

Descriptives

	Mean	SD
Q11	1.25	0.436

According to the data, daily expenses affect daily school allowance by overspending their allowance that actually led to discontentment of the respondents allowances. Where 74.6% of the respondents said yes,

while 25.4% said no by having the mean of 1.25 and standard deviation of 0.466.

Figure 6 :

Does a higher allowance lead to higher daily spending or greater saving?

Frequencies of Q13

Q13	Counts	% of Total	Cumulative %
1	101	51.3%	51.3%
2	96	48.7%	100.0%

According to the data, 51.3% respondents who answered the survey tend to think that if they had a higher amount of allowance they would have higher daily spending. While, 48.7% would have greater savings.

Figure 7 :

Does daily school allowance still sufficient to cover students' everyday expenses?

Frequencies of Q5

Q5	Counts	% of Total	Cumulative %
1	113	57.4%	57.4%
2	84	42.6%	100.0%

Based on the survey, 57.4% of respondents said that their daily allowances are still sufficient to cover their daily expenses in school. While, 42.6% said no. Which means that most of the students can actually cover their expenses for transportation, meals, and school supplies.

V. CONCLUSION

This chapter consists of a summary, conclusion and recommendation.

SUMMARY

Here is the summary of findings that we gathered from the survey.

Demographic Profile

Gender, 65% of the respondents were identified as female students, while 35% were identified as males.

Age, the age bracket of our surveys was between 17 to 20 years old. According to the data, 65% of the respondents were 17 years old. While 32.5% were 18 years old. Lastly , 2.5% of the respondents were 20%.

SES (Socioeconomic Status) of the respondents bracket were between lower, lower middle, middle, and upper bracket. According to the data, 42.6% were in the lower bracket, while 31.0% were in the lower middle bracket. Furthermore, 19.6% was in the middle bracket. Lastly, 6.6% of the respondents identify themselves as upper bracket.

Relationship between daily school allowance and daily school expenses

There is a strong relationship (0.771) between daily school allowance and daily school expenses. And also, were significant ($p<0.01$).

Overall Contentment with students allowance

The overall contentment of the students with their allowance was affected by overspending on their allowance leading to discontent of the respondents.

Higher daily spending or greater savings

According to the findings, most of the students think that the higher allowance led to higher spending of their allowance than greater savings.

Is daily allowance was sufficient to cover daily expenses

According to the findings, most of the students said that their current allowance was still sufficient to cover their daily expenses.

CONCLUSION

To obtain material that may serve as the researchers' foundation for this study, the researchers answered the questions stated in Chapter 1.

1. **Demographic profile of the respondents**

- According to data acquired by the researchers among 197 senior high respondents, 65% were female and 35% were male. 65.5% were seventeen (17) years old, 32% were eighteen (18), and 2.5% were nineteen (19) years old. The statistics presented indicated that the respondents' highest age was 17 years old, which was based on their responses to the survey questionnaire. According to the data acquired, the majority of respondents had between 20,000 and 44,000 per month, placing them in the lowest income bracket

2. **Is there a relationship between School Allowance and Daily School Expenses?**
    - According to the data, there is a strong positive relationship between the variables which is daily allowance and daily school expenses.
3. **How do daily expenses affect the overall contentment with students allowance?**
    - According to the study, the overall contentment of the students allowance was affected by overspending of the students on their allowances leading to discontentment of the respondents. Which is often used by buying beauty products, clothes, and other materials. Also, the students' spending on transportation, meals, and school supplies.
4. **Does a higher allowance lead to higher daily spending or greater savings?**
    - Based on the findings, students who have the higher amount of allowance tend to have an over or higher spending on expenses. It results in altering the budgeting skills of the students.
5. **Does daily school allowance still sufficient to cover students' everyday expenses?**
    - Based on the findings, most of the students have said that their current allowance was still sufficient to cover their daily school expenses. While 42.6% of the respondents think that their current allowance was insufficient to cover the school expenses.

RECOMMENDATION

Based on the results of the study and the formulate conclusions based on the data that had been gathered, the researchers recommendation are shown:

- Further investigate the effects of allowances on each student's spending.
- Determine the causes that caused the students to spend more money.
- Investigating the role of peer pressure and other factors on students' tendency to overspend.
- Conduct more research on the significance of allowance in daily spending by distributing flyers and administering pre- and post-tests.

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Examining the Relationship Between Consumer Awareness and Brand Loyalty Among ABM Students at San Jose Academy

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Abstract: Extensive research indicates that consumers are more likely to support brands they trust, particularly those free from controversy. Consumer awareness—encompassing knowledge of product origins, risks, and ethical practices—plays a crucial role in informed decision-making. This study examines the relationship between consumer awareness and brand loyalty among ABM students at San Jose Academy in Navotas City. Using a correlational quantitative research design, data were collected through survey questionnaires and analyzed via Jamovi software, employing descriptive statistics and correlation matrices. Results reveal a strong positive correlation between consumer awareness and brand loyalty, influenced by factors such as brand trust, customer experience, and product quality. These findings suggest that well-informed consumers are more likely to develop brand loyalty through increased engagement and trust. By highlighting the interplay between awareness and loyalty, this study provides valuable insights for optimizing marketing strategies and strengthening consumer-brand relationships, offering practical implications for future branding initiatives.

I: INTRODUCTION

This chapter outlines the study's background, conceptual framework, statement of the problem, hypothesis, significance, scope and delimitation, and definitions of terms.

1.1 Background of the Study

Consumer awareness plays a critical role in shaping purchasing behavior and brand loyalty, particularly among young consumers who are becoming more informed through digital media, social networks, and business education. Extensive studies suggest that consumers are more likely to support brands they trust and perceive as ethical while avoiding those that have been boycotted or associated with negative practices (Soroka & Wojciechowska-Solis, 2019). Understanding consumer awareness involves knowledge of product origins, risks, and corporate ethics, influencing purchasing decisions.

Hartmann and Klaschka (2017) highlighted that informed consumers rely on trusted sources, such as non-profits, to evaluate product risks, while Li et al. (2016) found that awareness of harmful ingredients influences brand loyalty and decision-making. Zheng (2024) further emphasized that brand loyalty strengthens consumer trust, increases purchase intent, and stabilizes market share. Integrating brand loyalty with sustainable marketing strategies has been shown to enhance long-term brand success (Dewi & Dermawan, 2022).

Despite these insights, there is limited research on how young consumers, particularly business-oriented students, develop brand loyalty based on consumer awareness. This study seeks to examine the relationship between consumer awareness and brand loyalty among ABM (Accountancy, Business, and Management) students at San Jose Academy, who represent a key demographic for future business and marketing strategies. By identifying brand loyalty mechanisms—such as brand image, brand trust, customer experience, and performance satisfaction—this research aims to provide insights into how consumer awareness influences purchasing intentions.

Additionally, the study will explore demographic differences in brand awareness and loyalty, assessing how marketing messages impact students differently based on their consumer knowledge and experiences. The findings will contribute to a deeper understanding of how young consumers develop brand loyalty and how businesses can effectively engage with emerging consumer segments.

1.2 Conceptual Framework

Independent Variable	*Dependent Variable*
Consumer Awareness ● Knowledge of product origins ● Awareness of ethical business practices ● Awareness of risks	**Brand Loyalty** – The level of consumer commitment to a brand over time.

This figure presents the Conceptual Framework of the study, illustrating the relationship between the independent variables and the dependent variable.

The independent variables include consumer awareness, brand attributes, and demographic variables. Consumer awareness consists of knowledge of product origins, awareness of ethical business practices, and awareness of risks. Brand attributes such as brand image, brand trust, and customer experience play a role in shaping consumer perceptions. Additionally, demographic factors like age, gender, and socioeconomic status may influence the level of consumer awareness and brand engagement.

The dependent variable is brand loyalty, which refers to the level of consumer commitment to a brand over time. This study examines how variations in consumer awareness, brand attributes, and demographics impact brand loyalty among ABM students at San Jose Academy, providing insights into factors that strengthen long-term consumer-brand relationships.

1.3 Statement of the Problem

This study aims to examine the relationship between consumer awareness and brand loyalty among ABM students at San Jose Academy. This study seeks to answer the following questions:

1. What is the demographic profile of the respondents in terms of:
   - 1.1. Age
   - 1.2. Gender
   - 1.3. Socio-economic Status

2. What factors play a role in shaping customer loyalty towards a brand, such as brand image, trust, customer experience, and satisfaction with the performance of the ABM students of San Jose Academy?

3. What is the relationship between consumer awareness and brand loyalty among ABM students of San Jose Academy? What specific mechanisms mediate this relationship?

4. How do different levels of consumer awareness (such as product knowledge and brand recognition) correlate with the effectiveness of marketing strategies in fostering brand loyalty?

5. How do various factors influencing brand loyalty—such as product quality, brand image, customer satisfaction, and trust—correlate with levels of consumer awareness among ABM students of San Jose Academy?

1.4 Hypothesis

H_0 (Null Hypothesis): There is **no significant relationship** between the mechanisms of consumer awareness and the brand loyalty of Accountancy and Business Management (ABM) students at San Jose Academy.
H_1 (Alternative Hypothesis): There **is a significant relationship** between the mechanisms of consumer awareness and the brand loyalty of Accountancy and Business Management (ABM) students at San Jose Academy.

1.5 Significance of the Study

This research aims to establish a realistic understanding and provide concrete evidence of the relationship between consumer awareness on brand loyalty. This study will be beneficial to the following:

Consumers. This research offers insights into how their understanding and beliefs influence their loyalty to a brand and choices when making purchases.

Businesses and Companies. The study can benefit from this research as it sheds light on the relationship of consumer awareness on loyalty levels and assists, in developing products and services that meet consumer needs and preferences effectively.

San Jose Academy: This study can be an invaluable instrument for teaching and learning about the dynamics of brand loyalty and consumer awareness, especially in business and marketing programs.

Future Researchers. This study serves as a valuable reference and guide for future researchers, providing insights, methodologies, and findings to advance knowledge in the field, and fostering ongoing progress and improvement.

1.6 Scope and Delimitation

This research aims to delve into the relationship between consumer awareness and brand loyalty, emphasizing

factors like brand image, trust, customer experience, and satisfaction with performance. Through Convenient Random Sampling, samples will be drawn from the population to examine the influence of this consumer awareness.

At its core, this study seeks to unpack the "Examining the Relationship Between Consumer Awareness and Brand Loyalty among ABM Students at San Jose Academy", striving to deepen our understanding of how such consumer awareness shapes consumer loyalty.

However, it is important to recognize certain limitations of this study. The limited number of respondents may affect the comprehensiveness of the data, potentially restricting the range of consumer awareness perspectives captured within the sample. Furthermore, the study's focus on ABM senior high school students narrows its scope, excluding insights from other grade levels. As a result, the generalizability of the findings may be limited, and the broader applicability of the research could be constrained. These limitations highlight the need for careful interpretation and application of the study's results.

2. METHODOLOGY AND RRL

The primary objective of this chapter is to review, analyze, connect, and interpret relevant literature to strengthen the core understanding of the topic and to gain deeper insight into the specific problem being studied.

Consumer Awareness

Consumer awareness refers to the extent to which individuals recognize and understand the attributes of products or services, which directly shape their purchasing behaviors and decision-making processes (Honka et al., 2017). Recent research has identified a worrying lack of awareness regarding food safety, with many consumers unaware of the dangers of food adulteration and its potential health impacts, underscoring the need for stronger educational efforts and greater government involvement (Dr. Rajshekhar et al., 2023). In this context, safety, quality, and ethical considerations are increasingly becoming critical factors in shaping consumer decisions.

Moreover, environmental awareness plays a vital role, as higher awareness levels tend to drive demand for sustainable products. Interestingly, subsidies can influence consumer behavior in complex ways, simultaneously promoting green purchasing while also leading to overconsumption in certain scenarios (Kadir et al., 2022). This dual impact highlights the intricate relationship between consumer awareness and purchasing behavior.

The cited articles are relevant to the research as they provide essential insights into how consumer awareness influences purchasing behavior and decision-making, which is central to understanding brand loyalty among ABM senior high school students. Honka et al. (2017) emphasize that consumer awareness, particularly the recognition and understanding of product attributes, directly shapes purchasing decisions, aligning with the study's goal of exploring whether awareness influences loyalty to certain brands. Similarly, Dr. Rajshekhar et al. (2023) highlight the lack of awareness regarding food safety and health impacts, stressing the need for educational interventions to address these concerns. This is particularly relevant when analyzing how awareness of product safety and quality affects students' trust and loyalty toward brands, such as fast-food chains. Furthermore, Kadir et al. (2022) underscore the role of environmental awareness in driving sustainable purchasing while pointing out its dual effect, where subsidies can promote green behavior but also lead to overconsumption.

Consumer Awareness of Product Risk

Consumer awareness of product risks plays a critical role in boosting trust and influencing decision-making. Informed consumers tend to prefer organic foods, perceiving them as safer and more environmentally friendly, which in turn drives market growth (Dash et al., 2014). Furthermore, awareness impacts brand loyalty, as consumers develop strategies to mitigate perceived risks associated with specific brands. These risks, including financial and psychological factors, can deter purchases, ultimately affecting brand loyalty (Turhan, 2014). Notably, high-risk perceptions may weaken the positive effects of brand loyalty on purchase intentions. Liang (2022) suggests that satisfaction and trust have a greater influence on attitudinal loyalty, while brand experience and commitment more strongly affect behavioral loyalty, underscoring the different dynamics in how consumers engage with brands.

This article highlights the critical role of consumer awareness of product risks in influencing brand loyalty and decision-making. Dash et al. (2014) emphasize that informed consumers favor safer and environmentally friendly products, promoting brand preference. Turhan (2014) discusses how perceived financial and psychological risks can hinder purchases and weaken brand loyalty. Liang (2022) differentiates between attitudinal and behavioral loyalty, showing how satisfaction, trust, and brand experience shape consumer engagement.

Brand Loyalty

Brand loyalty refers to a consumer's consistent preference for a specific brand over others, signifying a

strong emotional and psychological attachment. This attachment often leads to repeat purchases, even in highly competitive markets (Rasheed & Anser, 2017). As Moolla and Bischoff (2015) note, brand loyalty is vital for businesses because it fosters long-term customer relationships, resulting in increased sales and strengthened brand equity. Additionally, Alkhawaldeh and Eneizan (2018) highlight key factors such as perceived quality and brand image, which significantly influence consumer loyalty. When consumers perceive a brand as offering superior quality and maintaining a positive image, they are more likely to remain loyal over time.

The articles underscore the importance of brand loyalty as a consumer's consistent preference and attachment to a particular brand, leading to repeat purchases even in competitive markets (Rasheed & Anser, 2017). Moolla and Bischoff (2015) emphasize its significance for businesses, as it fosters long-term customer relationships, boosts sales, and strengthens brand equity. Additionally, Alkhawaldeh and Eneizan (2018) identify perceived quality and brand image as critical factors influencing loyalty. When consumers view a brand as offering superior quality and maintaining a positive image, they are more likely to remain loyal.

Brand Image

Brand image refers to the perceptions, beliefs, and associations that consumers hold about a brand, which significantly influence their purchasing behavior and decision-making processes. It encompasses both the emotional and cognitive responses elicited by a brand, shaping consumer attitudes and fostering loyalty (Zhang, 2015). According to De Jesus and Fajardo-Ibarra (2023), maintaining customer loyalty through the consistent delivery of high-quality products and services not only boosts product awareness and satisfaction but also strengthens the overall brand image. When customers are satisfied, they are more likely to develop a positive perception of the brand, reinforcing their loyalty. Customer happiness lies at the heart of effective marketing strategies, as it directly contributes to enhancing a brand’s image and reputation.

This literature is relevant to the study as it emphasizes the crucial role brand image plays in shaping consumer attitudes and fostering brand loyalty. The connection between customer satisfaction, loyalty, and brand image helps explain how consumer perceptions of a brand can influence their decision-making and purchasing behaviors, which is central to understanding brand loyalty among students in the research.

Brand Trust

Brand trust refers to consumers' confidence in a brand’s reliability and integrity, which significantly influences both their loyalty and the quality of their relationship with the brand (Nadeem et al., 2021). According to Hegner and Jevons (2016), brand trust is shaped by a brand's perceived competence and its ability to consistently deliver positive experiences. Consumers are more likely to trust brands that demonstrate genuine concern for their well-being and uphold ethical standards. This trust, in turn, fosters loyalty, as consumers feel more secure in their relationship with the brand. Lacap and Tungcab (2020) also identified a positive and significant relationship between brand trust and brand loyalty, noting that brand satisfaction and trust act as mediators between brand experience and brand loyalty.

This literature is relevant to the study as it highlights the essential role brand trust plays in fostering brand loyalty. Trust influences consumers' confidence in a brand, which is crucial for long-term loyalty. The connection between trust, satisfaction, and loyalty emphasizes how consumers' perceptions of a brand’s reliability and ethical standards can impact their purchasing behavior and commitment to a brand.

Customer Experience

Customer experience refers to the internal, subjective responses of customers during their interactions with a product or service, influenced by factors such as ease of use and reliability (Saputra et al., 2023). Research has consistently demonstrated that a positive customer experience significantly enhances brand loyalty, fostering stronger customer commitment to the brand (Fitri & Hannan, 2024). Additionally, brand experience—how consumers perceive and interact with the brand—strongly impacts brand image. This positive perception, in turn, boosts customer loyalty through behaviors such as word-of-mouth promotion, further reinforcing the brand’s reputation (Rahma et al., 2024).

This literature is relevant to the study as it emphasizes the significant impact of customer experience on brand loyalty. It highlights how positive interactions with a brand, shaped by factors like ease of use and reliability, contribute to stronger customer commitment.

Performance Satisfaction

Performance satisfaction is a multifaceted concept that involves the interplay of brand personality, image, and consumer relationships. Brand personality, in particular, plays a critical role in mediating the relationship between brand

loyalty and consumer satisfaction (Mabkhot et al., 2016). In competitive markets, the combined effect of brand image and personality significantly influences consumer satisfaction and loyalty (Roustasekehravani, 2015). Furthermore, a strong corporate image and high levels of customer satisfaction are essential for fostering brand loyalty, especially in retail settings (Ene & Özkaya, 2014). Customer satisfaction acts as a mediator between brand image and loyalty, highlighting its importance across various industries.

This literature is relevant to the study as it explores how performance satisfaction, driven by factors like brand personality, image, and consumer relationships, influences brand loyalty. It suggests that a positive brand personality and image enhance consumer satisfaction, which in turn fosters loyalty.

Mechanisms Linking Consumer Awareness and Brand Loyalty

Consumer awareness, particularly regarding product risks and ethical practices, plays a crucial role in influencing brand loyalty. Research shows that informed consumers are more likely to trust and commit to brands that demonstrate transparency and ethical behavior. For example, Moreira et al. (2021) found that consumer knowledge of food labeling significantly boosts confidence in food products, leading to stronger brand loyalty. Consumers who understand clear and honest labeling are more inclined to trust these brands. Additionally, Rajagopal (2017) emphasizes that educated consumers can better assess brand value, resulting in increased loyalty and purchase intentions.

Advertising also plays a pivotal role in raising consumer awareness, acting as a precursor to brand consideration and choice. In the banking sector, advertising helps consumers carefully evaluate specific banks, ultimately influencing their decision-making (Honka et al., 2017). Interestingly, awareness of counterfeit products can also drive loyalty. Consumers who recognize counterfeits may become advocates for the genuine brand, reinforcing their loyalty through protective behaviors (Baghi et al., 2016). Moreover, ethical consumption shapes consumer identity, fostering loyalty to brands that reflect their values. This dynamic creates a complex relationship between consumer identity and brand allegiance, particularly in gendered contexts (Shang & Peloza, 2016).

This literature is relevant to the study as it highlights how consumer awareness, especially regarding product risks and ethical practices, influences brand loyalty. It shows that informed consumers trust and remain loyal to brands with transparency and ethical behavior. The research also emphasizes the role of advertising in raising awareness and shaping purchasing decisions, offering valuable insights into how awareness and marketing strategies foster brand loyalty.

Consumer Awareness, Brand Loyalty, and Demographics

Demographic characteristics, particularly age, play a crucial moderating role in the relationship between social influences and brand loyalty. For instance, younger consumers, especially Generation Z, exhibit different loyalty patterns, heavily influenced by advertising and word-of-mouth, which directly enhance brand awareness and loyalty (Gumparthi & Srivastava, 2024). While gender was initially expected to moderate this relationship, findings suggest that it did not play a significant role in the studied context. This indicates that other demographic factors, such as age, may have a stronger impact on loyalty behaviors. In the personal care industry, age is a significant factor, with younger consumers more likely to switch brands due to heightened competition (Meena, 2024).

Moreover, socio-economic factors significantly affect brand loyalty by influencing consumers' engagement with brands and their perception of value. For example, affordability and participation in promotional events are critical in fostering loyalty, as demonstrated in the fish feed industry (Alam et al., 2023). These findings suggest that demographic factors, including age and socio-economic status, are pivotal in shaping both consumer awareness and brand loyalty across different industries.

This literature is relevant as it emphasizes how demographics, particularly age, influence brand loyalty. Younger consumers, especially Generation Z, are more influenced by advertising and word-of-mouth, impacting their brand awareness and loyalty. It highlights the importance of demographic factors in shaping consumer behavior, crucial for understanding brand loyalty in the study.

Consumer Awareness and Purchasing Intentions

Consumer awareness of a brand's ethical practices and product safety significantly influences purchase intentions. Research indicates that perceived brand ethicality (PBE) positively affects consumer attitudes and intentions, with self-accountability and brand experience moderating this relationship (Geetha et al., 2023). Additionally, brand awareness plays a crucial role in enhancing purchase intentions across various industries, such as leisure snacks, where brand recognition and distinctiveness are key factors (Huang, 2024). Optimizing brand image further strengthens

this connection, as consumer perceptions directly impact their willingness to purchase (Du & Tham, 2024).

However, consumers often weigh the risks associated with products, which can lead to healthier choices. For instance, while knowledge of health risks linked to smoking or obesity is widely acknowledged, it does not always translate into risk-averse behavior, revealing a gap between awareness and action (Leventhal et al., 2014). This gap may arise from various psychological processes, including habits and perceived barriers to change, which affect how consumers assess risks and rewards in their purchasing decisions (Carter, 2014).

Education and information are pivotal in shaping consumer preferences, particularly concerning food safety and ethical consumption. Governments and NGOs play a crucial role in providing this education (Peterman & Žontar, 2014). Informed consumers are more likely to make choices that reflect their values, which can enhance brand loyalty and significantly influence purchasing behavior (Berne-Manero et al., 2014). Ultimately, fostering consumer awareness is not only beneficial for individual consumers but also essential for businesses aiming to build trust and loyalty in a competitive marketplace.

This literature is relevant as it highlights how consumer awareness, particularly regarding ethical practices and product safety, impacts purchasing intentions. It emphasizes the role of brand awareness and ethicality in influencing consumer decisions, directly linking these factors to brand loyalty. Additionally, it underscores the importance of education in shaping consumer preferences, which is crucial for understanding how awareness drives purchasing behavior in the study.

2.2 METHODOLOGY

This chapter presented the research design, research setting, respondents and sampling procedure, research instrument, data gathering procedure, and statistical technique.

2.3 Research Design

The study will employ a correlational research design with a quantitative approach to examine the impact of consumer awareness on brand loyalty among ABM students at San Jose Academy. This design is well-suited for exploring the relationship between consumer awareness and brand loyalty within this student group, focusing on how various aspects of consumer awareness—such as brand image, trust, and satisfaction—relate to brand loyalty and purchasing intentions.

Data will be gathered through survey questionnaires using a Likert scale to quantify attitudes and behaviors related to consumer awareness. This design was selected because it enables the collection of numerical data, which can then be statistically analyzed to identify trends and relationships between brand loyalty and consumer awareness.

2.4 Research Setting

The research was carried out at San Jose Academy, a private school located in Navotas City that caters to students from kindergarten through senior high school. The institution is known for its diverse student body and its focus on both academic success and extracurricular engagement.

This study centered on the senior high school students from the Accountancy, Business, and Management (ABM) strand during the 2024-2025 academic year, specifically targeting grades 11 and 12. By focusing on this group, the research aimed to explore the influence of consumer awareness on brand loyalty, drawing insights from a wide range of student preferences and behaviors. Data was gathered through surveys, ensuring a consistent methodology to enhance the reliability and accuracy of the findings. This setting provided an ideal context for analyzing how consumer awareness affects brand loyalty within the student demographic.

2.5 Sample Population

The selected participants for this research are all the students in the ABM strand of San Jose Academy's Senior High School (SHS). To determine the appropriate sample size, the researchers used Slovin’s formula. Given the total population of 189 ABM SHS students, a margin of error of 5% (0.05) was used for the calculations. Applying Slovin's formula, expressed as:

n = N / 1+Ne^2 the researchers will substitute the relevant values to calculate the sample size:

$$n = \frac{189}{1 + (189 \times (0.05)^2} = \frac{189}{1 + 0.47} = \frac{189}{1.47} = 128.5 \text{ or } 129$$

After rounding to the nearest whole number, the target sample size will be 129 students. To ensure the sample represents a diverse group of students, the researchers will employ stratified random sampling as their sampling method. The strata will be based on the sections that the SHS students belong to.

Finally, within each stratum, the researchers will randomly select students to ensure that every student has an equal opportunity to be chosen. Through this stratified random sampling method, the researchers aim to collect comprehensive and valid data.

2.6 Research instrument

The main data collection tool for this study is a survey questionnaire, structured into two sections. The first section gathers demographic details such as age, gender, and grade level.

The second section applies a five-point Likert scale, ranging from Strongly Disagree (1) to Strongly Agree (5), to evaluate students' perspectives. Survey questions are categorized into three primary research areas: first, the elements that influence students' consumer awareness levels; second, the brand loyalty factors students consider that impact their consumer awareness when selecting products; and third, how brand loyalty affects students' consumer awareness.

2.7 Method of Data Analysis

The collected data was analyzed using Jamovi, a statistical software for quantitative data analysis. Descriptive statistics, specifically mean and standard deviation were used to summarize demographic information and key findings related to brand loyalty and consumer awareness among ABM strand senior high school students. Descriptive analysis was also applied to address SOP 1 and SOP 2, providing insights into central tendencies and variations in responses to identify patterns in consumer awareness and its influence on brand loyalty. Additionally, a correlation matrix was utilized for SOP 3 to SOP 5 to examine the relationships between consumer awareness, brand loyalty, marketing effectiveness, and other key variables. This approach ensured a comprehensive understanding of how consumer awareness correlates with brand loyalty and the effectiveness of marketing strategies across different demographic groups.

Ranking: The researchers will identify the highest and lowest scores for each question based on the respondents' answers.

P-Value Analysis: To interpret the final part of the statement of the problem, the p-value will be used to determine whether there is a significant difference between the impact of career aspirations and peer influence. This analysis will be conducted using the paired samples t-test in Jamovi, which is an appropriate method for comparing two related groups using the same set of respondents to test the null hypothesis.

- A p-value less than 0.005 indicates a significant difference.
- A p-value greater than 0.005 suggests no significant difference.

Likert Scale Interpretation

The following scale will serve as the basis for interpreting the scores obtained in the Likert-scale portion of the questionnaire:

Score	Interpretation
4.01- 5	Strongly Agree
3.01- 4	Agree
2.01- 3	Neutral
1.01- 2	Disagree
0.01- 1	Strongly Disagree

The scores obtained for each question will be ranked to identify the highest and lowest responses.

Finally, the results will examine the relationship between consumer awareness and brand loyalty among ABM students at San Jose Academy. This analysis will provide valuable insights into the relationship between these factors, highlighting trends, similarities, and differences in how consumer awareness influences students' purchasing decisions.

3. RESULT AND DISCUSSION

This chapter presents the analysis and interpretation of data gathered from the research study "Examining the Relationship Between Consumer Awareness and Brand Loyalty Among ABM Students at San Jose Academy." A total of 128 respondents from the ABM strand participated in the study. The data, collected through a researcher-designed questionnaire, is presented in Jamovi descriptive to enhance clarity and visual representation of the findings.

SOP 1: What is the demographic profile of the respondents in terms of?

Figure 1: Age

Frequencies of Age

Age	Counts	% of Total	Cumulative %
16	38	29.7%	29.7%
17	61	47.7%	77.3%
18	28	21.9%	99.2%

19	1	0.8%	100.0%

The majority of the respondents are 17 years old (47.7%), followed by a small fraction (0.8%) who are 19 years old. This distribution aligns with the expected age range for senior high school students, indicating a relatively homogeneous group in terms of age.

Figure 2: Gender

Frequencies of Gender

Gender	Counts	% of Total	Cumulative %
Female	86	67.2%	67.2%
Male	42	32.8%	100.0%

The sample consists predominantly of female respondents, who make up 67.2% of the total, while males account for 32.8%. This suggests that female students are more represented in the study, which could influence perspectives on brand loyalty and consumer awareness.

Figure 3: Section

Frequencies of Section

Section	Counts	% of Total	Cumulative %
11-St. Jude	32	25.0%	25.0%
11-St. Matthew	32	25.0%	50.0%
12-St. Bernardine	32	25.0%	75.0%
12-St. Peter Faber	32	25.0%	100.0%

Each section—St. Jude, St. Matthew, St. Bernardine, and St. Peter Faber—have an equal representation of 32 students (25% each). This balanced distribution ensures that responses are evenly gathered across different sections, minimizing biases related to academic grouping.

Figure 2: Socioeconomic Status

Frequencies of Socioeconomic Status

SES	Counts	% of Total	Cumulative %
Below ₱20,000	36	28.1%	28.1%
₱20,000 - ₱40,000	52	40.6%	68.8%
₱40,000 - ₱60,000	23	18.0%	86.7%
Above ₱60,000	17	13.3%	100.0%

In terms of financial background, the majority of respondents (40.6%) come from households earning between ₱20,000 and ₱40,000 per month. A smaller portion, 13.3%, comes from higher-income households earning above ₱60,000 per month. This distribution indicates that most students come from lower-middle-income families, which may impact their purchasing behavior and brand preferences.

SOP 2: What factors play a role in shaping customer loyalty towards a brand, such as brand image, trust, customer experience, and satisfaction with the performance of the ABM students of San Jose Academy?

Descriptives

	Q1	Q2	Q3	Q4
Mean	4.07	4.54	4.55	4.53
Standard Deviation	0.844	0.574	0.586	0.687

The descriptive statistics reveal the respondents' perceptions of factors influencing brand loyalty. Among the four statements, positive experiences with a brand (Q3) received the highest mean score (4.55), indicating that respondents strongly agree that positive interactions increase their loyalty. This is followed by (Q1) that have the lowest mean score (4.07), suggesting that while still important, it is considered less influential compared to other factors.

In terms of response consistency, Q2 (0.574) and Q3 (0.586) had the lowest standard deviations, indicating that respondents had relatively similar views on these factors. In contrast, Q1 had the highest standard deviation (0.844), suggesting greater variation in opinions regarding the role of brand image in shaping loyalty. Overall, the results highlight that customer experience, trust, and product reliability are stronger drivers of loyalty than brand image among the respondents.

SOP 3: What is the relationship between consumer awareness and brand loyalty among ABM students of San Jose Academy? What specific mechanisms mediate this relationship?

Correlation Matrix

		Consumer Awareness	Brand Loyalty
Consumer Awareness	Pearson's r df p-value	- - -	
Brand Loyalty	Pearson's r df p-value	0.778 126 <.001	- - -

The correlation matrix reveals a strong positive relationship between consumer awareness and brand loyalty among ABM students of San Jose Academy, as indicated by Pearson's correlation coefficient (r = 0.778). This value suggests that as consumer awareness increases, brand loyalty also tends to rise significantly. The p-value (< 0.001) indicates that this correlation is statistically significant, meaning the relationship is unlikely to be due to chance.

This strong association suggests that when students have greater knowledge about a brand—its products, values, and marketing efforts—they are more likely to develop loyalty towards it. Several mechanisms could mediate this relationship, such as brand trust, perceived quality, emotional connection, and marketing effectiveness. For instance, increased awareness through advertisements, word-of-mouth, and social media can enhance trust and familiarity, making students more inclined to remain loyal to a particular brand.

SOP 4: How do different levels of consumer awareness (such as product knowledge and brand recognition) correlate with the effectiveness of marketing strategies in fostering brand loyalty?

Correlation Matrix

		Consumer Awareness	Marketing Effectiveness
Consumer Awareness	Pearson's r df p-value	- - -	
Marketing Effectiveness	Pearson's r df p-value	0.820 126 <.001	- - -

The correlation matrix indicates a strong positive relationship between consumer awareness and marketing effectiveness, as shown by the Pearson's correlation coefficient (r = 0.820). This suggests that higher levels of consumer awareness—such as increased product knowledge and brand recognition—are significantly associated with more effective marketing strategies. The p-value (< 0.001) confirms that this correlation is statistically significant, meaning the relationship is unlikely to be due to random chance.

This finding implies that when consumers, particularly ABM students, have greater awareness of a brand's products and values, marketing efforts tend to be more impactful. This could be because well-informed consumers are more receptive to advertisements, promotions, and brand messages, making them more likely to engage with and respond positively to marketing campaigns.

SOP 5: To examine how various factors influencing brand loyalty—such as product quality, brand image, customer satisfaction, and trust—correlate with levels of consumer awareness among ABM students of San Jose Academy.

Correlation Matrix

		factors	Consumer Awareness
Factors	Pearson's r df p-value	- - -	
Consumer Awareness	Pearson's r df p-value	0.800 126 <.001	- - -

The correlation matrix shows a strong positive relationship between various factors influencing brand loyalty (such as product quality, brand image, customer satisfaction, and trust) and consumer awareness, as indicated by Pearson's correlation coefficient (r = 0.800). This suggests that when these factors are more prominent, consumer awareness also tends to be higher. The p-value (< 0.001) indicates that this correlation is statistically significant, meaning the relationship is unlikely to be due to chance.

This result implies that when brands emphasize high product quality, build a strong brand image, ensure customer satisfaction, and establish trust, consumers become more aware of their offerings. Higher awareness, in turn, may lead to increased engagement with the brand, better retention, and ultimately, stronger brand loyalty.

4. SUMMARY OF FINDINGS, CONCLUSION, AND RECOMMENDATION

This chapter presents the summary and conclusion of the study through the data gathered from the research study "Examining the Relationship Between Consumer Awareness and Brand Loyalty Among ABM Students at San Jose Academy." This chapter will also continue the recommendation.

4.1 Summary

The descriptive statistics provide key insights into the demographic composition and brand loyalty perceptions of the respondents. The majority of the participants are female, with a mean gender value of 1.33. Most students belong to either St. Jude or St. Bernardine, as indicated by the section mean of 2.50. The average age of respondents is 16.9 years, with minimal variation. Socioeconomic status (SES) is centered around the ₱20,000–₱40,000 range, with a mean of 2.16, indicating a diverse financial background.

Regarding brand loyalty factors, positive customer experiences had the highest influence (mean = 4.55), followed closely by trust in a brand (mean = 4.54) and product reliability (mean = 4.53). Brand image (mean = 4.07) was perceived as less influential. Consistency in responses varied, with the lowest standard deviations for trust and customer experience, while brand image showed the most variation in opinions.

The correlation matrix highlights a strong positive relationship between consumer awareness and brand loyalty ($r = 0.778$, $p < 0.001$), suggesting that increased awareness enhances loyalty. Factors like trust, product quality, and emotional connection may mediate this relationship. Similarly, a significant correlation between consumer awareness and marketing effectiveness ($r = 0.820$, $p < 0.001$) indicates that well-informed consumers are more responsive to marketing efforts.

Lastly, brand-related factors such as product quality, customer satisfaction, and trust also show a strong correlation with consumer awareness ($r = 0.800$, $p < 0.001$), implying that improving these elements boosts awareness and, in turn, brand loyalty.

4.2 Conclusion

This study aimed to examine the relationship between consumer awareness and brand loyalty among ABM students of San Jose Academy, addressing the specific research questions through statistical analysis. By analyzing demographic data, consumer awareness levels, and brand-related factors, the researchers identified key insights that help answer the statement of the problem.

1. What is the demographic profile of the student?

   The demographic analysis reveals that the majority of respondents are 17 years old, with a relatively uniform age distribution among senior high school students. The sample is predominantly female (67.2%), which may influence perspectives on brand loyalty and consumer awareness. Each section is equally represented, ensuring balanced data collection. In terms of socioeconomic status, most students come from lower-middle-income households, with the largest group (40.6%) earning between ₱20,000 and ₱40,000 per month. This financial background may play a role in shaping their purchasing behavior and brand preferences.

2. What factors play a role in shaping customer loyalty towards a brand, such as brand image, trust, customer experience, and satisfaction with the performance of the ABM students of San Jose Academy?

   The findings indicate that positive brand experiences, trust in a brand's products and services, and consistent delivery of high-quality offerings are the most significant factors influencing brand loyalty among respondents. Positive interactions with a brand were rated highest, emphasizing the importance of customer experience in fostering loyalty. Trust and reliability also play crucial roles, suggesting that consumers value consistency and dependability in a brand. While brand image remains a contributing factor, it is perceived as less influential compared to other aspects. The low standard deviations for trust and customer experience further reinforce the consistency of these perceptions among respondents. Overall, these results highlight the need for brands to prioritize customer engagement, build trust, and maintain product quality to strengthen consumer loyalty.

3. What is the relationship between consumer awareness and brand loyalty among ABM students of San Jose Academy? What specific mechanisms mediate this relationship?

   The results indicate a strong and statistically significant positive correlation between consumer awareness and brand loyalty among ABM students of San Jose Academy. This suggests that higher levels of awareness—through knowledge of a brand's products, values, and marketing efforts—lead to increased brand loyalty. The relationship is likely reinforced by factors such as brand trust, perceived quality, emotional connection, and effective marketing strategies. As students become more informed through advertisements, word-of-mouth, and social media, their trust and familiarity with a brand strengthen,

making them more likely to remain loyal. These findings highlight the importance of strategic consumer awareness initiatives in fostering long-term brand loyalty.

4. How do different levels of consumer awareness (such as product knowledge and brand recognition) correlate with the effectiveness of marketing strategies in fostering brand loyalty?

   The findings reveal a strong and statistically significant positive correlation between consumer awareness and marketing effectiveness. This suggests that as consumer awareness increases—through greater product knowledge and brand recognition—marketing strategies become more impactful. Well-informed consumers, such as ABM students, are more receptive to advertisements, promotions, and brand messaging, making them more likely to engage with and respond positively to marketing efforts. These results highlight the importance of enhancing consumer awareness to optimize marketing effectiveness and drive stronger brand engagement.

5. To examine how various factors influencing brand loyalty—such as product quality, brand image, customer satisfaction, and trust—correlate with levels of consumer awareness among ABM students of San Jose Academy.

   The results indicate a strong and statistically significant positive correlation between key brand loyalty factors—such as product quality, brand image, customer satisfaction, and trust—and consumer awareness. This suggests that brands that prioritize these elements tend to have more informed consumers. In turn, higher awareness leads to increased brand engagement, stronger customer retention, and enhanced brand loyalty. Therefore, businesses should focus on strengthening these factors to boost consumer awareness and foster long-term loyalty.

4.3 Recommendation

Strengthen Marketing Communication Strategies. Businesses should explore various marketing techniques to understand how they influence consumer awareness and brand loyalty. Effective communication can shape consumer perceptions, strengthen brand trust, and create meaningful connections between sellers and buyers, particularly among students who are still developing their purchasing habits.

Enhance Consumer Education Initiatives. Companies should invest in programs that educate consumers about product value, ethical business practices, and brand authenticity. By increasing awareness of a brand's reliability and quality, businesses can foster greater consumer trust and long-term loyalty.

Diversify Awareness Approaches. Instead of focusing solely on brand popularity, companies should educate consumers about what the brand represents, its ethical practices, and product quality. A well-informed consumer base is more likely to develop strong brand loyalty based on trust and satisfaction rather than just recognition.

Measure Awareness and Purchase Behavior Separately. Businesses should track actual purchase behaviors rather than relying only on self-reported intentions. This will provide a clearer picture of how consumer awareness translates into brand loyalty, helping companies refine their marketing strategies to better engage and retain their target audience.

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Analyzing the Effectiveness of Sustainability Practices in Food Businesses' Business Management in Navotas City

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Abstract: This study analyzes the effectiveness of sustainability practices in food businesses' management in Navotas City, focusing on their impact on profitability, resource management, and customer loyalty. As environmental concerns increase and consumers seek more sustainable options, food businesses are challenged to balance profitability with their environmental and social responsibilities. Using a quantitative approach, this study surveyed 50 food businesses through purposive sampling and conducted semi-structured interviews with business owners and managers to examine how sustainability practices such as saving resources, managing waste, and sourcing ethically are implemented. Findings revealed that sustainability practices generally have a positive impact on financial performance, including increased customer loyalty and help businesses grow. However, the way these practices are applied differs from one business to another. The study also reveals no clear connection between customer perceptions of sustainability and how businesses apply these practices. This suggests that although businesses value customer loyalty, they do not always adjust their practices based on customer feedback. Overall, the research concludes that sustainability practices are effective in improving business management, but their implementation differs across food businesses in Navotas City. The researchers suggested putting an understanding into the effectiveness of sustainability practices in food businesses in Navotas City, especially the importance of including these practices in business management. It provides valuable insights for those who want to improve their sustainability practices. To ensure improvements in their business systems.

Key Words: Sustainability practices; Food businesses; Navotas City; Implementation; Strategies; Customer loyalty; Ethical sourcing

1. INTRODUCTION

1.1 Background of the Study

This research focuses on how to manage sustainable The capacity of our society to develop while assuring the maintenance of the coming generations. In particular, food service operations face increasing pressure to adopt sustainable practices due to growing environmental concerns and consumer awareness. Having difficulty achieving sustainability in this area involves balancing economic performance with environmental and social responsibility.

This study aims to investigate the main factors behind Navotas City food business management's adoption of sustainable practices. Adopting sustainable practices has become a strategic focus for food firms as they deal with demands and difficulties from consumer preferences, regulations, and environmental issues.

This paper aims to give guidance for sustainability practices providing them with the required information and resources that will assist the value of effective sustainable practices in food businesses. These practices encompass a wide range of activities, including efficient resource use, waste management, and ethical sourcing.

1.2 Statement of the Problem

The research aims to investigate and analyze the effectiveness of the business' sustainability practices in terms of their business management.

This research also aims to provide answer the following questions:

1. What is the demographic profile of the respondents in terms of:
    a. Name (Optional)
    b. Gender
    c. Business Name (Optional)
2. What specific sustainability practices are currently implemented by food businesses in Navotas City? Are there particular examples of businesses that are leading in these practices, and how are these initiatives being monitored and evaluated for effectiveness?
3. What is the impact of implementing sustainability practices on the financial performance of food businesses in Navotas City?
4. To what extent do customers' perceptions of sustainability practices influence their decision to patronize and remain loyal to food businesses in Navotas City, and how do businesses gauge and respond to these perceptions to enhance customer engagement and loyalty?

1.3 Significance of the Study

The significance of this study lies in its exploration of the effectiveness of sustainability practices in food businesses in Navotas City from a business management perspective. The goal of this research is to provide insightful information to the academic and practical areas by investigating the effectiveness of implementation and management of these practices. This study can benefit:

Students. This study will help students to understand the Effectiveness and gain insights about the sustainable practices and their importance in the food industry that is fostering a sense of responsibility towards the environment.

Teachers. This research can help the teachers to develop sustainability topics to their lessons, This can inspire them to engage in projects that are related to sustainability.

Parents and Guardians. Parents can learn a lot from this research as they will have knowledge about the sustainable food practices, Giving them knowledge to make better choices for their families about food consumption.

Food Businesses. The study will help them to assess the effectiveness of their sustainability practices, Identifying areas for improvement that could lead to better management and operational efficiency.

Future Researchers. The research can serve as a starting point for more information in sustainability practices, providing data and insights that can be built upon.

1.4 Conceptual Framework

This conceptual framework illustrates the independent and dependent variables of the study, focusing on the sustainability practices that entrepreneurs implement.

Independent Variable	Dependent Variable
Sustainability practices	Effectiveness in Business Management

Table 1. In this framework, the purpose of this research project is to identify which food businesses in Navotas City implement sustainability practices in their operations. Additionally, it aims to outline these sustainability practices, measure their effectiveness, and provide evidence for their impact.

1.5 Scope and Delimitation

The scope of this study will cover the identification of common sustainability practices, their impact on business management, and the factors that affect their effectiveness. Researchers also aim to learn more about the efforts made by business owners to promote sustainable practices in their daily work. The researcher will collect data through survey interviews. The participants of this study will include business owners and customers who will be surveyed and interviewed.

This study is delimited only to 50 food business owners within Navotas City. This study focuses on knowing more about the sustainability practices implemented in their food business.

1.6 Research Hypothesis

Given the objectives stated and formulated by the researches, here are the expected outcomes of this research study:

- Effective implementation of sustainability practices positively influences environmental, social, and economic outcomes in food businesses.
- Strategic alignment of sustainability practices with business goals enhances the overall effectiveness of these practices.
- Adopting sustainability practices in food businesses in Navotas City leads to improved profitability, cost savings, and enhanced financial stability.

2. METHODOLOGY AND REVIEW OF RELATED LITERATURE

2.1 REVIEW OF RELATED LITERATURE

The implemented practices in restaurants and other businesses in the food industries are seen to have a huge effect on business' success. With this, the practices should cater to their sustainability as well as to cater their customers. A study by EunHa Jeong and SooCheong Jang (2010) dictates that food safety, sustainability, quality, and environmental sensitivity affects customer satisfaction and their intent to return, in this case, financial gain and success. In this study they investigated the effects of their practices by conducting a survey to 417 customers which confirmed that the stated factors strongly influence customer satisfaction. This leads the researchers to also aim to study and to gather insights from customers of the food businesses in Navotas City to learn and confirm whether they influence the customization of the practices of the businesses and its success.

Additionally, the study being conducted aligns well with the findings of Raul et al. (2019), which emphasize the importance of green management practices in enhancing both environmental sustainability and economic performance within the agro sector. By investigating similar performance-oriented indicators, this study could explore how practices such as collaborative green transportation and cold storage can be integrated into food businesses in Navotas City. The insights gained from this research could aid local managers and policymakers in understanding the relationship between sustainable practices and operational efficiency, ultimately contributing to improved business performance and sustainability in the local food supply chain.

The implementation of green practices to reduce cost, create positive impressions for customers, and actively measure outcome while motivating and training employees is also an essential for the business management success. According to Baloglu, S., Raab, C., & Malek, K. (2020), having green practices lessen the cost of capital for the business. In this, they learned that food businesses in the South West part of the U.S. are more focused on having and implementing green practices that reduce their capital and operational cost. After this finding, the researchers want to know if the food businesses in Navotas City also operate and think the same way. This underscores the necessity for managers to prioritize sustainability in their strategic frameworks, aligning business goals with environmental responsibilities. Organizations that embed sustainability into their core strategies not only meet regulatory requirements but also appeal to increasingly eco-conscious consumers, thereby enhancing their market position.

Investigating the following will help the researchers confirm the factors that will help them measure the effectiveness of the sustainability practices implemented by food business owners in Navotas City and how the said effectiveness affects the business management of the owners or managers. As consumer awareness and demand for eco-friendly practices continue to grow, it becomes increasingly vital for businesses to integrate sustainability into their core strategies to thrive in a competitive landscape. The existing studies indicate that sustainability is not merely an ethical imperative but a strategic advantage that can drive profitability and long-term success. Future research should continue to explore the evolving landscape of consumer preferences and the effectiveness of various sustainability initiatives, particularly in underrepresented markets and sectors.

Research by Jansen et al. As has been identified in this study, (2020) underscores that for most of the microenterprises functioning in their initial years of inception, to operate is synonymous with efficient financial management. Consistent with previous research [2] young individuals had poor financial knowledge due to many of them barely completed junior or senior high school as well as second, the majority of the respondents are teenagers and adolescents.

In addition, the high reliance of personal savings as a predominant source for funding is part of larger microenterprise finance trends in developing regions where formal lending options are often limited (Rogers 2020). The poor attendance of training and seminars points to a weakness in financial literacy and the provision that it is an avenue where local governments can play a role through collaboration with academic institutions.

Although this study focuses on microenterprise financial behavior in Quezon City, the results provide a basis for further research and may be useful to business owners, policymakers and financial institutions interested in improving the climate for microbusiness development. This way, strengthening financial management capabilities of stakeholders is capable of improving the economic landscape and sustainability of microenterprises in this region.

2.2 METHODOLOGY

2.2.1 RESEARCH DESIGN

Descriptive and Correlational , as the research design to analyze the effectiveness of sustainability practices in managing food businesses in Navotas City is helpful for the researchers. This allows researchers to investigate the associations between variables for example the implementation of sustainability practices and profitability as well as customer satisfaction, while identifying patterns or trends. An analysis of correlational studies allows us to quantify these relationships and provides further insight into the relationship between different variables. This method is

valuable in non-experimental settings when variables cannot or should not be manipulated. Correlation, furthermore helps in exploratory study which finds general trends without knowing that there is a cause and effect relationship.

2.2.2 DESCRIPTION OF PARTICIPANTS

The study's respondents are members of the Navotas City community. They were all selected through purposive sampling. This sampling method is selecting participants based on their characteristics, knowledge, and experiences.

The chosen respondents are fifty (50) business owners in Navotas City. The researchers chose those business owners because they were suitable and applicable to the study.

2.2.3 RESEARCH INSTRUMENTS

The chosen instrument is a Likert scale type survey that aims at obtaining quantitative information about the sustainability practices of food enterprises operating within Navotas City.

The Likert scale survey is a prepared device applying to target and measure the key consequences of specified implementation activities. It is a form that incorporates several items and the respondents are asked to confirm the possession of certain characteristics, attitudes and behaviors pertaining to the items.

2.2.4 SAMPLING TECHNIQUES

Purposive sampling gets us to have respondents to focus on their individual characteristics and knowledge when it comes to their sustainability practices. To gather information from those owners who have a business to provide valuable insights for our study. To ensure that the data we collected reflects their experiences and perspectives of businesses. By this purposive sampling ensures that the respondents we select for our study will provide the most meaningful sustainability practices in the food business here in Navotas City.

$$n = \frac{50}{1+50\,(0.05)^2}$$

$$n = \frac{50}{1+50\,(0.0025)}$$

$$n = \frac{50}{1+\,0.125}$$

$$n = \frac{50}{1.125}$$

$$n = 44.44$$

2.2.5 SAMPLE POPULATION

Slovin's formula was used to calculate sample size from the population. It is used to achieve a certain confidence interval when sampling a population. n = N/(1+Ne^2), this formula is used to calculate the sample size n given the population size N and a margin of error (e).

3.6 METHOD DATA ANALYSIS

This research is a quantitative research and purposive sampling techniques were utilized. The quantitative component entailed 50 food businesses that distributed structured questionnaires across this city, which was stratified by size and type of business for representativeness. The survey analyzed various sustainability practices, from budget management to resources, as well as key performance indicators such as profitability and customer satisfaction. The statistical software used helps in identifying trends and relationships that indicate the overall effectiveness of these practices in enhancing the management of business.

For this purpose, purposive sampling was used to complement the above quantitative analysis by providing qualitative insights from this selected group of key stakeholders who are business owners and managers actively engaged in such sustainability initiatives. Semi-structured interviews provided an opportunity for a deeper understanding into their experiences, challenges, and perceptions regarding the incorporation of sustainable practices. It further enriched the quantitative findings with context and nuanced perceptions on the impact of sustainability on business operations. This is very extensive in evaluation in terms of how sustainability practices are being implemented and how effective these are in driving business success in Navotas City.

3. RESULTS AND DISCUSSION

This section shows the findings through the results of the collected data. Each table represents the statistics of the respondents; it is shown through percentage, frequencies, and means that discusses the response of each business owner.

SOP 1- Demographic Information in terms of Gender

Frequencies of Gender

Gender	Counts	% of Total	Cumulative %
F	40	80.0%	80.0%
M	10	20.0%	100.0%

Table 1. The table above shows the frequencies of the gender in the study's respondents. Based on the table, there are 40 (80.0%) female respondents who participated in this study. Meanwhile, 10 (20.0%) are male respondents.

	Value	Range
Strongly Disagree	1	1.00 - 1.80
Disagree	2	1.81 - 2.60
Neither/Nor Agree	3	2.62 - 3.40
Agree	4	3.41 - 4.20
Strongly Agree	5	4.21 - 5.00

Table 2. The researchers used a 5-point Likert scale to depict ratings on a continuum, with 5 representing the highest rating and 1 representing the lowest. Also, shown on this table that "Strongly Agree" ranges from 4.21 to 5.00, whereas "Agree" ranges from 3.41 to 4.20. Additionally, "Strongly Disagree" ranges from 1.00 to 1.80, while "Disagree" ranges from 1.81 to 2.60. Lastly, the option "Neither/Nor Agree" ranges from 2.62 to 3.40.

STATEMENTS	MEAN	SD	I
1.Implementing budget sustainability practices (e.g., purchasing in wholesale and waiting for sales) has improved our overall financial performance	3.84	1.27	Agree
2. We regularly monitor and evaluate our spending. (e.g.,regular auditing)	3.84	1.15	Agree
3. My business prioritizes cost-effective sustainability solutions.	3.90	1.25	Agree
4. We incorporate methods like buying in bulk and waiting for sales to save money and reduce waste in our financial planning.	3.56	1.34	Agree
5. We use online ordering and delivery to expand our customer	3.56	1.42	Agree
6. We train staff to implement and follow sustainability practices in food preparation and service.	3.68	1.42	Agree
7. We prefer local suppliers to reduce transportation costs and support sustainability.	3.64	1.19	Agree
8. We have a detailed budget that accurately outlines our income and expenses.	3.80	1.31	Agree
9. We have an emergency fund to cover unexpected expenses.	3.30	1.27	Neither/Nor Agree
10. I ensure that our suppliers are treated fairly.	3.50	1.36	Agree
Total	3.66	1.30	Agree

In Table 3, the statement that got the highest mean is the statement that said "We have a detailed budget that accurately outlines our income and expenses." with the mean of 3.80 and the standard deviation of 1.31 which means that the participants agree to the statement. On the other hand, the statement "We have an emergency fund to cover unexpected expenses." got the lowest mean of 3.30 and standard deviation of 1.27 which means that they neither/nor agree to the statement.

Overall, the data shows that the business owners in Navotas City agree in having and implementing sustainability practices in their business management with the mean of 3.66 and standard deviation of 1.30. However, there are some practices such as having emergency funds and implementing practices that enhance the business' overall profitability are not given that much focus on.

STATEMENTS	MEAN	SD	I
11. I evaluate the role of sustainability practices in enhancing the competitiveness of food business in local market	3.64	1.19	Agree
12. Financial sustainability is important in our business	3.68	1.42	Agree
13. We implement sustainability practices that enhance the overall profitability of our business.	3.38	1.39	Neither/Nor Agree
14. Sustainability practices have led to cost savings (e.g., lower expenses and higher profit)	3.72	1.27	Agree
15. Our business has a clear financial plan that is regularly reviewed and updated.	3.84	1.22	Agree
16. Our budget sustainability practices have positively influenced customer loyalty.	3.88	1.26	Agree
17. Our customers appreciate our budget-friendly sustainability efforts.	3.68	1.32	Agree
18. The business is adapting the strategies on customer feedback.	3.52	1.45	Agree
19. Our sustainability initiatives contribute positively to the community in Navotas City.	3.56	1.28	Agree
20. We believe that our sustainability practices have increased customer loyalty.	3.76	1.44	Agree
21. The customer feedback helps to shape sustainability practices and strategies.	3.84	1.33	Agree
Total	3.68	1.32	Agree

Table 4. In Table 4. the statement that got the highest mean is the statement that said "Our budget sustainability practices have positively influenced customer loyalty" with the mean of 3.88 with the standard deviation of 1.26 which means that the respondents agree with the statement. On the other hand, the statement "We implement sustainability practices that enhance the overall profitability of our business" got the lowest mean of 3.38 with the standard deviation of 1.39 which means that they neither/nor agree with the statement.

With the data, it is evident that the participants find that implementing sustainability practices are effective in their business management with the overall mean of 3.68 and standard deviation of 1.32. The data also showed that there are only several positive impacts to the business' financial performance. Additionally, the data showed that customer loyalty also serves a huge part on the business' financial performance.

Correlation Coefficient (r) Value	Indication
Between ± 0.8 to ± 1.0	High correlation
Between ± 0.6 to ± 0.79	Moderately high correlation
Between ± 0.4 to ± 0.59	Moderate correlation
Between ± 0.2 to ± 0.39	Low correlation
Between ± 0.1 to ± 0.19	Negligible correlation

Table 5. The table above shows the value of the correlation together with the indication of how correlated the variables are, which are the customer's perceptions and the business' sustainability practices.

Correlation Matrix

		Customer's Perception	Sustainability Practices
Customer's Perception	Pearson's r	—	
	df	—	
	p-value	—	
Sustainability Practices	Pearson's r	0.993	—
	df	48	—
	p-value	< .001	—

Table 6. The table presents the relation between the customer's perceptions and the sustainability practices. As indicated by the correlation coefficient of 0.993 and p-value of <.001 in the table, the findings show that there is no relationship between the two variables.

4. SUMMARY OF FINDINGS, CONCLUSION, AND RECOMMENDATION

4.1 SUMMARY OF FINDINGS

This study aims to analyze the effectiveness of the sustainability practices that food businesses in Navotas City have. 50 food businesses were chosen to participate in this study. They were selected using random sampling, and were given a Likert scale type survey to answer.

1. Demographic Information- Gender

The respondents of this study are business owners inside Navotas City. The total number of participants was 50 business owners. There are 40 (80%) female respondents and 10 (20%) male respondents.

2. Frequencies- To measure the Implemented Sustainability Practices and its Effectiveness

A frequency test was conducted for the Statement of the Problem number 2 and 3, the results indicated the the weighted mean for the Statement of the Problem 2 is 3.58 that is interpreted as "Agree", while the weighted mean for the Statement of the Problem 3 is 3.72 that falls under "Agree".

3. Correlational Matrix- To measure the relationship between Customers' Perception and Sustainability Practices

The analysis revealed that SOP (Statement of the Problem) 2 and 3 have no degrees of significance, with the p-value of <.001. Which shows that there is no relationship between Customers' Perception and Sustainability Practices.

4.2 CONCLUSION

The study focused on the effectiveness of the implemented sustainability practices of food businesses in Navotas City. The researchers aimed to analyze the effectiveness of the said practices to enhance the business' business management and profitability.

Based on the finding of this study, the researchers have discovered the following:

1. Firstly, the data revealed a generally positive take on the financial effectiveness of sustainability practices within businesses. It was evident that they implement sustainability practices, such as regular financial monitoring and cost-effective alternatives. However, it also revealed inconsistency in how businesses implement these practices. Overall, the

data showed that the businesses value and implement sustainability practices in their management, though there are variations in the intensity of their practices.

2. Secondly, the study showed that there are several positive impacts of implementing sustainability practices on the financial performance of food businesses in Navotas City. One of which is customer loyalty, by this the business gains return customers that reflects on their financial performance. It also helps the business grow their market more due to the free advertisement done by their loyal customers.

3. Thirdly, the study did not show any relationship between customers' perception and sustainability practices. With this said, though the food businesses in Navotas City value customer loyalty, they deny considering their customers' perception with customizing and implementing their practices.

The findings state that the implemented sustainability practices that the food businesses in Navotas City have are effective for their business management. However, there was inconsistency in how they applied these practices. Overall, the study suggests that while sustainability is valued and implemented in management, the approach to its integration varies among businesses.

5.3 RECOMMENDATION

After gathering and carefully studying the collected data, the researchers suggests the following:

1. Every business owner must understand the importance of implementing sustainability in their operations for strategy and growth that align with profitability and responsibility. It can lead to awareness and social awareness.

2. Businesses should provide a budget to support and improve training facilities to ensure that employees are well trained, skills, and knowledge to carry on sustainability practices effectively. It has a big reflection in one business to enhance employee, and productivity. It enables employees to improve, learn, and practice their skills not only in the business but to enhance their capabilities in one business.

3. Businesses should take into consideration the feedback from consumers in order to enhance their business practices. through applying helpful feedback that has the potential to greatly improve their methods, results, and consumers. By paying attention and considering this, businesses may alter their products to better accommodate these demands, boosting customer satisfaction and loyalty.

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Understanding the Influence of Entrepreneurial Leadership Skills on Career Development Among Senior High School Accountancy Business Management (ABM) Strand Students in San Jose Academy.

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Abstract: This study shows the influence of entrepreneurial leadership skills on the career development of students. With a growing emphasis on entrepreneurial skills, the importance of Entrepreneurial Leadership competencies becomes relevant to the most gainful career paths in the future, such as creating and working on innovative ideas, the ability to make decisions and take risks. This fills a critical gap as the goal of this study is to assess how these skills ultimately bring students to their career ambitions, readiness, and advancement. A quantitative research study was used to guarantee that the collected data would be statistically significant and credible and was carried out by conducting surveys to a sample of 128 respondents from four sections of the ABM (Accountancy, Business, and Management) strand. The age of the respondents was 16 to 18 years old. The study shows that 16 years old has 31.3% while 17 years old 51.6% and 18 years old there are 17.2% which indicates that the majority of respondents who want to be an aspirant business owner 17 years old In this study, the data shows positive perceptions of leadership qualities, emotional intelligence, financial status, and environmental changes influence confidence, adaptability, and career development outcomes in individuals.

Keywords: Entrepreneurial leadership skills, thinking skills, Business.

1. INTRODUCTION

This chapter shows the background of the study, statement of the problem, significance of the study, scope and delimitation, conceptual framework, definition of terms.

1.1 Background of the Study

In the rapidly evolving global economy, entrepreneurial leadership has emerged as a critical driver of innovation and growth. It also plays a crucial role in shaping the future of businesses and industries worldwide entrepreneurial leadership is an essential trait for thriving in today's competitive business landscape. Aside from that, entrepreneurial leadership encompasses a unique set of qualities that are crucial for success in the dynamic business environment. This study is to explore the Influence Of Entrepreneurial Leadership Skills on Career Development Among Senior High School Accountancy Business And Management students which will be useful, particularly for students and future researchers who may or will do this type of study.

Leaders are usually known for their continual learning behavior that helps them to sustain and achieve desired objectives in the form of success, (Villaluz and Hechanova, 2021) thus; this study proves that knowing leadership skills plays an important role in career development.

The study shows that the majority of the research examined is concerned with how entrepreneurial leadership skills impact the career development of an individual.

1.2 Statement of the problem

The research aims to study and investigate how entrepreneurial leadership skills impact the career development of Senior High School Students Accountancy Business and Management strand at San Jose Academy.

How does demographic profile of the respondents may be described based on:

1.1 Grade Level

1.2 age

1.3 financial capability

1.4 Students environment

1. How often do ABM Strand students spend on activities that may develop their creative thinking and critical thinking skills?
2. What benefits can students gain from having creative and critical thinking?
3. How does financial status affect the career development of students?
4. How do changes in the environment alter the perception of a student?

Despite the recognized importance of entrepreneurial skills in fostering career readiness and success, there is a lack of empirical research specifically examining their influence on senior high school students, this gap hinders the ability of educators and career counselors to implement effective programs that could enhance the students career expectations.

1.3 Significance of the Study

STUDENT - The study emphasizes the value of important abilities like risk management, creativity, innovation, and problem-solving. Understanding how these abilities influence career goals can motivate students to improve and hone them.

TEACHERS - Teachers can use the study insight about how an entrepreneurial mindset influences job aspirations to create more successful and meaningful learning experiences. This may result in the inclusion of entrepreneurial skills in the curriculum.

SCHOOL - The significance of this study is in the ability to gain insights that might help to understand how the students in the Accountancy business and management strand perceive career choice based on the vested entrepreneurial mindset. Understanding these dynamics can have several important implications for educational practices and policies educational strategies: the findings can assist schools in developing and supporting interventions aimed at enhancing students' level of entrepreneurial thinking. It may consist of seminars, training sessions, homework, tutoring, or any other activities that positively introduce innovative and resilient attitudes towards learning.

FUTURE RESEARCHER - This study explores the impact entrepreneurial mindset of Accountancy Business and Management strand students, offering contributions for future research and practical applications. This study will serve as a guide for future researchers.

1.4 Scope and Delimitation

This study will determine whether entrepreneurship impacts the career growth of senior high school students and the influence of leadership abilities including creativity, risk-taking attitude, decision-making ability, etc. The study will focus on students in a specific area over a year to clarify how these skills develop to impact student aspirations and career goal setting. A wider range of leadership skills or aspects around career development beyond those related to entrepreneurship are also out of the scope of the research. This study will exclude participants who are engaged in professional roles or enrolled in educational programs beyond the high school level. The following are included based on the exact focus of research interest in senior high school students to allow for direct relevance and application.

1.5 Conceptual framework

Entrepreneurial leader leadership skills involve building a team or organization.



These graphs deeply analyze the broader impact of entrepreneurial leadership on the business. Understanding the influence of entrepreneurial leadership skills involves exploring how these skills can shape their future career paths and success.

Entrepreneurial leaders often exhibit a high level of risk-taking behavior, which involves making bold decisions that have the potential for significant outcomes, whether positive or negative. Innovation is another key trait that sets entrepreneurial leaders apart. They are constantly looking for new ideas, processes, or products that can give them a competitive edge in the market. Comfort with uncertainty is crucial for entrepreneurial leaders, as

they operate in dynamic environments where outcomes are often unpredictable. Their ability to navigate ambiguity and still make informed decisions is a valuable skill. Having a strategic vision allows entrepreneurial leaders to set long-term goals and steer their organizations toward success. this foresight enables them to anticipate challenges and opportunities in the ever-changing business landscape adaptability is essential for entrepreneurial leaders to thrive in today's fast-paced world they must be willing to pivot their strategies quickly in response to feedback, market shifts, or technological advancements networking and communication skills are vital for entrepreneurial leaders to build relationships, attract resources, and rally support for their ventures the ability to connect with others effectively can open doors to new opportunities and collaborations.

2. METHODOLOGY AND REVIEW OF RELATED LITERATURE

2.1 Review of Related Literature

Foreign Literature

Numerous studies have explored the relationship between entrepreneurial leadership skills and career development. For instance, a study by Gupta et al. (2019) examined the impact of entrepreneurial leadership on student engagement and career aspirations among business students.

The research utilized a quantitative approach with surveys distributed to a large sample size, which allowed for statistical analysis of data.

Another relevant study by Zhao et al. (2020) focused on the role of entrepreneurial leadership in fostering innovation and adaptability among students in business programs. While both studies provided valuable insights into the relationship between entrepreneurial leadership and career development, they also had limitations. Gupta et al.'s reliance solely on quantitative methods may overlook nuanced experiences that qualitative data could reveal. Similarly, Zhao et al.'s mixed-methods approach may complicate data interpretation due to differing methodologies.

The appropriateness of research designs in prior studies can be evaluated based on their alignment with research objectives. Gupta et al.'s quantitative design was effective for establishing correlations but lacked depth in exploring individual experiences. Conversely, Zhao et al. mixed-methods approach offered a more holistic view but introduced complexities that could affect clarity.

In contrast, the present study will adopt a predominantly qualitative methodology through semi-structured interviews with ABM students at San Jose Academy. This choice is informed by the need to capture rich, detailed narratives about how entrepreneurial leadership skills specifically influence career development among students in this particular educational setting. Nurturing an entrepreneurial mindset extends Beyond assimilating the necessary skills and reaches more deeply into cognitive processes at a higher level of how people practice entrepreneurship. Most of these cognitive phenomena sit uniquely on top with the characteristics of strong problem-solving, creative abilities and passion all important for thriving in a fast-moving corporate environment today.in addition, people with this mindset have increased competency in terms of critical skills, strategy planning, and flexible coping and adapting mechanisms in this constantly changing society. (Wardana et al., 2020)

According to Germán Vargas-Callejas, et al., (2018), We are feeling the effects of climate change more and more in our daily lives. While some social groupings remain skeptical, the majority of lay discourses demonstrate an understanding of the current environmental issues. Young people's voices need to be heard in order to move forward and create action plans to mitigate and adapt to climate change.

According to Erin Doyle
Australian (2011), Finding out if this student cohort's career demands are different from those of other university students is crucial, especially in light of the Australian federal government's increasing funding to enhance the enrollment of students from low socioeconomic backgrounds. This will guarantee that career services provide thorough and efficient support while avoiding repetition or needless actions.

Local literature

According to Emejidio C Gepila Jr, Paul S Agulto, Kate F Fetalcorin, Sophia E Elgario (2022), The purpose of this study is to assess the thinking abilities of senior high school students at Philippine State University studying accountancy and business management. It also seeks to ascertain the correlation between the respondents' age and sex and their degree of thinking abilities. The research methodology employed in the study was descriptive-correlational.

According to Patrick Glaser, (195-207, 2012) Human subjects research data gathering depends on participants' voluntary or involuntary involvement. Respondent cooperation is the extent and thoroughness to which participants voluntarily participate in the data collection process when using conventional survey and opinion research methods.

According to Christian Harrison, et al.,(2016) International Review of Entrepreneurship 14 (2),
This paper provides a comprehensive review of literature relating to entrepreneurial leadership. A systematic literature review (SLR) is an acknowledged method for producing reliable knowledge from an evidence-based approach. The SLR approach applied in this paper is conducted in three stages to provide support for the conceptual development of entrepreneurial leadership.

According to Kim Yin Chan, et al., Journal of Vocational Behavior 81 (1), 73-88, 2012
We propose a person-centered framework for conceptualizing subjective careers in an increasingly boundaryless work context. Specifically, we argue that entrepreneurship, professionalism, and leadership (EPL) can serve as three key dimensions of subjective career space. We relate this framework to earlier macro-level national and organizational career models proposed by Kanter (1989) and Schein (1978). Our empirical study

involving 10,326 Singaporean university students demonstrated that entrepreneurial, professional, and leadership career aspirations (including motivations, efficacies, and intentions) can be measured independently, that these career dimensions are independent of vocational interests, and that they are to some degree viewed as competing career alternatives.

Étienne S, et al., Journal of Career Development 42 (4), 325-338, 2015 Mentoring is reputed to support the career choices and development of individuals in various contexts. This study is one of the few that investigates the effect of mentoring on the career satisfaction and retention of novice entrepreneurs. We surveyed 360 novice entrepreneurs who had been supported by a mentor. Our analyses demonstrate the direct effect of mentoring on entrepreneurial self-efficacy, which mediates the relationship between the satisfaction of being an entrepreneur and the intention of staying in the profession. Moreover, mentoring not only has an indirect effect on satisfaction; it seems to have a negative direct effect on intention. This result could possibly be due to the awareness of novices regarding the limitations of their initial business project. Given that entrepreneurs are closely tied to their business projects, mentoring should come earlier in the entrepreneurial process in order to influence career satisfaction and retention of novice entrepreneurs.

According to Joshua D, et al., (2023) Journal of Small Business Management 61 (1), 12-44, Despite an increasing interest in understanding the mindset of entrepreneurs, little consensus exists on what an entrepreneurial mindset (EM) is, how it is developed, or its precise outcomes. Given the fragmented nature of the multidisciplinary study of EM, we review prior work in an effort to enhance scholarly progress. To this end, we identify and review 61 publications on the topic and offer an empirically derived, integrated definition of EM.

CRITICAL THINKING SKILLS IN STUDY:

Critical thinking in education is an enduring and controversial topic. A plethora of articles, books, and studies exist in the field, particularly from recent years, making a fully comprehensive review of the literature virtually impossible. It is a broad topic overlapping with many areas of study in various disciplines, including cognitive psychology, philosophy, human development, curriculum development, and educational psychology, to name a few. An effort is made in this review to cover a wide range of issues relevant to critical thinking as well as the most important and controversial works.

To start, we discuss the movement in critical thinking followed by definitions and theories of critical thinking. We then present an overview of efforts in curriculum and instruction related to the teaching and learning of critical thinking, as well as a discussion of the issues involved in teacher training. The testing and evaluation of critical thinking capacities is then discussed. Finally, we make some suggestions for further research that is needed.

Given the context of "double innovation," college students will be the center of future economic growth, making study on their entrepreneurial leadership extremely valuable. In order to examine the characteristics that influence college students' entrepreneurial leadership, this study uses the partial least squares method with a focus on college students.

Not only may entrepreneurship, and social entrepreneurship in particular, improve human well-being and quality of life (Zahra & Wright), but it can also heighten anxiety related to one's profession. We discussed the potential that while students' anxiety about their future careers is negatively correlated with their entrepreneurial goals, their aptitudes, such as leadership and innovation, may have a positive effect.

METHODOLOGY

2.2 Research design

The study collects data using a quantitative survey method designed to examine the relationship of entrepreneurial leadership skills and career development. Researchers employ a quantitative, correlational method, which allows them to observe the relationship between these two variables and generalize their results to a larger population. The design of the study is cross-sectional, which means that it assesses the association between these two factors at a single point in time rather than observing changes over time. The focus is on understanding what works best to address the research problem, rather than adhering strictly to a single philosophical concept.

2.3 Research instrument

The study will use Likert scale question surveys to Senior High School Accountancy Business And Management Strand Students In San Jose Academy. By employing this method, the researchers aim to gather clear and concise responses that will provide valuable insights into how entrepreneurial leadership and skills impact career development. for demographic profile, it will include the following; the name, Gender, Age, and Section. The

focus on Senior High School Accountancy Business and Management Strand students at San Jose Academy will allow for a tailored understanding of these dynamics in a specific educational context. The survey will seek to identify key areas where leadership and entrepreneurial skills contribute to students' career readiness, potentially guiding curriculum enhancements and policy decisions. Through careful analysis of the collected data,
The study hopes to highlight effective strategies that educators can implement to better prepare students for successful careers in a rapidly evolving business landscape. The questionnaire has fourteen items.

2.4 Validity and Reliability

To explicitly ensure the questionnaires used in the study, the researchers will use face validity to identify entrepreneurial leadership skills and their influence on the career development of Accountancy Business and Management students; following that, the researchers will seek out a panel of experts in education, and subject teachers that are specialized for business and marketing will review the questionnaire. They are going to give input on each item's applicability and clarity, making sure that the questions adequately cover the concepts of entrepreneurial leadership
skills and their influence on career development.
The required revisions will be made in response to their input in order to improve the validity and credibility of the research instruments.

The *respondents answered these questions using the following Strongly Agree - 5 Agree - 4 Neither Agree or Disagree - 3 Disagree - 2 Strongly Disagree - 1 by putting a check on each question.*

2.5 Sample population

Senior High School ABM Strand Sample Size

St Jude - 47
St Matthew - 46
St Bernardine - 46
St Peter Faber - 49
= 188

Slovin's formula

$$n = \frac{N}{1+Ne^2}$$

n= ?
N= 188
e= 0.05%

Where in

$$n = \frac{188}{1+188(0.05\%)}$$

n = 127.891 or 128

2.6 Method of Data Analysis

The collected data will be provided to researchers for interpretation following the survey; hence, the Jamovi application will be used to provide summarized data with numerical visualization following computation. Consequently, the researchers will use a scale to assess the results and offer brief interpretation for any significant relationships found.
Consequently, the researchers will use a scale to assess the results and offer brief interpretation for any significant relationship found.

3: RESULTS AND DISCUSSION

Table 1

Frequencies of Gender

Gender	Counts	% of Total	Cumulative %
F	**84**	**65.6%**	**65.6%**
M	**44**	**34.4%**	**100.0%**

Based on Table 1, there are 84 (65.6%) female respondents who participated in this study. Meanwhile, there are 44 (34.4%) male respondents.

Table 1.1

Frequencies of Age

Age	Counts	% of Total	Cumulative %
16	40	31.3%	31.3%
17	66	51.6%	82.8%
18	22	17.2%	100.0%

Based on Table 1.1, there are 40 (31.3%) 16-year-old respondents, 66 (51.6%) 17-year-old respondents, and 22 (17.2%) 18-year-old respondents.

Table 1.2

Frequencies of section

section	Counts	% of Total	Cumulative %
bernardine	32	25.0%	25.0%
jude	28	21.9%	46.9%
jude	4	3.1%	50.0%
matthew	32	25.0%	75.0%
peter	32	25.0%	100.0%

Based on Table 1.2, there are 32 (25.0%) three sections, such as Bernardine, Matthew, and Peter respondents. Meanwhile, there are 28 (21.9%) jude respondents and 4 (3.1%) jude respondents.

Table 2

Frequency of ABM Strand Students Engaging in Activities that Foster Creative and Critical Thinking Skills

STATEMENTS	MEAN	SD	I
3. I believe that effective communication is essential for leadership	4.11	0.990	Strongly Agree
5. I think critical thinking is a vital skill for leaders	4.25	0.804	Strongly Agree
14. I am comfortable presenting my ideas to a group	3.71	1.323	Strongly Agree
TOTAL	**4.02**	**0.632**	**Strongly Agree**

The table shows that the highest score 4.25 (SD= 0.804) reflects the importance of effective communication for leadership. Meanwhile, the comfort in presenting ideas to a group received the lowest score 3.71 (SD= 1.323). Overall, the total mean score of 4.02 (SD= 0.632) suggests a strong, consistent agreement across all statements, reflecting a generally positive perception of these leadership qualities.

Table 3

Benefits that can students Gain from having Creative and Critical Thinking

STATEMENTS	MEAN	SD	I
4. I believe that failure is part of learning as a leader	4.22	0.803	Strongly Agree
11. I believe emotional intelligence plays a role In an effective leadership	4.16	1.002	Strongly Agree
TOTAL	**4.19**	**0.658**	**Strongly Agree**

Based on Table 3, it shows that the highest mean score is 4.22(SD= 0.803), related to the belief that failure is part of learning as a leader. The lowest mean score is 4.16(SD= 1.002), related to the belief that emotional intelligence plays a role in effective leadership. Overall, these high scores reflect strong agreement among respondents.

Table 4

Correlation Matrix

		sop 4	Q7
sop 4	**Pearson's r**	—	
	df	—	
	p-value	—	
Q7	**Pearson's r**	0.558	—
	df	126	—
	p-value	<.001	—

Based on Table 4, the study illustrates that there is a statistically significant positive correlation between financial status (sop 4) and career development (Q7). There was moderate to strong positive correlation r(0.558)= 126 and a highly significant (p<.001) that students with better financial status tend to have better career development outcomes.

Table 5

Changes in the Environment Alter the Perception of a Student

STATEMENTS	MEAN	SD	I
6. I feel confident in making decisions under pressure	3.34	1.331	Strongly Agree
12. I can solve my own problems	4.08	1.084	Strongly Agree
13. I can decide on your own	3.96	1.180	Strongly Agree
TOTAL	**3.79**	**0.701**	**Strongly Agree**

Based on Table 5, it shows that the highest mean score is 4.08(SD= 1.084), related to their ability to solve their own problems. The lowest mean score is 3.34(SD= 1.331), related to their confidence in making decisions under pressure. Overall, environmental changes likely influence their confidence and adaptability, shaping their overall perception of their capabilities.

4. Summary of findings, Conclusion, and Recommendations

4.1 Summary of Findings

To give an outline, the result of the survey shows that the majority of respondents are 17 years old (51.6%). Furthermore, table 1.1 shows that the highest score 4.25 (SD= 0.804) reflects the importance of effective communication for leadership. Meanwhile, the comfort in presenting ideas to a group received the lowest score.

Overall, the total mean score of 4.02 (SD= 0.632) suggests a strong, consistent agreement across all statements, reflecting a generally positive perception of these leadership qualities. The survey result also explicitly shows that failure is part of learning as a leader and it is vital in every individual's career growth. In addition, emotional intelligence also plays a crucial role in effective leadership.

Based on the summary of findings, this study indicates that the understanding of entrepreneurial leadership skills significantly influence the career development and decisions of senior high school students from Accountancy, Business and Management in San Jose Academy.

4.2 Conclusion

Based on a summary of findings the study emphasized the significance of entrepreneurial leadership skills in shaping the career development and decision making of senior high school students, particularly those in Accountancy business, and management strand at San Jose Academy. The results of the study highlight that effective communication and emotional intelligence are fundamental components of successful leadership that also play a key role in the growth of the career path of a student. Despite challenges, such as the displeasure presentation of an idea in a group, students recognized the importance of failure and learning for personal development. In conclusion, this study deepens the need of nurturing entrepreneurial leadership skills in educational settings to better prepare students for their future careers.

4.3 Recommendations

Critical thinking and decision-making

To better understand the influence of entrepreneurial leadership skills on a career development of ABM (Accounting, Business and Management) students the teachers should give activities or programs that incorporate entrepreneurial leadership skills to better prepare students for their future careers. These activities or programs should focus on practical skills for instance decision-making and innovation.

This certainly will enhance students' capacity to lead in professional settings and enable them to acquire or unlock critical entrepreneurial skills that are essential in business events.

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The Role of Entrepreneurship on the Financial Decision Making of Grade 12 Students of San Jose Academy

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Abstract: This study aims to know the role of entrepreneurship on the financial decision making of grade 12 students of San Jose Academy. The purpose of the study is to determine (1) the demographic profile of the respondents (age and strand), (2) does the subject of entrepreneurship improve the students ability to allocate their allowances for daily use, (3) determine the different factors that affect the financial decision making of students, and (4) determine the influence of entrepreneurial education on the financial decision making of the students. The researchers used survey-questionnaires to gather data and information to the chosen respondents of the study. The survey-questionnaire is composed of closed-ended statements regarding the objectives and is in the form of evaluation of each statement. The researchers determined that the respondents are between the ages of 15-28 years old, with respondents commonly aged 17-18 years old. STEM students are the highest frequency of respondents followed by ABM students, HUMMS students, and GAS students being the lowest frequency of respondents. The researchers found out that entrepreneurship isn't just for a single strand which is ABM strand which is more exposed to business related or entrepreneurship. Entrepreneurial education has also significantly impacted other strands which are GAS, STEM, and HUMMS in terms of financial decision making. It is concluded that other strands can learn through the subject entrepreneurship. Additionally, the entrepreneurship subject only lasts for a semester making the correlation between financial decision making and entrepreneurship weak. The subject focuses more on how to build a business rather than financial literature. In conclusion, entrepreneurial education impacted grade 12 students in San Jose Academy in making good financial decisions in their everyday lives. Thus, entrepreneurship education is an important matter for students throughout their education as it significantly affects their ability to make decisions financially about the current and the future.

1. INTRODUCTION

This chapter presents the arguments and problems our study aims to provide answers to.

1.1 Background of the study

Entrepreneurship is the capacity and willingness to create, plan, and manage a business venture, along with all of its unknowns in order to turn a profit. The desire to create new companies and goals in order to succeed in its businesses. It also refers to knowledge in different aspects of growing a business as well as minor ideas like financial literacy. Financial literacy refers to the knowledge about having financial awareness or wellbeing. According to Turner, there are five principles of financial literacy (Earning, Saving, Borrowing, Spending and Protecting Assets) that enable you to use money wisely, make informed decisions about finances, create budgets, manage debts and plan your financial future. In this modern day, studying financial literacy is important in having

to deal with daily lives. It makes the lives of others easy by having enough knowledge on it. Entrepreneurship is one of the subjects that is being teached in Grade 12 Senior High school students in order to have a brief background on the business sector. It prepares Senior High students for future business ideas and goals. In this study, the researchers aim to understand the role of Entrepreneurship in the financial decision making of Grade 12 students at San Jose Academy. In the modern age, students appear to be more impulsive, have many trends that they are driven to follow, have a lavish lifestyle, and the majority does not know how to budget, save and allocate their money to important things. Most of the young generation are familiar with business and entrepreneurship but they lack the necessary knowledge and proper education for it. By that, the researchers have a need to conduct this study to further analyze the importance and impact of learning Entrepreneurship in enhancing the financial management skills of the students.

The significance of Entrepreneurship to the financial decision making of students is very crucial especially in the present day. In this paper, the researcher's purpose is to offer help and give guidance to the students in improving and developing their ability in managing their finances. In making strategic financial decisions, businesses can optimize profitability, mitigate risks, and guarantee long-term sustainability. That's why providing students with knowledge about Entrepreneurship has a significant positive impact in nourishing the mindsets, values and decision making of the graduating students.

Entrepreneurs are known to be good at making difficult decisions, and after this study, the researchers want to achieve that the Grade 12 Students of San Jose Academy will have the mindset and principles of a Entrepreneur that will help them master their financial decision making.

1.2 Statement of the Problem

This study sought to examine the role of entrepreneurship on the financial decision making of the students. This study aims to achieve the following objectives:

1. What is the demographic profiles of the respondents in terms of:
   1.1 Age
   1.2 Strand

2. How does the subject of entrepreneurship improve the students ability to allocate their allowance for daily use?

3. What are the different factors that affect the financial decision making of students?

4. What is the influence of entrepreneurial education on the financial decision making of the students?

1.3 Significance of the study

This section enumerates the importance of this study. The study may be important to several groups and individuals.

Students - This research helps the students become more financially responsible in their decisions regarding their finances

Teachers and School - This research helps the school see the importance of teaching Financial Literacy in each curriculum.

Future researchers - This research helps the future researchers on gaining more knowledge on Financial Literacy, and how it affects the financial decision making of students.

1.4 Scope and Delimitations

This study focuses on how the Grade 12 students of San Jose Academy perceive the role of learning Entrepreneurship on their financial decision making, what factors they consider, how they implement their learnings in their day to day lives, and how they can establish what is a good financial decision and what is a bad financial decision.

The target respondents of this research are the Grade 12 students of San Jose Academy that learned the subject of Entrepreneurship in their first semester. Furthermore, this research will help the students enhance their financial decision-making, and will contribute to how

important financial literacy is to make better financial decisions.

1.5 Conceptual Framework

Independent variable	Dependent Variable
Entrepreneurship	Financial Decision Making

The conceptual framework shows the Independent and dependent variables of the study. This study aims to find out the role of entrepreneurship to the financial decision making of students. As entrepreneurship is a subject all of the strands had in their 1st semester, we aim to know if this subject affects the financial decisions of students and if Entrepreneurship has a relationship with financial decision making.

With this in mind, here are the hypothesis the researchers settled on:

Null Hypothesis:
There is no relationship between other grade levels of students at San Jose Academy on their financial decision making on Entrepreneurship as they don't have the subject to attend.

Alternative Hypothesis:
There is a significant relationship on financial decision making of Grade 12 students of San Jose Academy on Entrepreneurship.

1.6 Definition of terms

Entrepreneurship - Entrepreneurship is the capacity and willingness to create, plan, and manage a business venture.

Financial Literacy - "Financial literacy is the ability to understand and effectively use various financial skills, including personal financial management, budgeting, and investing." (Fernando, Jazon, 2024)

Financial decision making - According to Zazil Martinez (2024), financial decision making is choosing between different financial choices to achieve your financial goals.

country as it is considered as the foundation of the economical growth of the country, there is a lack of focus in developing creativity and innovation as a mindset of the students in the education system.

"This study aimed to determine the enabling environment factors for entrepreneurship development of the respondents in terms of: personal, social, technological, economic, psychological and political-legal; test the significant difference on the enabling factors when grouped according to profile variables and to propose a plan of action to enhance the enabling environment factors toward entrepreneurship development." (Dr. Remedios P. Magnaye, 2022)

2. Review of Related Literatures and Methodology

This chapter presents the literature that is connected to the study and the methods used.

2.1 Entrepreneurship

Entrepreneurship in all aspects is proving that universities like engineering schools, business schools, and other institutions have been progressively common to see. Entrepreneurship is presented as being experiential in nature, defining the characteristics to prospective students in most model programs across the globe and advertised into. (Matthews et al, 2021; Fayolle, 2018)

Entrepreneurship is a special kind of tool for social activities that has an effect on its ability to educate people. The effectiveness and use of entrepreneurship has sometimes led to doubts among scholars, educators, administrators, entrepreneurs, students and other groups. It remained a hot topic in attracting researchers for its ability and effectiveness in empowering society. With the continuous change in the society, the entrepreneurship educators have been focusing on entrepreneurship education to its extent to play a crucial role in everyone's ability and perception. (Liu et al., 2020)

It was found in a study that the higher the level of entrepreneurship education students received, the stronger the self-efficacy presented. In addition, it was also found that taking entrepreneurship classes has a positive role in shaping student's entrepreneurial intention, entrepreneurial attitude, and the entrepreneurial mindset. (Mei et al., 2020; Wardana, 2020)

According to Aida Velasco (2023) though entrepreneurship is studied all around the

2.2 Financial Decision Making

According to the study of Cortés et al. (2023) Differentiating from a general work hypothesis that states that their decisions, how economic-administrative students from two Argentine universities make financial decisions. The general work hypothesis will be supported by the evidence presented in the study. The results of the study support their hypothesis, which states that there is no connection between the choices made by the study's participants and their bachelor's degrees. Also, there is a gender difference in decision-making, leading one to believe that financial judgments made solely in gainful territory differ.

According to the study of Albert, Réka. (2023), Influencing the appearance of biases in the behavior of university students. Studied biases are herding the behavior, overconfident, mental accounting, loss-aversion, anchoring and introspection. It highlights that gender significantly influences biases, with men being more affected by herding, overconfidence, mental accounting, and loss aversion. While it was discovered that the presumption that the Cognitive Reflection Test results influence these biases is invalid.

2.3 Research Design

The research uses correlational research design because the aim of this study is to find out

how Grade 12 students' of San Jose Academy financial decision-making skills are related to the entrepreneurial knowledge of the students. The study makes the assumption that having the knowledge of entrepreneurship affects the students' financial judgments, students who are engaging in entrepreneurial activities have higher levels of knowledge in handling their financial decision making.

2.4 Sample population

The participants in this study are Grade 12 students of San Jose Academy that is a total of 310 students and the respondents will be randomly chosen among the Grade 12 students.

The researchers used Slovin's formula to determine the sample size. It helps the researchers get an estimate on how large their sample size needs to be.

Slovin's formula:

n= $N/(1+Ne^2)$

Where:
n = Sample size
N = Population
e = Margin of error

Wherein:

n= $310/(1+310(0.05^2))$

N= 310
e = 0.05
n = 174.648

2.5 Research Instrument

The researchers aim to see the correlation of the entrepreneurial subject and the financial decision making of the student therefore, the instrument that is used in this research is the rating scale or more specifically, the likert scale. This is because it is the easiest and less time consuming form of collecting and analyzing data. We used a 4- point likert scale (4 - Strongly Agreed, 3 - Agreed, 2 - Disagree, 1 - Strongly Disagree) to get the ratings in which the respondents think the statement is agreeable or not.

2.6 Method of Data Analysis

The researchers used Simple random sampling for this study. According to Shagofah Noor et. al (2022) simple random sampling is the most utilized sampling method in quantitative studies not only because it is the easiest, but also because it ensures that the data is unbiased and the population is equally represented.

3. Results and Discussion

(SOP 1) Table 1

Frequency of Grade and Sections

Grade and Section	Counts	% of total	Cumulative %
12 - Anselm	23	13.2%	12.2%
12 - Agatha	22	12.6%	25.9%
12 - Bernardine	26	14.9%	40.8%
12 - Claire	22	12.6%	53.4%
12 - Jerome	17	9.8%	63.2%
12 - La salle	22	12.6%	75.9%
12 - Peregrine	21	12.1%	87.9%
12 - Peter	21	12.1%	100%

This table presents the number of respondents from each strand, with most of the respondents being students from St. Bernardine with 14.9%. Following this are students from St. Anselm with 13.2%, along with students from St. Agatha, St. Claire, and St. La salle with 12.6%. Students from St. Peregrine and St. Peter are 12.1% of the respondents, and lastly, students from St. Jerome are only 9.8% of the respondents.

(SOP 1) Table 2

Frequencies of Age

Age	Counts	% of Total	Cumulative %
15	2	1.1%	1.1%
16	1	0.6%	1.7%
17	103	59.2%	60.9%
18	60	34.5%	95.4%
19	5	2.9%	98.3%
20	2	1.1%	99.4%
28	1	0.6%	100.0%

This table presents the ages of the respondents, with most of the respondents being 17 years old with a 59.2%, some of the respondents being 16, and 28 years old with a 0.6%, a few of respondents being 15 and 20 years old with a 1.1%, a couple of the respondents being 19 years old with a 2.9%, and a handful of the respondents being 18 years old with a 34.5%.

(SOP 1) Table 3

Frequencies of Strand

Strand	Counts	% of Total	Cumulative %
ABM	47	27.0%	27.0%
GAS	17	9.8%	36.8%
HUMMS	22	12.6%	49.4%
STEM	88	50.6%	100.0%

This table presents the frequencies of respondents belonging to these strands, beginning with the highest STEM with a 50.6%, and the lowest is GAS with a 9.8%, and ABM with 27.0%, and with HUMMS being at 12.6%

(SOP 2) Table 4

Descriptives

	Strand	Mean	SD
EED1	ABM	3.35	0.838
	GAS	3.44	0.512
	HUMMS	2.91	1.019
	STEM	3.06	0.845
EED2	ABM	3.25	0.758
	GAS	3.56	0.512
	HUMMS	3.10	0.995
	STEM	3.14	0.702
EED3	ABM	3.27	0.736
	GAS	3.38	0.719
	HUMMS	3.09	0.921
	STEM	3.11	0.836
EED4	ABM	2.85	0.899
	GAS	3.00	1.033
	HUMMS	2.86	0.990
	STEM	3.05	0.772
EED5	ABM	2.65	0.934
	GAS	2.94	1.181
	HUMMS	2.73	1.202
	STEM	2.83	1.031

The table presents the descriptive statistics of the results of strands mean and standard deviation (SD) of each question provided. The following are the order of who got the highest to lowest result per strand. For EED1, GAS (*M*=3.44, *SD*=0.512) got the highest percentage, following with ABM (*M*=3.35, *SD*=0.838), as well as STEM (*M*=3.06, *SD*=0.845), and HUMMS (*M*=2.91, *SD*=1.019) that got the lowest percentage. For EED2, GAS (*M*=3.56, *SD*=0.512) got the highest percentage, following with ABM (*M*=3.25, *SD*=0.758), as well as STEM (*M*=3.14, *SD*=0.702), and HUMMS (*M*=3.10, *SD*=0.995) that got the lowest percentage. For EED3, GAS (*M*=3.38, *SD*=0.719) got the highest percentage, following with ABM (*M*=3.27, *SD*=0.736), as well as STEM (*M*=3.11, *SD*=0.836), and HUMMS (*M*=3.09, *SD*=0.921) that got the lowest percentage. For EED4, STEM (*M*=3.05, *SD*=0.772) got the highest percentage, following with GAS (*M*=3.00, *SD*=1.033), as well as HUMMS (*M*=2.86, *SD*=0.990), and ABM (*M*=2.85, *SD*=0.899) that got the lowest percentage. Lastly, for EED5, GAS (*M*=2.94, *SD*=1.181) got the highest percentage, following with STEM (*M*=2.83, *SD*=1.031), as well as HUMMS (*M*=2.73, *SD*=1.202), and ABM (*M*=2.65, *SD*=0.934) that got the lowest percentage.

(SOP 3) Table 5

Descriptives

	Strand	Mean	SD
FDM1	ABM	3.62	0.610
	GAS	3.56	0.512
	HUMMS	3.91	0.294
	STEM	3.33	0.789
FDM2	ABM	3.46	0.743
	GAS	3.53	0.516
	HUMMS	3.73	0.456
	STEM	3.43	0.693
FDM3	ABM	3.04	0.898
	GAS	3.06	1.063
	HUMMS	2.95	0.999
	STEM	3.00	0.935
FDM4	ABM	2.71	1.071
	GAS	2.81	0.981
	HUMMS	2.41	1.098
	STEM	2.82	0.947
FDM5	ABM	3.44	0.712
	GAS	3.69	0.602
	HUMMS	3.59	0.666
	STEM	3.34	0.829

The table presents the descriptive statistics of the results of strands mean and standard deviation (SD) of each question provided. The following are the order of who got the highest to lowest result per strand. For FDM1, HUMMS (*M*=3.91, *SD*=0.294) got the highest percentage, following with ABM (*M*=3.62, *SD*=0.610), as well as GAS (*M*=3.56, *SD*=0.512), and STEM (*M*=3.33, *SD*=0.789) that got lowest

percentage. For FDM2, HUMMS (*M*=3.73, *SD*=0.456) got the highest percentage, following with GAS (*M*=3.53, *SD*=0.516), as well as ABM (*M*=3.46, *SD*=0.743), and STEM (*M*=3.43, *SD*=0.693) that got the lowest percentage. For FDM3, GAS (*M*=3.06, *SD*=1.063) got the highest percentage, following with ABM (*M*=3.04, *SD*=0.898), as well as STEM (*M*=3.00, *SD*=0.935), and HUMMS (*M*=2.95, *SD*=0.999) that got the lowest score. For FDM4, STEM (*M*=2.82, *SD*=0.947) got the highest percentage, following with GAS (*M*=2.81, *SD*=0.981), as well as ABM (*M*=2.71, *SD*=1.071), and HUMMS (*M*=2.41, *SD*=1.098) that got the lowest percentage. Lastly, for FDM5, GAS (*M*=3.69, *SD*=0.602) got the highest percentage, following with HUMMS (*M*=3.59, *SD*=0.666), as well as ABM (*M*=3.44, *SD*=0.712), and STEM (*M*=3.34, *SD*=0.829) got the lowest score.

(SOP 4) Table 6

The correlation matrix shows that the questions for SOP 3 ranges to moderately

Correlation Matrix

		EEDFD1	EEDFD2	EEDFD3	EEDFD4	EEDFD5
EEDFD1	Pearson's r	—				
	df	—				
	p-value	—				
EEDFD2	Pearson's r	0.461	—			
	df	172	—			
	p-value	< .001	—			
EEDFD3	Pearson's r	0.246	0.221	—		
	df	171	171	—		
	p-value	0.001	0.003	—		
EEDFD4	Pearson's r	0.276	0.384	0.273	—	
	df	171	171	170	—	
	p-value	< .001	< .001	< .001	—	
EEDFD5	Pearson's r	0.501	0.415	0.319	0.249	—
	df	171	171	170	170	—
	p-value	< .001	< .001	< .001	< .001	—

correlated to weakly correlated with each other with the Pearson's r ranging from 0.501 to 0.246, and are all significant with a (p<.001)

Table 7

One-Way ANOVA (Welch's)

	F	df1	df2	p
EEDFD1	1.4133	3	49.9	0.250
EEDFD2	5.6688	3	53.9	0.002
EEDFD3	0.0752	3	50.8	0.973
EEDFD4	0.3472	3	48.5	0.791
EEDFD5	0.3414	3	48.5	0.795

This table presents the questions that are eligible to go through post hoc test the basis for the question to be eligible is based on the p-value of the question, if the question has greater than 0.05 p-value then the question is eligible for POST HOC Test, but if the question is equal or less than to 0.05 then the question is not eligible for POST HOC Test. The questions that are eligible for POST HOC TEST are, questions EEDFD1 p(0.250), EEDFD2 p(0.002), EEDFD3 p(0.973), EEDFD4 p(0.'791), EEDFD5 p(0.795).

Table 8

Tukey Post-Hoc Test – EEDFD1

		ABM	GAS	HUMMS	STEM
ABM	Mean difference	—	−0.104	−0.331	−0.0928
	p-value	—	0.958	0.281	0.889
GAS	Mean difference		—	−0.227	0.0114
	p-value		—	0.771	1.000
HUMMS	Mean difference			—	0.2386
	p-value			—	0.506
STEM	Mean difference				—
	p-value				—

In this table a Tukey post hoc test revealed the following results. Those from GAS have a significantly low difference compared to those from ABM with a mean difference of -0.104 (p=0.958). Those from HUMMS have a significantly low difference compared to those from ABM with a mean difference of -0.331 (p=0.281). Those from HUMMS have a significantly high difference compared to those from GAS with a mean difference of -0.227 (p=0.771). Those from STEM have a significantly low difference compared to those from ABM with a mean difference of -0.0928 (p=0.889). Those from STEM have a significantly high difference compared to those from GAS with a mean difference of 0.0114 (p=1.000). Those from STEM have a significantly high difference compared to those from HUMMS with a mean difference of 0.2386 (p=0.506).

Table 9

Tukey Post-Hoc Test – EEDFD3

		ABM	GAS	HUMMS	STEM
ABM	Mean difference	—	−0.0625	−0.06548	−0.0114
	p-value	—	0.992	0.987	1.000
GAS	Mean difference		—	−0.00298	0.0511
	p-value		—	1.000	0.994
HUMMS	Mean difference			—	0.0541
	p-value			—	0.991
STEM	Mean difference				—
	p-value				—

In this table a Tukey post hoc test revealed the following results. Those from GAS have a significantly low difference compared to those from ABM with a mean difference of -0.0625 (p=0.992). Those from HUMMS have a significantly low difference compared to those from ABM with a mean difference of -0.06548 (p=0.987). Those from HUMMS have a significantly low difference compared to those from GAS with a mean difference of -0.00298 (p=1.000). Those from STEM have a significantly low difference compared to those from ABM with a mean difference of -0.0114 (p=1.000). Those from STEM have a significantly high difference compared to those from GAS with a mean difference of 0.0511 (p=0.994). Those from STEM have a significantly high difference compared to those from HUMMS with a mean difference of 0.0541 (p=0.991).

Table 10

Tukey Post-Hoc Test – EEDFD4

		ABM	GAS	HUMMS	STEM
ABM	Mean difference	—	−0.0572	0.0735	0.1190
	p-value	—	0.996	0.988	0.876
GAS	Mean difference		—	0.1307	0.1761
	p-value		—	0.969	0.881
HUMMS	Mean difference			—	0.0455
	p-value			—	0.996
STEM	Mean difference				—
	p-value				—

In this table a Tukey post hoc test revealed the following results. Those from GAS have a significantly low difference compared to those from ABM with a mean difference of -0.0572 (p=0.996). Those from HUMMS have a significantly high difference compared to those from ABM with a mean difference of 0.0735 (p=0.998). Those from HUMMS have a significantly high difference compared to those from GAS with a mean difference of 0.1307 (p=0.969). Those from STEM have a significantly high difference compared to those from ABM with a mean difference of 0.1190 (p=0.876). Those from STEM have a significantly high difference compared to those from GAS with a mean difference of 0.1761 (p=0.881). Those from STEM have a significantly high difference compared to those from HUMMS with a mean difference of 0.0455 (p=0.996).

Table 11

Tukey Post-Hoc Test – EEDFD5

		ABM	GAS	HUMMS	STEM
ABM	Mean difference	—	−0.0745	−0.0290	0.0846
	p-value	—	0.987	0.999	0.930
GAS	Mean difference		—	0.0455	0.1591
	p-value		—	0.998	0.873
HUMMS	Mean difference			—	0.1136
	p-value			—	0.926
STEM	Mean difference				—
	p-value				—

In this table a Tukey post hoc test revealed the following results. Those from GAS have a significantly low difference compared to those from ABM with a mean difference of -0.0745 (p=0.987). Those from HUMMS have a significantly low difference compared to those from ABM with a mean difference of -0.0290 (p=0.999). Those from HUMMS have a significantly high difference compared to those from GAS with a mean difference of 0.0455 (p=0.998). Those from STEM have a significantly high difference compared to those from ABM with a mean difference of 0.0846 (p=0.930). Those from STEM have a significantly high difference compared to those from GAS with a mean difference of 0.1591 (p=0.0873). Those from STEM have a significantly high difference compared to those from HUMMS with a mean difference of 0.1136 (p=0.936).

4. Results and Discussion

This chapter presents the result and discussion of the survey conducted.

4.1 Summary of Findings

In the study, most of the respondents came from St. Bernardine from ABM, with St. Anselm, St. Agatha, St. Claire from STEM and St. La Salle from HUMMS following, as well as St. Peregrine and St. Peter from STEM and ABM respectively, with St. Jerome from GAS being last. The age ranges from 17-28 with 17 being the most frequent age and 28 being the least. As STEM has the most sections in grade 12, they were the most frequent strand while GAS was the less frequent.

In terms of performance on various measures, GAS consistently had the highest scores across several questions. For example, in EED (Entrepreneurial Education), GAS outperformed other strands, including ABM, STEM, and HUMMS, in most areas. HUMMS had the lowest overall scores, particularly in the FDM (Financial Decision Making) questions, although STEM scored very well in certain but not all areas. ABM performed differently than the others, falling somewhere in the middle.

4.2 Conclusion

Our research concludes that both entrepreneurial education and financial decision making has a relationship however it is minimal or weak.

SOP 1 presents the demographic profiles of our respondents, the grade 12 students of San Jose Academy, the highest percentage of respondents who participated in the study were from St. Bernardine and the least were from St. Jerome. The ages of students were dominant between ages of 17 and 18 years old. Lastly, half of the respondents were from the STEM strand and the least were from the GA strand.. Showing that although

SOP 2 presents the ability of grade 12 students to comprehend questions from EED or entrepreneurial education. According to results, although low on respondents, in terms of performance on various measures, **GAS** consistently had the highest scores across several questions. Following that is ABM, STEM, and HUMMS respectively. Wherein, they researched the product they intended to buy, which helped them decide whether or not to buy it and save money. Their ability to adapt to any situation demonstrates their ability to overcome any financial obstacles. Self-managing their allowances for the day Appropriately distributes daily expenses on their own. Finally, they carefully consider the long-term impact of their purchases. These results show that although ABM has the most exposure to entrepreneurial education, some strands can still compete, therefore solidifying that entrepreneurship isn't just for a single strand.

SOP 3 presents the grade 12's ability to comprehend questions from FDM or financial decision making. Wherein, the study ponders on what the different factors may affect the financial decision making of students, whether it be price, quantity, their needs, their wants, or if it's the discounts or sales that affects them. In terms of the mean and standard deviation, ABM has the most highest scores, with **GAS** and **STEM** following closely, and HUMMS being the last. ABM students outperformed other strands in terms of making financial decisions. This is because the strand encounters these decisions in multiple subjects within their strand. Therefore, it is concluded that some strands can still learn financial decision making through the subject, but it is not as prominent as strands who have more knowledge in financial decision making and that the students strongly agreed that the price, the quantity, their needs, and discounts are the most important factors when considering what to buy, leaving their wants as the last.

SOP 4 presents the correlation between EED (Entrepreneurial Education) and FD (Financial Decisions). According to the results, financial decision making and entrepreneurial education are correlated but the correlation is weak. This is due to the fact that the entrepreneurial subject only lasts for a semester, with its main focus being how to build a business, and not how to make good financial decision making.

4.3 Recommendation

These recommendations are focused on students, the school and parents, which they can apply in real-life situations.

Based on the findings of this study, which utilized a survey to assess the students' opinion on entrepreneurship and its influence on financial decision-making. The following recommendations are proposed to enhance the Gr. 12 student's ability to maximize, manage and to make better financial decisions in the future:

1. Introduce more practical activities about financial management

- The results of the study has shown that the students of San Jose Academy recognize the influence of entrepreneurship on their financial decisions but to help them better on building their knowledge, integrating more hands-on practical activities where they can experience real-life scenarios would allow them to apply their knowledge in entrepreneurial concepts.

2. Introduce Financial Literacies across all strands

- Based in the findings of the survey, ABM students have clearer understanding of entrepreneurship's impact as given that it is the main focus of their track, but the study reveals that studying basic financial management lessons and entrepreneurship concepts can be beneficial to all students to ensure that every student develops a skill in budgeting, investing and making good financial decisions regardless of their track or field of study.

3. Include Parents in Financial Education and Decision Process

- According to the study, education and external factors are frequently responsible for students understanding the ideas and impact of entrepreneurship in financial decision-making. Parents' involvement in their children's financial education is very significant in guiding and shaping them to make wiser financial decisions.

By putting these recommendations into action, San Jose Academy will be able to improve the students' ability to make wiser financial decisions through the influence of studying entrepreneurship, making them prepared for managing their finances and pursuing a successful future in entrepreneurship.

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The Effectiveness of Entrepreneurship Capstone on the Entrepreneurial Skills of Grade 12 Students at San Jose Academy

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Abstract: The 21st world offers a wide variety of opportunities for the aspiring young entrepreneurs as of today. It introduced an accessible path through the influence of continuous cultural shifts and technology. However, these are not sufficient for a successful beginning, as it requires a strong set of entrepreneurial skills. This study seeks to determine how the entrepreneurship capstone contributes to the development of Grade 12 students' entrepreneurial skills. It will examine the specific skills gained through the entrepreneurship capstone, such as self-efficacy skills, strategic planning skills, and teamwork skills. The research aims to highlight the role of the entrepreneurship capstone in shaping the positive mindset and aspirations of young learners towards entrepreneurship. To obtain the objectives, this study used a quantitative method and a descriptive analysis to provide a comprehensive presentation of data. The researchers distributed a survey questionnaire to 126 participants involving the Grade 12 level under ABM (Accountancy, Business, & Management), GA (General Academic), and HUMSS (Humanities and Social Science) with a 4-point scale. It was later tabulated through the utilization of Jamovi application (version 2.3.28) and statistical tools including mean, percentage, and likert scale. The obtained data showed the effectiveness of the entrepreneurship capstone through the heightened score of skills from self-efficacy, strategic planning, and teamwork. It was more exhibited through the application of simulated start-ups with its ability to improve communication, business knowledge, and creativity. Entrepreneurship capstone has also significantly enhanced the students' positive mindset and interest towards entrepreneurship, further highlighting its influence on each given category.

Key Words: entrepreneurship capstone; entrepreneurial skills; entrepreneurship; entrepreneurship education; business enterprise simulation

1. INTRODUCTION

This chapter presents the problem and its setting. It includes the background of the study, statement of the problem, significance of the study, conceptual framework, hypothesis, scope and delimitations, and the definition of terms used.

1.1 Background of the Study

As the entrepreneurship world continues to reach far and extend any human possibilities, it is a simple yet collaborative ambition to enhance and improve what the field has more to offer. In their early years, the next leaders of the 21st-century are gradually being introduced to the competitive and driven world of entrepreneurship, be it in the academic settings or the routine of everyday life. They are anticipated and envisioned to have a set of skills and qualities that will guide them in entering their future fields. Akeke et al., (2022) simply explains that today's education, specifically in the business field, requires the cultivation of human relation competence and marketing competence as learners continue to hone their skills in the field. This states that there must be an effective way to employ these capabilities in order to accomplish in the business world.

As stated in Jardim (2021), most of the professionals must have entrepreneurial skills to succeed. This study highlights that in the current job market, entrepreneur skills must be manifested first before undertaking a business or venturing on a new path. It also emphasizes that entrepreneurial skills are essential for individuals to stand out in a competitive job market. Therefore, blending professional expertise with entrepreneurial skills has become a key factor in career development and organizational success.

With the help of schools and universities that act as the learner's first step, through a responsible party, and a practitioner in the training process, achieving these entrepreneurial competencies would be possible (Oosterbeek et al., 2010, as cited in Yin & Wang, 2017). The learners would have the chance to successfully apply it in her or his social settings and perform not solely as a consumer but also as a producer, executive, leader, who can carry out different social roles while determining the effectiveness and quality of her or his works (Martynets et al., 2020). It would also allow learners to produce such contributions to the economic welfare, may it be their country or not, as they directly partake in the innovative capacity of the economy they are in (Akeke et al., 2022).

As stated by Xia and Mathematics (2014), entrepreneurship requires pragmatic knowledge and experiences which cannot be sustained only by using textbooks. Thus, bringing the capstone course to light. Capstone course is a synthesis that allows learners to demonstrate or perform the field or area of study they are expertise in (Cole, 2024). Capstone courses are heavily integrated under the curriculum of business colleges and early education, used to provide real life experiences and assess the students' readiness in the real business world (De George, 2014). It provides students with the opportunity to think creatively and utilize an entrepreneurial mindset to develop a plan for their own business. These projects allow students to identify what is the connection of learning and applying what they've learned.

Entrepreneurship capstone gives students a chance to interact with the outside world and exhibit the knowledge, skills, and abilities they have acquired to help them get ready for post-secondary education and starting or running their own business (South Dakota: Department of Education & Department of Labor & Regulation, n.d.). It provides students with a focused and structured experience through applying what they have learned throughout the whole course. These projects often serve as a bridge between academic learning and practical application, allowing students to leave a

lasting impact on their communities and prepare them for the diverse opportunities that lie ahead.

Moreover, it is also responsible for the development of students' 'soft' and 'employability' skills sought in business sectors (van Acker, 2011, as cited in De George, 2014). However, no studies have yet provided what entrepreneurial skills are most evidently enhanced through the capstone courses and how it reinforces a positive mindset on students. These aspects shall be identified to inherently see the value of capstone courses in academic setting along with the creation of an effective training ground at an early age.

1.2 Statement of the Problem

This research aims to determine the role of entrepreneurship capstone in developing the entrepreneurial skills of Grade 12 students at San Jose Academy. To obtain this objective, the following questions are to be answered:

1. What is the demographic profile of the respondents in terms of:
    1.1 Name (optional);
    1.2 Age; and
    1. 3 Gender
2. What specific entrepreneurial skills of Grade 12 students at San Jose Academy were most evidently developed through the entrepreneurship capstone?
3. Which entrepreneurship capstone design enables Grade 12 students at San Jose Academy to channel their entrepreneurial skills best?
4. How do entrepreneurship capstone help to reinforce the positive mindset of Grade 12 students at San Jose Academy in pursuing entrepreneurship?

1.3 Significance of the study

Results of the study would be beneficial to the following:

Students. This study will be a useful tool in encouraging the students to be an active participant and contributor inside an entrepreneurship capstone course while honing their ability to be a critical thinker, solve complex problems, demonstrate their readiness for entrepreneurship, and prepare them for the challenges they may encounter in the business field.

Teachers. Findings of this study could be a guide in creating better assessment tools that accurately measure the development of entrepreneurial skills, ensuring that students receive constructive feedback and support while going through an entrepreneurship capstone.

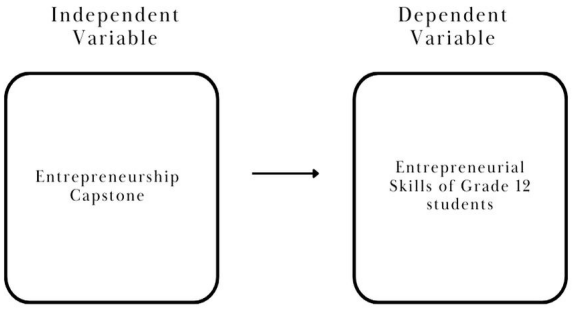
Parents. This study will help the parents ensure that their children are prepared for their future business career. This study can also help the parents to guide their children in choosing what entrepreneurial career they will take.

School. Results of this study will serve as a guide for the school administration to establish clear, constructive, and feasible objectives resulting in a successful execution

of an entrepreneurship capstone experience.

Future Researchers. This study will be a valuable instrument for future studies to discover new findings on various ways an entrepreneurship capstone could support its participant. It can also be used as a reference to achieve their own objective of the study.

1.4 Conceptual Framework



1.5 Hypothesis

Based on the given conceptual structure, the following hypothesis are determined:

Alternative Hypothesis: The entrepreneurship capstone has an influence on the development of entrepreneurial skills among the Grade 12 students at San Jose Academy. This is determined through the students' enhanced entrepreneurial skills and an increased interest and positive outlook in entrepreneurship.

Null Hypothesis: The entrepreneurship capstone has no contribution to the development of entrepreneurial skills among Grade 12 students at San Jose Academy. This is determined by the students' lack of development in entrepreneurial skills and absence of interest and negative outlook in entrepreneurship.

1.6 Scope and Delimitations

This study focuses on the role of the entrepreneurship capstone in honing the entrepreneurial skills of Grade 12 students at San Jose Academy. This includes the ABM (Accountancy, Business, & Management), GA (General Academic), and HUMSS (Humanities and Social Science) with a requirement of 126 participants who have actively engaged in entrepreneurship capstone.

However, this study will only cover what entrepreneurial skills are enhanced during the project and excludes its application after senior high school, as it is out of the range of the research purpose and researchers. Above all, it excludes other senior high school levels and strands that did not undergo any entrepreneurship capstone.

3. RESULTS AND DISCUSSION & METHODOLOGY

This chapter presents the related literature gathered, divided into two major sections: local literature and foreign literature and methods employed in order to attain the given objectives.

LOCAL

As the 21st century continues to shift and lean towards the future, it is certain to assume that there will be a new set of leaders that will extend ideas or even break the status quo. Entrepreneurship has always been a lively world of ideas composed together for mutual benefits. It is a production component that has gradually been recognized as an influential aspect of the modern economy and is a source of economic growth that produces new job opportunities for the community. In Lemo (2013; Catacutan et al., 2023),

entrepreneurship is a suitable option to create a job; it is a way to eliminate unemployment and poverty and empower the community to establish a business. Promoting the development of entrepreneurship can assist individuals to transform issues into business possibilities (Audretsch et al., 2014; Catacutan et al., 2023). This simply explains the crucial role of entrepreneurship in achieving prosperity in the development and a successful future of the modern economy.

Entrepreneurship begins when an individual identifies market or economic opportunities to exploit and provides the capital necessary to work those opportunities (Manisha & Singh, 2016; G. et al., 2022). This leads to an individual being encouraged to be ready to venture a business and establish countless opportunities for his or her starting career. However, establishing these opportunities would be impossible if entrepreneurial skills are not prioritized and developed (Nellas, 2022). This concludes that in order for entrepreneurs to hone their skills and succeed in the field, it is essential to undergo various training and interventions as a starting point.

Ramos (2014) states that college graduates are not able to successfully find work following their graduation as a direct result of scarcity in available jobs and high level of competition in the growing economy. Therefore, the intensification of entrepreneurship in the academic curriculum must be implemented in order for students to effectively generate jobs for themselves. For Caro et al. (2022), the involvement of academic institutions in implementing entrepreneurship education greatly contributes to a country’s entrepreneurial growth. It is explained that in order to produce entrepreneurs, it is crucial for them to exhibit a set of skills and attitudes that can be provided by the help of entrepreneurship education inside an academic institution.

This further gives light on how the implementation of entrepreneurship education results in students slowly discovering their skills by joining entrepreneurship-related activities (Baaken, 2016; Nella, 2022). An environment that prioritizes the development of each student's interests and passion is undoubtedly creating an effective training ground for these skills to be successfully fostered. In the context of entrepreneurship, Jack and Anderson (1999; Caro et al., 2022) consider the application of skills as contextual and influenced by collaborative and individual knowledge based on the given situation. This only states that skills that are practiced and are in action greatly contribute to its own development and make use of the experience that will take place in the future.

Thus, it is imperative for students, especially those who are interested in entrepreneurship, to be equipped with knowledge and skills necessary in the business world before they take a step forward as an entrepreneur.

FOREIGN

An entrepreneur is someone who has innovative ability, creates something new and different, seeks opportunities, starts a business, takes risks, develops ideas, and manages available resources to succeed. Entrepreneurs are agents that overcome obstacles to build their enterprises in an entrepreneurial relationship by being change agents through recognition of opportunities and exploring them through innovation and creativity (Okute, 2020). Anyone who has the knowledge, skills, and possesses such personal qualities, attitudes, values, and behaviors necessary to perform activities and

tasks to be self-reliant is known as an entrepreneur.

For entrepreneurship to continuously flourish, it stands as a collective standpoint that it can only be done through various abilities and ideas that go with it. Seeing that entrepreneurship takes a great value in new ideas that enhance different creative thinking and innovative contributions, it demands great abilities, commitment, and strong skills to expect a high probability of fruition and longevity (Akeke et al., 2021). Focusing on developing such abilities can significantly enhance chances of success and navigate the entrepreneurial landscape more effectively. These skills can encompass a broad range of opportunities that can aspire entrepreneurs to productively manage and function a chosen business venture. Jardim (2021) highlights that cognitive and technical skills are not adequate to suffice the demands of professional settings in facing the current digital and global world, as they cannot strongly promise the development of appropriate attitudes in the entrepreneurial world. Despite receiving numerous criticism that entrepreneurship should be strongly integrated into curricula, it initially earned a part and a prevalence in higher education and soon became an essential element in the academic world.

Entrepreneurial skills are defined by Jaenudin et al. (2021) as a set of various attitudes and competencies that should be enhanced among entrepreneurs to identify and secure opportunities. It is the same for Jardim et al. (2021), where entrepreneurial skills are understood as "knowledge, attitudes, and skills that enable someone to be successful in developing original and valuable projects, products, or services based on the needs of a company—target population and, as a result, the fulfillment of functional, social, or emotional objectives."

Due to entrepreneurial skills being composed of various competencies and elements, this study will focus on three important skills necessary for a withstanding path and career in entrepreneurship.

1.1. Self-efficacy Skills

As entrepreneurship seeks to identify endless opportunities and produce creative work, it requires great competence in facing these demands in the form of self-determination and leadership (Dornelas, n.d; Jardim, 2021). In Bandura (1977; Caliendo et al., 2023), self-efficacy is seen as a vital concept in creating desired results as it reflects the self-belief that one must possess to productively perform difficult tasks while coping with adversity. It is also a predictor of venture growth as it reflects one's innovativeness (Baum & Locke, 2004; Caliendo et al., 2023). As a result, several studies have curated programs that activate this competence, for it is positively associated with undertaking (Jardim, 2021).

1.2. Strategic planning Skills

For most people, ideas are a product of spontaneity. In the world of entrepreneurship, it's a calculated process in which goals and objectives are specified to be met. Jardim (2021) identifies planning as an activity wherein key activities are laid out to be achieved and distributed within a specific time frame. It is a tool that allows an entrepreneur to take action and exploit its opportunities. In Toofan (2018; Habib et al. 2022), the importance of strategic planning in entrepreneurship is highlighted. Strategic planning is a key element in shaping and crystallizing objectives as it helps to define the organization's capability, employ several identified resources, create a comprehensive

vision without any conflict (Walsh, 2017; Habib et al., 2022), and distribute goals within a necessary time period.

1.3 Teamwork Skills

The success of an organization strictly lies in a series of ideas produced by the collaboration of its members (Sun et al., 2016; Mytelka & Smith, 2002; Pazos et al., 2022). This can only be achieved through shared goals, complementary skills, and dedication to a common purpose and objectives, resulting in an efficient operation (Sirena et al., 2020; Krawczyk-Bryłka., 2020). This process refers to teamwork, a joint action of people in which knowledge, attitudes, and skills of each individual are combined to achieve a common good (Jardim., 2020). On Zhou and Verburg (2020; Pazos et al., 2022), it is one of the factors in creating innovative tasks and producing diverse ideas by entrepreneurial teams in experiential entrepreneurship education programs. This corresponds to Oswald et al. (2019; Salas et al., 2020; Jardim, 2020), in which it is stated that entrepreneurs are recognized by their ability to facilitate this action, further highlighting that it is a necessity in the world of entrepreneurship (Oswald et al., 2019; Salas et al., 2020; Jardim, 2020).

The mentioned skills are slowly being taught to students as they step forward in their journey. As stated by Manzi et al., (2019), schools play a crucial role in fostering entrepreneurial intention and drive among students through dedicated programs, particularly in Asian nations where creativity is vital for innovation. Business administration departments have evolved from providing broad, theoretical coursework to encouraging students to engage actively in their education, equipping them with the skills needed to establish businesses that benefit society. Education for entrepreneurship now focuses on imparting knowledge that helps identify opportunities for creating goods and services.

As the world revolves and enters a new set of leaders, it's the academic institutions' role to hone the students' intelligence in every aspect. With the universities' efforts to enrich the entrepreneurial skills and capability of business students, achieving this mission alongside creating an effective education by fostering such skills wouldn't be possible. To Rasmussen (2011: Yin & Wang, 2017), universities and colleges stand as the main channel and source of cultivating students' entrepreneurial capability. Many business schools have shouldered this role in the form of providing capstone courses or may be referred as entrepreneurship capstone that stand as a guide in introducing students to the real world.

On a surface level, a capstone is a comprehensive synthesis that acts as the students' final assignment in their chosen program (Southern New Hampshire University, 2024). It seeks to evaluate and test the readiness of students as they transition to the real world— carrying what they have gained in the process (DeGeorge, 2014). In the same study, the three major functions of the capstone are mentioned: 1) The capstone aims to extend and apply the culmination of previous learning (Bailey et al, 2007: DeGeorge, 2014). 2) To contribute to the development of professional identity and socialization that will later on assist students in the workforce. Lastly, 3) To ensure the enrichment of students' soft and employability skills by the business sector, while on the other hand, it's considered the 'generic' or 'graduate' skills in the academics (van Acker, 2011: DeGeorge, 2014). This further attests to Vygotsky's (1986; Woodward

& Wragg, 2022) theory of zones of proximal development or scaffolding, in which the collaboration of learners with more capable peers and educators simply puts importance on the significance of social processes in terms of learning or development (Billings & Walqui, 2017).

Simulated Start-ups in Entrepreneurship Capstone

With business studies being a vocational and changeable set of topics and themes rather than an academically contained subject in which concepts are already determined, e.g., history and physics, this explains the necessity for a beneficial and comprehensive application of capstone (Woodward & Wragg, 2022). Some entrepreneurship capstones that are typically used and provided in universities under business studies include creating a business plan for a new venture, launching an actual business or a business website, and any form of fieldwork that relates to what they have obtained throughout the whole course.

These examples— usually involving group work and done as simulated business start-ups are provided in Steiner & Wells' (2000; van Acker & Bailey, 2011; Woodward & Wragg, 2022) study and may be effective of how it will be executed in terms of providing a set of diverse business aspects such as market entry research, legal forms of organization, financial forecast, and the most common, business planning— all known to be useful for students seeking to take an entrepreneurial road or enterprise based business degrees.

Experiential Learning in Entrepreneurship Capstone

In Bell and Bell (2016; Heagg & Gabrielsson, 2020; Lackeus, 2020; Kozlinska et al., 2020; Gonzalez-Lopez, 2022), various studies have a wide agreement on how entrepreneurship education should be employed through experiential and action-oriented theories and pedagogies. This states that in order to effectively make use of the entrepreneurial process, it should be experienced by the students and not passively taught unlike other academic subjects. Academic professor Reg Revans introduced this approach as Action based learning in the 1970s (Malywanga et al., 2020). He claims that there is no learning without taking an action, and no action if learning is not present. He also emphasized collaborative learning that takes form in a team, a practice that is actively employed in academic institutions in which real tasks are given and executed through a series of actions.

Unlike other pedagogies that is performed only by discussions, entrepreneurship experiential learning that takes place in entrepreneurship capstone focuses more on teaching what is "for" rather than what is "about" (Neck & Greene (2011; Monllor et al., 2023). It leans more on activities that provide an actual process and actions through the use of real life settings and is done usually through collective team efforts.

Entrepreneurship Capstone in School Setting

Entering the pedagogical context, George & Rawis (2017: Woodward & Wragg, 2022) speak volume to the fruitful success of entrepreneurship capstone through findings of their assessment— several positive reports are garnered from students regarding their improvement in their generic skills, such as

oral communication, leadership, teamwork, and problem solving.

It is viewed that the application of accumulated learning will take a form that strengthens the students' capabilities as an employable graduate. Though the acquisition of new content learning is played down, there is belief in the transformative potential of capstone in terms of students developing different ways of understanding frames and reference about their subject field (Moore, 2006; Holdsworth et al., 2009; Van Acker et al., 2011; Sill et al., 2009; Woodward & Wragg, 2022). It indicates that it is advantageous for the students who undergo training in terms of entrepreneurial skills, as they are presumed to result in entrepreneurial effectiveness (Rivera, 2021). It is a way to complement an entrepreneur to analyze situations, opportunities, and environments and assist the students in managing and assuming a business's risk and reward.

Furthermore, the capstone will serve as a bridge between knowledge and application of this knowledge to real-world situations and challenges. It also serves as a culminating experience that synthesizes learning, innovation, and prepares students for their future success (Mwangi, 2020). Different studies, theories, and approaches that are provided attest the role of entrepreneurship capstone in developing and fostering entrepreneurial skills. May it be individual or collaborative, students are able to partake in action-oriented and simulated start-up activities that ensures them to be equipped with necessary skills that the business world requires. Moreover, students are given the chance to take a risk and execute their ideal capabilities to actively stimulate their passion and interests, resulting in a fulfilled entrepreneurial career path in the near future.

3.1 Research Design

This study used quantitative methods to collect and analyze the data on how entrepreneurship capstone contributes to the development of specific entrepreneurial skills of Grade 12 students. This study will analyze if the students gained knowledge through their entrepreneurship capstone. The researchers used descriptive analysis to provide a summary on the developed entrepreneurial skills of the students.

3.3 Research Instrument

In order to gather the necessary data for this study, the researchers produced a survey questionnaire containing three different parts that will evenly assess the objectives: (1) Determine the entrepreneurial skills developed through entrepreneurship capstone. This contains three sub-parts where specific entrepreneurial skills are given: a) Self-efficacy skills; b) Strategic Planning skills; and, c) Teamwork skills. (2) Determine which entrepreneurship capstone design enables entrepreneurial skills to be unleashed and improved through the use of two sub-parts where entrepreneurship capstone design is to be evaluated: a) Simulated start-ups; and b) Entrepreneurship Experiential Learning And lastly, (3) Determine how entrepreneurship capstone reinforce a positive mindset in pursuing entrepreneurship among the Grade 12 students.

A 4-point Likert scale is later applied to assess the respondents' answers, which correspond to the following: [4 - Strongly Agree; 3 - Agree; 2 - Disagree; 1 - Strongly Disagree]. This measurement is used to efficiently evaluate the responses without reducing the accuracy of future results. Afterwards, respondents are instructed to tick

off the boxes that will respond to their desired answers, which is assured to be a confidential agreement with the researchers.

3.4 Sample Population

The researchers will use Slovins Formula to identify the respondents sample size from the population. The tool that will be using is given below:

$n = N/1+Ne^2$

Where:
n = Sample
N = Population
e = Margin of Error

3.4 Method of Data Analysis

The data will be analyzed and processed using appropriate statistical tools to ensure accuracy and reliability. To facilitate this, the researchers will utilize the Jamovi application (version 2.3.28) for data computation and analysis.

Frequency and Percentage Distribution

The frequency and percentage distribution is a statistical tool used to calculate and present the proportion of observations for each category of data. This method will be applied to analyze and to interpret the respondents' age and gender.

$P = f\ N \times 100$

Where:

P = Percentage (%)
f = Frequency
N = Number of respondents

Average Weighted Mean

The average weighted mean is a statistical measure used to determine varying degrees of importance assigned to each data point collected. This method will be applied to scale and interpret the respondents' responses.

$X = \sum fx\ f$
Where:
X = Weighted mean
$\sum fx$ = Sum of all products
f = Sum of all the respondents

Likert Scale

The Likert scale is a quantitative rating tool used to evaluate opinions or statements systematically. This study employs a 4-point scale to ensure balanced data collection to avoid vague results.

Below is the interpretation on each point and how it will be administered:

POINT	SCALE	INTERPRETATION
4	4.00 - 3.00	Strongly Agree
3	2.99 - 2.00	Agree
2	1.99 - 1.00	Disagree
1	1.00 - 0.99	Strongly Disagree

4. RESULTS AND DISCUSSION

This chapter reviews the data and results gathered through application of presented statistical treatment prior to the data collection. It seeks to answer the given research questions for a precise presentation of the study.

In accomplishing the objectives of the research, the following tables are organized through the distributed survey questionnaire:

DEMOGRAPHIC PROFILE OF THE RESPONDENTS

I. Frequencies of Gender

Gender	Counts	% of Total	Cumulative (%)
Female	77	60.2%	60.2
Male	51	39.8	100.0%

According to Table 1, 60.2% of the participants in the study were female, while 39.8% were male.

II. Frequencies of Age

Age	Counts	% of Total	Cumulative (%)
16	2	1.6%	1.6%
17	71	55.5%	57.0%
18	51	39.8%	96.9%
19	2	1.6%	98.4%
20	2	1.6%	100.0%

As indicated in Table 2, the participation rates in our research study were as follows: 55.5% of 17-year-olds, 39.8% of 18-year-olds, and 1.6% for each of the 16, 19, and 20-year-old age groups.

III. Frequencies of Section

Section	Counts	% of Total	Cumulative (%)
Bernardine	32	25.0%	25.0%
Jerome	32	25.0%	50.0%
Peter	32	25.0%	75.0%
La Salle	32	25.0%	100.0%

Table 3 reveals that each section contributed equally to our research study, with a participation rate of 25% per section.

1. **What entrepreneurial skill of Grade 12 students at San Jose Academy was most evidently developed through the entrepreneurship capstone?**

Table 1.1

STATEMENTS
SELF-EFFICACY SKILLS
1. Entrepreneurship capstone made me cultivate an unwavering assurance in my ability to engage in business related matters.
2. After experiencing an entrepreneurship capstone, I developed a sense of responsibility in producing desired results that I want.
3. Entrepreneurship capstone shaped me to become accountable for my assigned tasks and commitments.
STRATEGIC PLANNING SKILLS
4. Entrepreneurship capstone helped me to develop a strong analytical mind to interpret and create helpful decisions.
5. Entrepreneurship capstones have reinforced effective strategies in creating well-established goals.
6. Entrepreneurship capstone enhanced my ability to prioritize competing tasks and goals strategically.

TEAMWORK SKILLS
7. Entrepreneurship capstone helped me to work with the team effectively to achieve the common purpose.
8. Entrepreneurship capstone has shaped me to communicate with transparency and trust everyone's own ability.
9. Entrepreneurship capstone taught me how to accept criticism from my teammates and from others.

Table 1.2

STATEMENTS	M	SD	I
SELF-EFFICACY SKILLS			
S1	3.30	0.607	Strongly Agree
S2	3.38	0.616	Strongly Agree
S3	3.38	0.689	Strongly Agree
TOTAL	**3.35**	**0.493**	**Strongly Agree**
STRATEGIC PLANNING SKILLS			
S4	3.32	0.752	Strongly Agree
S5	3.31	0.661	Strongly Agree
S6	3.27	0.771	Strongly Agree
TOTAL	**3.30**	**0.586**	**Strongly Agree**
TEAMWORK SKILLS			
S7	3.47	0.709	Strongly Agree
S8	3.44	0.649	Strongly Agree
S9	3.48	0.664	Strongly Agree
TOTAL	**3.46**	**0.530**	**Strongly Agree**

Table 1.2 shows the specific entrepreneurial skills that were most developed among Grade 12 students through the entrepreneurial capstone.

Teamwork skills result in an average mean of 3.48 (SD=0.530), indicating that Entrepreneurship Capstone has helped the students the most and enabled them to recognize their capacity in accepting criticism from their teammates and peers. This shows that teamwork skills are highly effective in enhancing social awareness and improving communication skills to achieve a common purpose.

Self-efficacy skills come in second with their average mean of 3.35 (SD=0.493). It is shown upon students developing effective strategies that equip them to create well-established goals through undergoing an Entrepreneurship Capstone. It has enhanced students' confidence, responsibility, and accountability in business-related tasks that all contribute to strengthening students' self-efficacy, equipping them with the mindset

and skills necessary to tackle entrepreneurial challenges.

Strategic planning skills come at last with its average mean of 3.30 (SD=0.596). This signifies the students' sense of accountability and responsibility they have acquired during the Entrepreneurship Capstone. The findings present how a simple construction of a plan creates an engaging journey for the students, building a strong commitment in accomplishing their assigned tasks.

2. Which entrepreneurship capstone design enables Grade 12 students at San Jose Academy to channel their entrepreneurial skills best?

Table 2.1

STATEMENTS
SIMULATED START-UPS
1. Doing a group work business plan project has helped me communicate my knowledge and ideas for a new business venture.
2. Engaging in a group work marketing plan has sparked a creativity in me in terms of communicating with potential customers.
3. Simulated start-ups have helped me integrate various academic concepts and theories effectively.
ENTREPRENEURIAL EXPERIENTIAL LEARNING
4. Entrepreneurial experiential learning guided me to become more imaginative when it comes to producing a product.
5. I developed confidence in connecting with people by marketing the products I have made along with my group mates.
6. Entrepreneurial experiential learning helped me understand the function and challenges of running a business.

Table 2.2

STATEMENTS	MEAN	SD	I
SIMULATED START-UPS			
S1	3.31	0.684	Strongly Agree
S2	3.30	0.621	Strongly Agree
S3	3.20	0.643	Strongly Agree
TOTAL	**3.27**	**0.527**	**Strongly Agree**
ENTREPRENEURIAL EXPERIENTIAL LEARNING			
S4	3.30	0.593	Strongly Agree
S5	3.16	0.715	Strongly Agree
S6	3.28	0.731	Strongly Agree
TOTAL	**3.24**	**0.538**	**Strongly Agree**

Table 2.2 shows which of the two given Entrepreneurship Capstone designs has notably enabled the students to employ their entrepreneurial skills.

Simulated start-ups result in the average mean score of 3.24 (SD=0.527) and

are observed through students' ability to communicate business ideas, which improved the most in participating in group business plan projects. The data clearly indicates that simulated start-ups are highly effective educational tools, fostering improved communication, creativity, and the integration of business knowledge among students.

Entrepreneurial experiential learning comes second in the average mean score of 3.24 (SD=0.538). This is observed through students' ability to be imaginative individuals for a potential product creation, which suggests their skill or capacity to generate various ideas and concepts. The findings suggest that entrepreneurial experiential learning fosters creativity by encouraging hands-on engagement, critical thinking, and collaboration.

3. How do entrepreneurship capstone help to reinforce the positive mindset of Grade 12 students at San Jose Academy in pursuing entrepreneurship?

Table 3.1

STATEMENTS
1. After experiencing an entrepreneurship capstone, I found out that I am capable of managing a business.
2. Entrepreneurship capstone inspired me to pursue a business path after learning its concepts.
3. Entrepreneurship capstone helped me find out that my generic skills are enough for me to pursue entrepreneurship.
4. Entrepreneurship capstone offered me valuable connections and opportunities that enhanced my interest in entrepreneurship.
5. Entrepreneurship capstone are pleasant and exciting experiences that enabled me to acquire a positive outlook on what I am capable of.

Table 3.2

STATEMENTS	MEAN	SD	I
S1	3.11	0.786	Strongly Agree
S2	3.07	0.744	Strongly Agree
S3	3.04	0.873	Strongly Agree
S4	3.23	0.643	Strongly Agree
S5	3.25	0.832	Strongly Agree
TOTAL	**3.14**	**0.512**	**Strongly Agree**

Table 3.2 shows the positive mindset that Grade 12 students acquired after undergoing an Entrepreneurship Capstone. The average mean is 3.14 (SD=0.512), which attests to the motivating experiences that the Entrepreneurship Capstone has yielded for the students in recognizing their abilities and interests in different aspects of entrepreneurship. It can be observed through students' optimistic outlook on what they are capable of, which results in a heightened interest in pursuing entrepreneurship.

This only suggests that the entrepreneurship capstone has a strong influence in shaping students' enthusiasm to learn and enter the path of entrepreneurship.

5. SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATION

This chapter presents the summary and conclusion derived from the conduct of the study which is to probe the effect of entrepreneurship capstone on the entrepreneurial skills of Grade 12 students at San Jose Academy. Moreover, it offers recommendations that can be followed by the school to create an effective entrepreneurship capstone.

The study was conducted at the premises of San Jose Academy involving 126 participants from the Grade 12 level under ABM (Accountancy, Business, & Management), GA (General Academic), and HUMSS (Humanities and Social Science) who underwent an entrepreneurship capstone. They were selected through random sampling. The study employed a quantitative approach with the utilization of descriptive analysis. The following data were obtained through a survey questionnaire and later tabulated with the use of Jamovi application (version 2.3.28). The statistical tools used were mean, percentage, and likert scale.

5.1. Summary of Findings

The findings of the study were summarized according to the statement of the problems stated in Chapter 1.

1. **What is the demographic profile of the students?**

The study involved 60.2% female participants and 39.8% males, with participation rates of 55.5% for 17-year-olds, 39.8% for 18-year-olds, and 1.6% for 16-19-year-olds. Each section contributed equally, with a 25% participation rate per section.

2. **What specific entrepreneurial skills of Grade 12 students at San Jose Academy were most evidently developed through the entrepreneurship capstone?**

Teamwork resulted in an average mean of 3.48 (SD=0.530), which was the highest among the three entrepreneurial skills. Self-Efficacy came in second with an average mean of 3.35 (SD=0.493) and Strategic Planning came last with its average mean of 3.30 (SD=0.596).

3. **Which entrepreneurship capstone design enables Grade 12 students at San Jose Academy to channel their entrepreneurial skills best?**

Simulated Start-Ups resulted in an average mean of 3.24 (SD=0.527) while Entrepreneurial Experiential Learning had an average mean of 3.24 (SD=0.538) and were both under the Strongly Agree level.

4. **How do entrepreneurship capstone help to reinforce the positive mindset of Grade 12 students at San Jose Academy in pursuing entrepreneurship?**

The reinforcement of a positive mindset in pursuing entrepreneurship among Grade 12 students after undergoing an Entrepreneurship Capstone was significantly high, obtaining an average mean of 3.14

(SD=0.512) and falling under the Strongly Agree level.

5.2. Conclusion

Based on the collected data, the following conclusions were accomplished and organized in accordance to the statement of the problem presented in Chapter 1.

1. Entrepreneurship capstone has significantly developed three valuable skills among Grade 12 students, ranging from Self-Efficacy skills, Strategic Planning, and Teamwork skills. While all the skills are proven to be the key figures in students' journey under entrepreneurship capstone, Teamwork skills achieved the highest score as being the most evident skill developed among students. It equipped them to be an open and responsible individual who has the capacity to accept criticism and advice from teammates and peers in order to achieve the common goal.

   This result can be associated in Krawczyk-Bryłka et al. (2020)'s study which highlights the effective collaboration of entrepreneurial teams. Through teamwork, a team or a group consisting of dedicated individuals operates in an efficient manner through their shared goals, commitment to a common purpose, complementary skills, and accountability.

2. The research findings indicate that simulated start-ups significantly enhanced students' communication skills, creativity, and business knowledge. Simulated start-ups encouraged students to develop essential business competencies, such as problem-solving, teamwork, and decision-making, which are critical for entrepreneurial success.

   This study aligned with Sofiullah et al. (2021) who found that the business simulation start-ups were beneficial to improve student's existing entrepreneurial skills and competences. A large percentage of participants found the start up simulation beneficial for improving entrepreneurial skills, leadership abilities, and teamwork. These results show that integrating business start-up simulations into educational curricula can help students to prepare them for entrepreneurial ventures, and future business opportunities and business risk.

3. Entrepreneurship capstone has created a positive mindset involving entrepreneurship among Grade 12 students. It introduced various experiences focusing on creativity, commitment, and communication that significantly influenced their confidence and outlook towards their capabilities. Through entrepreneurship capstone students are given the chance to encounter conflicts that ultimately act as an opportunity for learning and improvement under a given task. It allows students to firmly prepare themselves for their own future endeavors involving entrepreneurship and further motivates an optimistic and positive perspective towards entrepreneurial activities.

   This correlates to the study of Jiatong et. al., (2021), wherein features how an early exposure to entrepreneurship

education cultivates young talents and develops entrepreneurial intention, enabling them to explore their abilities at an early age. Through this, an individual can be encouraged and inspired to partake in any activities and discussion involving entrepreneurship that further drives their motivation to pursue such endeavors.

5.3. Recommendations

After undergoing a thorough study on the effectiveness of entrepreneurship capstone on entrepreneurial skills of Grade 12 students, the following recommendations are established:

1. Introduce a hands on intervention through mentorship programs strengthened by partnering with local entrepreneurs who can provide guidance and support. Continuous training and workshops on business planning, marketing strategies, and financial management for the students should be conducted as the environment faces critical changes and development.

2. Create a more engaging and advanced collaborative work that fosters an effective entrepreneurial attitude through communication, responsibility, and exposure to real-life situations. Encourage students to partake in various capstone activities to mold their aspirations and abilities that further promotes an environment where students are able to execute their potential that later develops as a soft skill.

3. In order to effectively hone the students' potential, it is important to guide and mentor their journey through encouraging self-assessment that focuses on their capacities. By providing a helping hand, students are given the chance to actively recognize their expertise and earn the chance to put their abilities into action in the form of entrepreneurship capstone.

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Influence of the Classroom Learning Environment and Student Behaviour in San Jose Academy

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Abstract: The learning environment bears an apparent influence on students' lives. Interpersonal relationships and pedagogical curricula are cited as one of the prime factors that influence a student's behaviour along with individual factors. This study analyzes the influence of the classroom learning environment on student behaviour based on an adapted research instrument. Employing the quantitative research design, the study revealed through descriptive statistics that there is a degree of direct proportionality between experiences in the learning environment and influences thereof. Furthermore, the study revealed that the grade 11 students in San Jose Academy are influenced positively by their experiences in the classroom, the implications of which underline the need to maintain the seeming existing conditions.

Key Words: learning environment; influence; behaviour

1. INTRODUCTION

1.1 Background of the Study

It is a universal experience and a generally known fact that most people spend a good chunk of their lives at school. It is where one typically establishes connections with other people who are not family; where one becomes fully exposed to new people with a set of beliefs and values that are similar or may differ from theirs; and where one adopts another person's habits and interests, among others. To put it simply, educational institutions are breeding grounds of interpersonal networks and another place wherein intrapersonal development takes place.

The learning environment bears an apparent influence on students' lives, be it on a day-to-day basis or on its lifelong trajectory. A key aspect of which is the manner in which these influences are manifested or externalized through their behaviour. In light of this, the researchers seek to discover the extent in which the learning environment influences their behaviour, as well as to what extent personal factors account thereto.

Barth et al., (2004) cite classroom environment, peer group contributions, teacher's role, and parents' contributions as the prime factors attributed to the learning environment that influence student behaviour.

Students' accounts of experiences and interactions within the learning environment are prime determinants of its effectiveness in terms of fostering academic excellence and cultivating a pleasing personality in the form of social relations — teacher-student and student-student — academic opportunities, intellectual outlets, achievement, and exploration (Kong, 2006).

Karatzias et al. (2010) defines the quality of a student's school life as a general sense of well-being resulting from the students' involvement and engagement within the learning environment, based on this definition alone, it can be summarised that the quality of a student's school life are a synthesis of positive or negative experiences and feelings related to different learning environment factors; it is the cognitive aversion or appraisal of the quality of the learning environment based on one's own standards.

1.2 Statement of the Problem

This study aims to discover the influence of the learning environment on student behaviour in San Jose Academy along with the following goals:

1. To find out which negative experience do students encounter the most in the classroom learning environment.
2. To find out which positive experience do students encounter the most in the classroom learning environment.
3. To find out the prevailing negative influence of the classroom learning environment on student behaviour.
4. To find out the prevailing positive influence of the classroom learning environment on student behaviour.

1.3 Scope and Delimitation

The field experience is conducted at San Jose Academy. The data of the paper will be collected by means of conducting a survey using the Descriptive Method. This study limits its coverage on the grade 11 students of San Jose Academy in the academic year 2024-2025 by means of the cluster sampling method.

Furthermore, this study focuses on the influence of classroom learning environment conditions on student behaviour in terms of interpersonal relations, manner and conduct, and the extent through which they externalise themselves, highlighting cited factors and influences in order to produce possible solutions which may aid in solving problems that have arisen in light of the study.

1.4 Significance of the Study

This study seeks to obtain an understanding of the influence of the classroom learning environment on student behaviour in San Jose Academy. It aims to emphasize factors that contribute to the effects of the classroom learning environment on student behaviour.

This study also aims to benefit the following stakeholders:

To Students. Students are expected to benefit from this study by helping them identify both the positive, and especially negative influence of the classroom learning environment in San Jose Academy on their behaviour, ultimately enabling them to seek ways in rectifying possible negative traits and behaviour. It will also help them figure out how much of it can be attributed to personal factors.

To Counselors. Counselors are to benefit from this paper by having them equipped with a study that focuses on the external manifestation of the influence of a student's classroom learning environment. This will help them identify causes of problems concerning children during their developmental stage and whether or not it can be attributed to external and personal factors. This also serves to aid them in working toward methods that may apply to a student's circumstance within the context of academic settings.

Teachers and Administrators. Teachers and Administrators will benefit from this study by providing them insights on student behaviour. This also serves to identify aspects of a student's personhood which may be overlooked.

To Parents. Parents are to benefit from this study by gaining awareness of the treatment and conditions that their children are subjected to, which they may not be able to voice out themselves. This enables them to provide support and assurance to their children, as well as the educational institution in helping them toward restitution and resolution over children's behaviour, as well as maintaining existing beneficial conditions along with developmental progress.

San Jose Academy. The institution itself stands to benefit from the study as it provides valuable insights into the role of the classroom learning environment in shaping student behaviour. This study can serve as a reference for creating a more conducive classroom learning environment that fosters both academic success and personal development. Additionally, the findings may help San Jose Academy enhance its reputation as an institution that prioritizes student well-being.

To Future Researchers. Future researchers are expected to benefit from this study by enabling them to identify the influence of the classroom learning environment on student behaviour in which a student actively partakes with. It also benefits them by providing points for improvement and recommendations to work upon at the time of writing.

2. METHODOLOGY

This study employed the quantitative research design and descriptive approach.

In order to learn about the influence of the classroom learning environment on student behaviour, researchers surveyed grade 11 students enrolled at San Jose Academy in School Year 2024-2025 using the cluster sampling method.

2.1 Respondents

The research sample consisted of 125 out of 417 students in grade 11 with ages ranging from 15 to 17. However, only 119 were retrieved, 6 were disregarded due to missing responses, and only 113 were used in the study.

2.2 Instrument

The influence of the classroom learning

environment on student behaviour was found through a survey questionnaire containing 32 situations divided into four parts. These situations were adapted from The Classroom Learning Environment (CLE) Questionnaire: Preliminary Development designed by Debby E. McGhee, Nana Lowell, and Sebastian Lemire in 2007 at the University of Washington Office of Educational assessment.

The first part consisted of situations that are considered negative experiences, this part was made up of 5 items. The second part were positive experiences in the classroom learning environment which consisted of 10 items. The third part consisted of negative influences that accounted for the negative experiences cited in the first part, this was made up of 7 items. Lastly, the fourth part were positive influences which corresponded with the positive experiences cited in the second part of the survey.

Two likert scale systems were employed each for positive and negative statements. Portions containing negative statements used Strongly Disagree as the verbal interpretation for the highest numerical value on the scale (4), while positive statements used Strongly Agree for the highest numerical value.

2.3 Procedure

Construction of the instrument began upon the approval of the statement of the problem. The instrument was forwarded to the research adviser and tested for validity by a member of the Social Studies Department of San Jose Academy. Upon validation, the instrument was administered to the respondents and was retrieved thereafter.

2.4 Analysis

Upon retrieval, it was found that <1% of the data were missing. For this reason, several were disregarded to maintain objectivity. The retrieved data was encoded into Microsoft Excel and used Jamovi software for analysis.

In the first stage of data analysis, the tallied counts and percentages of the demographic profile of the students were grouped in terms of gender and strand. The second stage consisted of the determination of mean scores and standard deviation for each of the 32 items of the questionnaire. Lastly, a verbal interpretation was given for each portion containing negative experiences, positive experiences, negative influences, and positive influences following the rating scale system below.

TABLE 1.1.
RANGE AND VERBAL INTERPRETATION FOR NEGATIVE STATEMENTS

RANGE	INTERPRETATION
1 — 1.75	Strongly Agree
1.76 — 2.5	Agree
2.51 — 3.25	Disagree
3.26 — 4	Strongly Disagree

TABLE 1.2.
RANGE AND VERBAL INTERPRETATION FOR POSITIVE STATEMENTS

RANGE	INTERPRETATION
1 — 1.75	Strongly Disagree
1.76 — 2.5	Disagree
2.51 — 3.25	Agree
3.26 — 4	Strongly Agree

3. RESULTS AND DISCUSSION

TABLE 2
NEGATIVE EXPERIENCES ENCOUNTERED BY STUDENTS IN THE CLASSROOM

Situation	Mean	SD	I
I am shut down or ignored in class when I try to participate.	3.30	0.789	Strongly Disagree
My teachers often make inappropriate comments.	3.21	0.737	Disagree
I am often laughed at or become the butt of a joke inside the classroom.	3.10	0.886	Disagree
The classroom does not have a welcoming atmosphere.	3.40	0.738	Strongly Disagree
My opinions are immediately dismissed by my classmates.	3.38	0.659	Strongly Disagree

Table 2 shows the negative experiences encountered by the students in the classroom, it can be seen that “I am often laughed at or become the butt of a joke inside the classroom” obtained the lowest mean score of 3.10 (*SD=0.886*) suggesting that it is the negative experience that the students encounter the most. On the contrary, “The classroom does not have a welcoming atmosphere” obtained the highest mean score of 3.40 (*SD=0.738*) and that the students strongly disagree with having encountered the situation.

TABLE 3

POSITIVE EXPERIENCES ENCOUNTERED BY STUDENTS IN THE CLASSROOM

Situation	Mean	SD	I
My teachers generally encourage mutual respect among students.	3.48	0.553	Strongly Agree
My classes generally provide an environment for free and open expression of ideas.	3.41	0.577	Strongly Agree
My teachers generally respect me as a person.	3.68	0.539	Strongly Agree
My teachers are generally fair and unbiased in their treatment of students.	3.16	0.635	Agree
My teachers generally encourage equal participation of all students.	3.41	0.663	Strongly Agree
My teachers are sensitive to the difficulty of coursework for students.	3.25	0.662	Agree
Inappropriate comments are not tolerated in class.	3.31	0.669	Strongly Agree
I am taken seriously by my teachers and classmates.	3.37	0.554	Strongly Agree
My classmates value and respect my opinions.	3.27	0.613	Strongly Agree
I can confidently express myself in class.	3.06	0.771	Agree

Table 3 shows the positive experiences encountered by students in the classroom, it can be seen that "My teachers generally respect me as a person" obtained the highest mean score of 3.68 (*SD=0.539*) and therefore is the positive situation that the students encounter the most in the classroom.

TABLE 4
NEGATIVE INFLUENCES OF THE CLASSROOM LEARNING ENVIRONMENT ON STUDENT BEHAVIOUR

Situation	Mean	SD	I
I find it difficult to participate in class because my classmates are not welcoming of ideas.	3.05	0.742	Disagree
I get into fights with people at school over trivial differences	3.41	0.703	Strongly Disagree
I find it difficult to partake in group activities because my classmates make me feel insecure.	3.15	0.928	Disagree
I find it difficult to concentrate on the discussions because I am distracted by the noise inside the classroom.	2.65	0.999	Disagree
I have been reprimanded for absenteeism because I would choose not to go to school as I find it stressful.	3.55	0.707	Strongly Disagree
I am told by my teachers to participate in class more often.	3.17	0.865	Disagree
I struggle with my relationships with schoolmates due to personal differences.	2.91	0.978	Disagree

Table 4 shows the negative influences of the classroom learning environment on student behaviour. It can be seen that the most prominently negative influence of the classroom learning environment on student behaviour was: "I find it difficult to concentrate on the discussions because I am distracted by the noise inside the classroom" which obtained the lowest mean score of 2.65 (*SD=0.999*). While "I have been reprimanded for absenteeism because I would choose not to go to school as I find it stressful" obtained the highest mean score of 3.55 (*SD=0.707*) and is the least prominently negative influence of the classroom learning environment on student behaviour.

The findings concur with Thien (2007) who discovered that students resort to dysfunctional coping mechanisms when facing unpleasant ordeals at school such as noise and encounters with people. These coping mechanisms range from behavioural disengagement to aggression.

TABLE 5
POSITIVE INFLUENCES OF THE CLASSROOM LEARNING ENVIRONMENT ON STUDENT BEHAVIOUR

Situation	Mean	SD	I
I am encouraged to partake in classroom activities.	3.39	0.591	Strongly Agree
I treat my peers with respect as they do me.	3.61	0.490	Strongly Agree
I generally do well in my course subjects.	3.35	0.611	Strongly Agree
I am compelled to provide assistance to my peers when it appears that they need it.	3.42	0.547	Strongly Agree

I encourage my peers to express themselves freely in class as I do.	3.38	0.659	Strongly Agree
I submit my class outputs before or when it is due.	3.42	0.638	Strongly Agree
I do as I am told by elders, from schoolmates older than me to my teachers.	3.35	0.609	Strongly Agree
I make it a habit to study my course subjects beforehand.	3.01	0.800	Agree
I am never late to school and class periods.	3.34	0.786	Strongly Agree
I am never absent if I do not have to.	3.52	0.721	Strongly Agree

Table 5 shows the positive influences of the classroom learning environment on student behaviour, it can be seen that "I treat my peers with respect as they do me" is the prevailing positive influence of the classroom learning environment on student behaviour with a mean score of 3.61 (*SD=0.490*).

Thien (2007) supports the findings citing that learning environment factors, such as teacher monitoring, accounted for student emotional and behavioural outcomes. Results from Table 4 showed that the students mostly experience their teachers encouraging mutual respect for each other.

4. CONCLUSION AND RECOMMENDATION

4.1 Conclusion

The researchers concluded that students in San Jose Academy do not encounter the negative experiences as was presented to them, however, they do encounter the presented positive experiences. It was also found that they are not negatively influenced but are positively influenced by their classroom learning environment. The data reveals a degree of direct proportionality between negative and positive experiences and influences, suggesting a correlation and even a causal link between the two.

4.2 Recommendations

In light of the findings of this study, the researchers have come to recommend the following:

1. The students were revealed to have a generally positive perception of the classroom learning environment in San Jose Academy suggesting awareness thereof and as such, must feel a sense of empowerment so that they feel that their concerns are heard.
2. It is imperative that counselors bolster students to be truthful of their experiences and how it affects them through empathy and understanding. Whilst the study yielded generally positive results, it would be prudent to underline the minority who encounter unpleasant experiences inside the classroom and afford for them an avenue to channel their tribulations.
3. Teachers and administrators may begin to look into broader aspects of the institution to further improve experiences encountered by students.
4. Parent participation and classroom involvement is necessary in creating a pleasing classroom environment, this also ensures that even household conditions remain in check.
5. As the findings reveal a generally conducive classroom learning environment in San Jose Academy, the school must see to it that these conditions are maintained by means of consistent monitoring and encouragement. It would be prudent to look further into other areas that may require improvement and rectification such as conditions outside the classroom.
6. For further research, it is advised that future researchers consider the limited nature of the instrument as it failed to present all empirical scenarios that may occur as regards the subject of the study given the exclusively conclusive and contextual result thereof. It was also found that combining objective and subjective accounts of experiences and influences and taking into account individual factors may provide further support to the findings and allow for more nuance.

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The Influence of Peer Pressure to the Decision-Making of Grade 12 Students in San Jose Academy

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Abstract: Peer pressure plays a crucial role in the lives of many adolescents today. By their influence, behaviors, and decision-making. This study aims to explore how peer pressure affects the decision-making of Grade 12 students at San Jose Academy. It aims to determine how often students peer pressure, what is the most beneficial impact and evaluate whether there is a significant relationship between peer pressure and decision-making. The researchers used a 4-point Likert scale to quantify the responses. The data are interpreted by calculating its mean, standard deviation, and by using Pearson correlation analysis. The results revealed that Grade 12 students experience peer pressure sometimes, with discovery of new experiences being the most beneficial impact while increased productivity becomes the least beneficial impact. The correlation matrix indicated that there is no significant relationship between peer pressure and decision-making. Overall, these findings suggest that students do not easily let their decisions in life be influenced by their peers. The researchers recommend to the future researchers to explore a younger age line and specify the decision-making area.

Key Words: Peer pressure; Decision-making; Peers; Influence.

1. INTRODUCTION

1.1 Background of the Study

Decision-making is becoming an increasingly important responsibility for young adolescents as they get older and go through their senior years. And with these decisions comes the pressure of friends to decide on doing things. From school activities to college program choices and even personal goals, which leads them to being dependent on their peers instead of being a grown and responsible young adolescent. They often see their peers as a comfort option without knowing if it will bring them any good or bad.

Teens are very quick and accurate in making judgments and decisions on their own and in situations where they have time to think. However, when they have to make decisions in the heat of the moment or in social situations, their decisions are often influenced by external factors like peers. In a study funded by the National Institute on Drug Abuse (NIDA), teen volunteers played a video driving game, either alone or with friends watching. What the researchers discovered was that the number of risks teens took in the driving game more than doubled when their friends were watching as compared to when the teens played the game alone. This outcome indicates that teens may find it more difficult to control impulsive or risky behaviors when their friends are around, or in situations that are emotionally charged (Aldanese, 2010).

Influences often get recognised when people act or behave on something they normally would not, which can be a result of being linked with their peers (Laursen, 2018). According to Chen and Deng (2021), Peer groups can have both a positive effect and harmful impact on an individual, the regulatory processes of peer review maintain competition among peers but this process also flares intuitive rivalry toward success. This means they also begin to second guess their own decisions when it deviates from the rest of society, forcing them to either act against their better judgment or comply with societal norms.

Peer pressure becomes easily enabled because for younger individuals, it takes a considerable amount of time for them to build up their confidence and learn how to reject their peers' influence into doing something (Spunshot, 2023). In order to fit in with their peers, people tend to do risky behaviors or participate in delinquent activities. Their well-being and judgment might be altered because of the perception of the group, and this greatly affects their self-development (Eugen, 2023). This is inevitable because a group of peers can be quickly persuasive to make people have their decisions beyond their restraint (Dedhiya, 2022). The peer pressure might at times be managed, but it is studies that show it leads people into making a choice that is not in their best judgment. On the other hand, in worst situations, just one supportive peer is sometimes enough to enable an individual to make the right decisions aligned with his or her values. Positive influence, on the one hand, aids in resisting negative peer pressure while promoting personal growth by reinforcing trust and confidence in decision-making. Given the fact that the influence of peers can significantly affect the decision making process of a student, it would be important to know how such influences manifest themselves and what eventualities they cause.

This study seeks to know the level to which peer influence affects the decisions of Grade 12 students of San Jose Academy, both the negative and positive side of peer influence.

1.2 Statement of the Problem

The researchers decided to examine this topic to analyze The Influence of Peer Pressure to the Decision-Making of Grade 12 Students in San Jose Academy. This study is expected to have an excellent result that is certain to help the respondents and other students that have experienced the Influence of Peer Pressure to Decision-Making.

This proposed study intended to address the following questions to shed insight on the chosen topic:

1. What is the profile of the respondent?
    A. Sex
    B. Section

2. How often do the students get influenced by their peers in decision-making?

3. What is considered to be the most beneficial effect of peer pressure to the decision making of students?

4. Is there a significant relationship between peer pressure and decision-making skills of students?

1.3 Significance of the Study

This study will examine the influence of peer pressure to the decision-making of Grade 12 students in San Jose Academy. The result of this research will benefit the following:

Students. All students will benefit from this study since they will gain information about peer pressure and its influence on their decision-making.

Parents. Parents will benefit from this study because it will give them information and awareness about the effects of peer pressure and be more aware of their children's environment and to prevent them from making negative or wrong decisions influenced by their peers.

Teachers. Knowledge about peer pressure helps the teachers to know if the students are being negatively influenced or positively through looking for specific sudden changes of behaviors, attitudes or patterns. This study will also help them to teach, assist and provide guidance to the students to make good and better decision-making in both academic and personal life.

School Administrators. This study will help them to promote and encourage open discussions with students and parents about peer pressure and decision-making as well as create a more supportive, responsive, and effective learning environment for students.

Future Researchers. This study may serve as a foundation for them to explore deeper aspects of peer pressure and decision-making, such as the long-term effects of peer influence.

2. METHODOLOGY

2.1 Significance of the Study

This correlation study focuses on examining the relationship between peer pressure and the decision-making process of Grade 12 students. Data is collected through a rating scale method, which allows respondents to share their views and opinions clearly.

The research aims to evaluate various types of peer pressure, including its impact on academic performance and personal choices. The findings will offer a deeper understanding of how peer pressure influences decision-making, providing valuable insights for students.

2.2 Research Population and Sampling

Participants were senior high school students, specifically the Grade 12 students of San Jose Academy for the school year 2024-2025. The researchers used random sampling in order for the students to have a choice in answering the survey. They were asked possible questions in order for the researchers to obtain a result for their given topic.

2.3 Research Instrument

The researchers prepared three parts for the survey questionnaire.

The survey questionnaire has three parts, the first part is the demographic data of the respondents, second and third part of the survey that needs to be answered by the respondents of the researchers. The survey questionnaire contains two tables, each table has 10 questions to be answered by the respondents. The first table aims to explore the frequency of peer pressure while the second table explores the beneficial impact of peer pressure. The respondents had answered 20 questions in total.

The respondents of the survey questionnaires were asked to which degree they agree using a 4-point Likert rating scale. For the first table, the respondents were asked to the degree they agree by rating the questions; 4 - Always, 3 - Often, 2 - Sometimes, 1 - Never. For the second table, the respondents were asked to do the same thing using the 4-point likert scale but this time they were asked to determine whether they agree by using; 4 - Strongly Agree, 3 - Agree, 2 - Disagree, 1 - Strongly Disagree.

INTERPRETATION	POINT	SCALE RANGE
Always	4	3.26 - 4
Often	3	2.51 - 3.25
Sometimes	2	1.76 - 2.5
Never	1	1 - 1.75

INTERPRETATION	POINT	SCALE RANGE
Strongly Agree	4	3.26 - 4
Agree	3	2.51 - 3.25
Disagree	2	1.76 - 2.5
Strongly Disagree	1	1 - 1.75

2.4 Data Gathering Procedure

The research questions were developed based on the questions shown in chapter 1. The questionnaire was divided into two parts: the first part is the demographic information of the respondents, while the second part includes the survey questions. The questionnaire also contains two tables: the first table is about the influence of peer pressure on the decision-making of the students, while the second table highlights the most beneficial impact that is influenced by peer pressure. The researchers used a 4-point Likert scale for this study and was conducted at San Jose Academy.

Before the distribution of the survey questionnaire, it was validated by Ms. Princess Clarisse Luciano on December 9, 2024. Then after it was validated, the researchers distributed the survey on December 10, 2024 to each section of Grade 12. The researchers used random sampling inorder to get answers from the students. Then, after the respondents answered the questionnaire, the researchers collected the survey the same day as they distributed the survey, December 10, 2024. The accomplished survey questionnaire will be utilized for interpretation and conclusion of the study.

3. RESULTS AND DISCUSSION

1 . Demographic Profile of the Respondents

Table 1.1

Sex

SEX	Counts	% of Total	Cumulative %

FEMALE	10 5	53.8 %	53.8 %
MALE	90	46.2%	100.0 %

Table 1.2

Strand

STRAND	Counts	% of Total	Cumulative %
ABM	60	30.8 %	30.8 %
GA	21	10.8 %	41.5 %
STEM	114	58.5 %	100.0 %

Sex. Table 1.1 presents that the majority of the respondents are female with 53.8% (105 respondents) and 46.2% (90 respondents) being male.

Strand. Table 1.2 presents the distribution of respondents by strand, with Science, Technology, Engineering, and Mathematics (STEM) having the most students at 114 (58.5%), followed by Accountancy, Business, and Management (ABM) with 60 students (30.8%), and General Academic (GA) with the fewest at 21 students (10.8%).

2. How often do the students get influenced by their peers in decision making?

Table 2

	Mean	SD	Interpretation
I can't resist whatever my friend tells me to do.	2.28	0.900	Sometimes
I am skipping school because my peers told me to do so.	1.49	0.827	Never
I can't say 'NO' to my peers even if my parents don't agree.	1.88	0.898	Sometimes
I tend to disregard my limits when I'm with my peers.	2.22	0.951	Sometimes
I consider my peers first before myself.	2.11	1.034	Sometimes
I am dependent on my peer's decisions.	2.21	0.952	Sometimes
I do activities that are against my will just to be accepted and valued.	1.88	0.944	Sometimes
I don't think of the consequences just so I can relate to my peers.	1.93	0.997	Sometimes
I tend to lie to my parents so I can enjoy myself with my peers even if there is danger.	2.15	1.062	Sometimes
Me and my parents have understanding because of what I do with my peers.	1.91	0.991	Sometimes
TOTAL MEAN :	2.01		Sometimes

As per Table 2, The question, "I can't resist whatever my friend tell me to do" got the highest mean of 2.28 (SD=0.900), while the question, "I am skipping school because my peer told me to do so" got the lowest mean of 1.49 (SD=0.827) showing that peer pressure influence people in different ways.

3. What is considered to be the most beneficial impact that is influenced by peer pressure?

Table 3

	Mean	SD	Interpretation

I know what's best for me.	3.34	0.752	Strongly Agree
I received good advice that is useful on a daily basis.	3.27	0.740	Strongly Agree
I am confident with what I do because my peers give me comments and suggestions for me to succeed.	3.09	0.823	Agree
I am open with my peer's suggestions and advice.	3.35	0.755	Strongly Agree
Helps me to identify what is right and what is wrong.	3.36	0.678	Strongly Agree
Helps me discover new things I can experience.	3.47	0.706	Strongly Agree
Helps me participate in different extracurricular activities.	3.21	0.799	Agree
I am influenced to adapt healthier habits.	3.06	0.895	Agree

As per Table 3, the question, "Helps me discover new things I can experience" got the highest mean of 3.47 (SD+0.900), on the contrary, "I become more productive and finish my activities on time" got the lowest mean of 3.03 (SD=0.792).

4. Is there a significant relationship between peer pressure a decision-making skills of the students?

Table 4

		Peer Pressure	**Decision-making Skills**
Peer Pressure	Pearson's r	—	
	df	—	
	p-value	—	
Decision-making Skills	Pearson's r	-0.060	—
	df	193	—
	p-value	0.407	—

As per Table 4, the data analysis reveals that there is no statistically significant relationship between peer pressure and decision-making among Grade 12 students, as indicated by the p-value of 0.407. For a relationship to be considered statistically significant, the p-value must be below 0.05 ($p<0.05$), meaning that in this case, the results do not meet the criterion.

4. CONCLUSION AND RECOMMENDATION

4.1 Conclusion

The researchers identify if peer-pressure has influence on the decision-making of the Grade 12 student, as well as if there is a significant relationship between the two.

Based on the indicated findings, the following conclusions were drawn:

1. Peer pressure can "sometimes" influence the students depending on the situation.
2. Majority of the Grade 12 students were not influenced by their peers when it comes to decision-making. Therefore, it can be concluded that having peers is also beneficial for the students. However, the students should pick their friends wisely.
3. Peer pressure and decision-making of the Grade 12 students has no significant relationship.

4.2 Recommendation

This study revealed that there is no significant relationship between peer pressure and the decision-making of Grade 12 students in San Jose Academy. Based on these findings the following recommendations are hereby proposed:

1. Inclusion of Younger Respondents

For future studies it is recommended to consider younger students such as those in junior high school, to explore whether peer pressure has a stronger or weaker relationship into their decision-making at every developmental stage.

2. Specification of Decision-Making Areas

It is recommended to future researchers to focus on specific areas of decision-making that can be found inside the school such as, academic choices, social interactions, personal development, to determine whether peer pressure has an impact in certain areas of the student's life rather than as a general factor.

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Diskarte o Pangarap?: Factors Affecting the Degree Program Selection of Grade 12 Students of San Jose Academy

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Abstract: Nowadays, students face many factors when choosing their college courses, making it a defining moment in their lives. For many, this decision is more than just selecting a program, it's about shaping their future careers and personal growth. Grade 12 students face big decisions, balancing dreams, family expectations, money matters, and society's influence. Some pursue their passions, others, however, take practical routes to guarantee employment security. Understanding these factors is important to help students make informed decisions that align with both their dreams and situations. This study, "Factors Affecting the Degree Program Selection of Grade 12 Students of San Jose Academy," aims to determine the varied aspects that affect students' choices in their career degree program. Applying a descriptive research method, surveys were conducted among the Grade 12 population to identify how socioeconomic status, parental influence, peer pressure, and personal preferences correlate in the decision-making process. Results show that while some students will pursue courses aligned with their interests, many prioritize practicality, and socioeconomic status emerging as the most significant factors. These findings showcase the need for thorough career guidance, where schools and families get together to support students in helping this determine life choice.

Key Words: College course; Degree program; Factors; Decisions.

1. INTRODUCTION

1.1 Background of the Study

There are countless major decisions that students must make that have significant impacts on their lives as they think thoughtfully for their future educational paths. The considerations involved in choosing a degree program go far beyond personal desires or practicalities, often considering multiple varieties of factors. These factors may include parental guidance, societal expectations, financial limitations, the practicality of pursuing a particular career trajectory, personal preferences, and the influence of socioeconomic circumstances on the decision-making process.

College education is crucial and provides more than just identifying and expanding the superficial benefits of more career opportunities. It is a realm where students can explore different paths, discover new passions, and experiences that prepare them for the ever-changing world and help them build a successful future. However, choosing a degree program can be tough and requires a broad mindset and wise decision-making. Many students must consider several factors that will shape their future careers. Typically, students are guided by their own interests, skills, competencies, or expertise when selecting their preferred course. Moreover, students may feel obligated to align their choices with social pressures and trends. They may select for a popular course at the time, or their socio-economic background may limit their options, forcing them to settle for courses that fit within their financial means. The fast-paced changes in society also influence students to conform to the latest trends and select courses that are currently popular or in demand (Abelo, et, al,. 2024).

There are many factors that could be considered in selecting courses like quality education, the people from the environment, personal choice and accessibility of the school from student`s residences. Helping students choose the career that suits them can be done by integrating a career plan with the K-12 curriculum so that students can make good decisions on

what course to take in college. Collaborative effort of the school administrators, teachers, and parents should also be made to come up with better career plans for every individual student`s (Joaquin et al., 2019).

Due to the importance of choosing a course for the career path of a student, decision making plays an important role in this situation. It is a process that explains or characterizes the considerations an individual makes when deciding on a career. Course has many different choices that students have but they still need to decide on the best career they can pursue.

According to Sharf (2015) course decision making is a process that describes or explains the choices that a person makes when selecting a particular course. It also helps to identify different factors involved in the decision making of a person and provides an understanding of the way these factors such as parental influence, socio-economic status, peer pressure, career aspirations, personal preferences, personal passion and interest have an impact on their course decision and choices.

Students often navigate a complex multiple ways of influences to select the path that aligns best with their personal aspiration and circumstances. The most frequent and common factors that influence students' course choices include parental discretion and external influences, such as affordability, practicality, personal preference, interests, and socio-economic factors.

In the context of senior high school students' selection of a degree program is a defining point in the educational process that will affect their future academic and professional journey. This study, titled "Factors Affecting The Degree Program Selection Of Grade 12 Students Of San Jose Academy" aims to look into the different aspects students in grade 12 consider when choosing their degree programs. This study investigates how socioeconomic position, career goals, personal ambitions, and other factors interrelate to determine the most important aspects influencing students' decisions. Educational institutions need to be knowledgeable with these concerns in order to develop focused strategies and support systems that help students make enlightened options regarding their pathways to higher education.

The researchers want to delve into the descriptive research design between the factors affecting the students' degree program selection and their course aspirations, hoping to shed more light on this topic and provide insights.

1.2 Statement of the Problem

In order to have a successful output that will provide knowledge to the students in regards to their degree program selection, the researchers of this study decided to identify the descriptive research design among the students' aspirations and the factors affecting the students' degree program choices.

This proposed study sought to answer the following questions to shed light on the chosen topic:

1. What is the demographic profile of the student?
    a. Name (Optional)
    b. Sex
    c. Age
    d. Socio Economic Status; and
    e. Strand
2. What is the top basis of students in choosing a degree program?
3. Which among the factors affects the degree program selection of students the most?
4. Is there a significance difference in factors affecting students in terms of:
    a. Sex; and
    b. Socioeconomic Status

1.3 Significance of the study

The study would provide different benefits to students, parents, teachers, and future researchers. The benefits that the study can provide are as follows;

To Parents. Parents will benefit from this study since it could enable them to better understand and guide their child in regards to college degree program selection. Parents can better support their child's academic and career journey, helping them make informed decisions and providing the necessary encouragement or guidance.

To Guidance Officers. Guidance officers would benefit from this research as they would gain more knowledge about degree program selection of students, and would help them to formulate a more supportive and open classroom environment. Guidance officers would be able to implement strategies in order to provide guidance among students.

To Future Researchers. The next researchers would benefit from this study as they would be able to continue the study that fills the gaps of this topic, and help the future researchers to proceed on their aspirations. The study will provide insights into why Grade 12 students choose certain degree programs, making this study a springboard to those who wish to expand this study in order to achieve the things that the current researchers did not discover in the present time.

2. METHODOLOGY

2.1 Research Design

This descriptive research design was employed to describe the factors affecting the college course selection of grade 12 students of San Jose Academy. The researchers collected data to explain the variables given in this study. The main objective is to offer a complete account of the variables, by employing quantitative methods in order to obtain numerical data that is systematically organized.

2.2 Research Population

The participants included in this study were the grade 12 senior high school students who possessed experience and knowledge in the subject topic. The researchers used purposive sampling since grade 12 students are upcoming college students and also currently in the process of course selection for their college years. Slovin's formula was used to calculate the sample size of 194 from a population of 390.

2.3 Research Instrument

The study utilized a self-made survey questionnaire to obtain the necessary data. The research questionnaires for respondents were divided into two parts. The first part of the questionnaire was created to provide the background of the respondents in the study such as their age, gender, and socio economic status.

The second part of the survey contained tables with 10 questions about factors affecting course selection which was respondents were asked to indicate the degree to which they believed a statement to be effective using a four-point Likert rating scale: Strongly Agree - 4 Agree - 3 Disagree 2 - Strongly Disagree - 1. The questions were given in order to gather information about the factors that can influence the course selection of students.

2.4 Data Gathering Procedure

The questionnaire was referred for comments to school administrators in order to determine test validity. It was then consulted to a statistics teacher to ensure clarity of ideas and appropriateness of the questions. This questionnaire was validated by Mr. Charles Alison C. Rivera of San Jose Academy on November 26, 2024.

The study was conducted at San Jose Academy, the questionnaire was then distributed to the grade 12 students with informed consent, with the use of survey questionnaires, for the researchers to collect the required data accurately, obtaining it with a far higher response rate and credibility. On December 4, 2024, the researchers distributed the questionnaire to 194 respondents equally divided in each section, which helped the researchers make reliable comparisons to accurately generalize the result of the data.

The data was then collected the same day, the researchers utilized the collected data to make an interpretation and conclude the factors that affect the college degree program selection of the grade 12 students in San Jose Academy. Unfortunately, due to the unavailability of other respondents there are only 171 out of 194 respondents who answered the survey questionnaire

POINT	SCALE RANGE	INTERPRETATION
1	1 - 1.75	Strongly Disagree
2	1.76 - 2.5	Disagree
3	2.51 - 3.25	Agree
4	3.26 - 4	Strongly Agree

3. RESULTS AND DISCUSSION

Table 1.1 Gender of the Respondents

Gender	Counts	% of Total	Cumulative %
F	95	55.6%	55.6%
M	76	44.4%	100.0%

Table 1.2 Age of the Respondents

Age	Counts	% of Total	Cumulative%
16	5	2.9%	2.9%
17	111	64.9%	67.8%
18	48	28.1%	95.9%
19	5	2.9%	98.8%
20	2	1.2%	100.0%

Table 1.3 Age of the Respondents

Strand	Counts	% of Total	Cumulative%

ABM	61	35.7%	35.7%
GA	21	12.3%	48.0%
STEM	89	52.0%	100.0%

Table 1.4 Socio Economic Status of the Respondents

SES	Counts	% of Total	Cumulative%
Lower Class	73	42.7%	42.7%
Middle Class	84	49.1%	91.8%
Upper Class	14	8.2%	100.0%

Gender. Table 1.1 shows the frequency of gender participating in the study. The table reveals that 55.6% of the participants are ninety-five (95) female students. In contrary, only 44.4% of the participants are seventy-six (76) male students.

Age. Table 1.2 shows the age of respondents who participated in the study. 64.9% of the participants are one hundred eleven (111) 17 years old students. However, the lowest was 1.2%, who are the two (2) respondents with 20 years of age.

Strand. Table 1.3 indicates the strand of the respondents, majority of the respondents are from the Science, Technology, Engineering, and Mathematics (STEM) strand that has a percentage of 52.0% consisting of eighty-nine (89) respondents. While General Academic (GA) strand being the lowest with twenty-one (21) respondents or 12.3% of the sample.

Socio Economic Status. Table 1.4 above shows the socio economic status of the respondents, the table proves that nearly half of the respondents, eighty-four (84) are from the middle class, which has a percentage of 49.1% while only fourteen (14) respondents or 8.2% of the sample are upper class.

Table 2. Basis of students in choosing a degree program

Basis of students in choosing a degree program	Mean	SD	Interpretation
The course chosen is based on my personal ambition and interest.	3.27	0.796	Strongly Agree
I consider practicality in my decisions to choose college courses.	3.26	0.785	Strongly Agree
Parental expectations seriously influence my choice of college courses.	3.07	1.032	Agree
I consider financial capacity in my decision-making when choosing a college course.	3.27	0.810	Strongly Agree
Peer pressure from my friends had an influence on my course selection.	2.36	1.089	Disagree

Table 2 shows the basis of students in choosing a degree program. It can be seen that personal ambition and interest obtained the highest mean of 3.27 (SD=0.796). On the contrary, peer pressure obtained the lowest mean of 2.36 (SD=1.089).

This result disagrees with the study of Lupas and Farin (2021) in Zambales which reveals that the students prefer choosing a degree program based on their preferred course while acknowledging support and guidance from their families and friends.

Table 3. Factors that affect degree program selection the most.

Basis of students in choosing a degree program	Mean	SD	Interpretation

Socio Economic Status	3.20	0.847	Agree
Parental Influence	2.63	1.046	Agree
Peer Pressure	2.39	1.020	Disagree
Personal Ambition	3.09	1.073	Agree
Practicality	3.28	0.856	Strongly Agree

Table 3 shows the factors that affect the degree program selection of students the most. It can be seen that the "practicality" obtained the highest mean of 3.28 (SD=0.856). On the contrary, "peer pressure" obtained the lowest mean of 2.39 (SD=1.020).

The results are aligned with the study of Belkim (2014) that students mostly choose a degree program with the reason of high profit, in other words, practicality. Other studies also support this result such as the study of Matolo (2014) in which practicality was stated to be one of the factors that influences students in choosing a degree program.

Table 4.1 Results of independent t-test in determining the significance of difference in factors on degree program selection when grouped according to gender

Factors	Statistic	df	p
Socio Economic Status	2.311	169	0.022
Parental Influence	0.669	169	0.504
Peer Pressure	0.720	169	0.472
Personal Ambition	1.829	169	0.069
Practicality	2.813	169	0.005

Descriptive

Factors	G	N	Mean	SD	SE
SES	F M	95 76	3.34 3.04	0.794 0.886	0.0814 0.102
Practicality	F M	95 76	3.44 3.08	0.754 0.935	0.0774 0.107

Table 4.1 presents the results of significant difference factors in terms of gender, examining whether gender significantly affects the factors influencing degree program decisions. It was revealed that there is a significant difference on how socio-economic status and practical degree program choices influence decisions in terms of gender, with p-values of .022 and .005, respectively.

This result agrees with Tukiran et al. (2021) where in the study suggests that career considerations play a significant role in male students' selection of degree programs that indicates notable differences in the factors influencing degree program selection.

Table 4.2 Results of One-way Anova in determining the significance of difference in factors on degree program selection when grouped according to Socio Economic Status.

	F	df1	df2	p
Factors	0.120	2	35.0	0.888

Descriptives

Factors	SES	N	Mean	D	E
Socio Economic Status	Lower Middle Upper	73 84 14	3.18 3.21 3.29	0.855 0.837 0.914	0.1001 0.0913 0.2442
Parental Influence	Lower Middle Upper	73 84 14	2.71 2.54 2.71	0.112 0.963 1.204	0.1301 0.1050 0.3219
Peer Pressure	Lower Middle Upper	73 84 14	2.48 2.30 2.50	1.042 0.941 1.345	0.1220 0.1027 0.3593
Personal Ambition	Lower Middle Upper	73 84 14	3.07 3.13 2.93	1.110 1.027 1.207	0.1299 0.1121 0.3225

Practicality	Lower Middle Upper	73 84 14	3.32 3.26 3.21	0.831 0.838 1.122	0.0973 0.0914 0.2998

Table 4.2 show the result on the significant difference in factors in terms of socio economic status above, it was found that there are no statistical significant differences in the factors in terms of the socio economic status as determined by ONE-WAY ANOVA F(2, 35.0)=0.120, p=<.888.

This agrees to the study of Sadjail et al, (2022) that socio-economic factors, such as the costliness of the degree program, make students look for alternative degree programs that will fit the requirements of their socio-economic status.

4. CONCLUSION AND RECOMMENDATION

4.1 Conclusion

Based on the presented and verified data, the following have been the conclusions of the researchers.

1. The respondents choose their degree program based on their personal interest and ambition, on the contrary, peer pressure affects them the least.
2. It was found that practicality is the most influential factor in student's degree program selection, while peer pressure has the least impact.
3. The results concluded that among the factors considered by the students in choosing their college degree program it was found that there is a significant difference on how the socio-economic status and practicality choices can influence decisions in terms of gender.
4. It was found that there was no statistically significant difference on the factors considered by students from various socio-economic status when choosing their college degree program.

4.2 Recommendations

Based on the findings of this study and also based on those developed conclusion, the researcher humbly recommends those follows:

1. Students should choose their degree program based on their interest while maintaining balance with their financial capacity to ensure the feasibility of their chosen college degree program, to assess their options to make better decisions, attending an internship is also recommended.
2. Parents should encourage their children to pursue a college degree according to their interest and ambition while still putting into consideration of their financial status to ensure a firm and effective decision on degree program selection.
3. Guidance officers should create and establish a career guidance program in order to assist and prepare the students on making firm decisions about their career path in higher education.
4. It is recommended for future researchers to delve into the factors affecting degree program selection that the current researchers were not covered in the study. They can also expand this study by including the other grade levels to find more insights.

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Attendance Check, Say Present: Study on the Effects of Parental Absence an a Child's Academics Performance and in Relation to Their Personal Life

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Abstract: Parental absence significantly impacts children's academic performance and overall well-being, particularly in the Philippines, where many children grow up without both biological parents. This absence can lead to poor academic performance, low motivation, feelings of loneliness, and challenges related to mental health and relationships. The researchers aim to investigate the effects of parental absence on a child's academic performance and personal life. The study focuses on students in grades 9 to 12 at San Jose Academy, employing a descriptive-quantitative design with purposive sampling to explore the effects of parental absence through a survey. The survey includes a variety of situations concerning the academic performance and personal lives of the students, which will be assessed using a 4-point Likert scale. The study revealed a significant difference in the academic performance of students based on the type of parental absence they experienced. However, it found only a weak significant difference in the personal lives of the students when classified according to the type of parental absence they faced. Overall, the findings emphasize the barriers that parental absence creates for children's development and academic success. This paper aims to raise awareness among students, families, and society about the impact of parental absence on a child's academic performance and personal life. Since families are the basic unit of society, increased awareness can lead to a more productive and unified community that values strong connections.

Key Words: Academic Performance; Blended Families; Incarceration; Long Working Hours; Overseas Parents; Parental Absence; and Separated

1. INTRODUCTION

1.1 Background of the Study

Parental absence refers to the temporary or long-term absence of one or more parents, which can negatively impact a child's academic performance and overall well-being. Parental absence, whether temporary or permanent, significantly impacts children, particularly in the Philippines, where about one-third grow up without both biological parents (U.P. Population Institute, 2022). This situation can lead to challenges such as poor academic performance, low

motivation, and feelings of loneliness due to a lack of support and guidance.

Children without parental involvement often struggle with homework and miss important educational opportunities. Studies show that absent parents can negatively affect children's mental health and relationships (Khan, 2022; Manalo et al., 2023).

Separated parents can lead to behavioral issues and poorer educational outcomes for children due to factors like lack of commitment and financial struggles. Studies show that these children often face challenges in motivation and engagement (Gratz et al., 2024).

Blended families, which include children from previous relationships, may struggle with academic difficulties due to rivalry for parental attention and adjusting to new family dynamics (Njoroge et al., 2018; Alli, 2024).

Children with overseas parents may experience emotional distance, affecting their social and educational experiences. Additionally, children of incarcerated parents often face stigma, low self-esteem, anxiety, and limited opportunities, which can perpetuate hardship. Policy reforms and support systems are essential to help these children have a normal childhood and a better future.

Incarceration, or having imprisoned parents, causes greater harm than parental death or divorce. Children of incarcerated parents face issues such as stigma, low self-esteem, anxiety, poverty, and limited educational opportunities, perpetuating a cycle of hardship.

Parental absence can profoundly affect a student's academic success, social growth, and emotional health, leading to resilience in some and isolation in others. Communities and support networks must recognize these challenges and provide essential assistance to help youth reach their full potential.

Overall, parental absence creates barriers to a child's development and academic success, underscoring the importance of support and encouragement from parents to foster resilience and self-confidence.

1.2 Statement of Problems

The researchers decided to understand the effects of parental absence on grade 9 to 12 students' academic performance. This study is anticipated to yield fruitful results that benefit the respondents and other pupils with absent parent/s.

This proposed study sought to answer the following questions to shed light on the chosen topic:

1. What is the profile of the respondent?
    a. Name (optional),
    b. Gender,
    c. Age,
    d. Grade Level
2. What kind of parental absence is experienced by the student?
    - Annulment
    - Blended/Reconstituted
    - Overseas parent/s
    - Having long working hours
    - Incarceration
3. What is Considered to be the Most Impactful Effect of Parental Absence on the Students' Academic Performance?
4. What is Considered to be the Most Impactful Effect of Parental Absence on the Students' Personal Life?
5. Are there significant differences in the effects of parental absence based on the type of absence?
    5.1 Effects on the Academic Performance of the Students
    5.2 Effects on the Personal Life of the Students

1.3 Significance of the Study

This study aims to provide the necessary information and understanding about the effects of parental absence on the academic performance of Grades 9 to 12 students. For this conducted study, it has importance to the following:

Teenagers. This study raises students' awareness regarding the effects of parental absence on their academic performance, which would help them know what to do in similar situations.

Parents. The results of this study will provide knowledge regarding the effects of their absence on their child's academics. Letting the parents aware would make them cautious regarding their possible actions in terms of their relationships.

Teachers. Educators should be aware of potential conflicts in their students' homes, as this knowledge can assist them in adjusting their academic assessments and support.

School and Administrators. This study would help school administrators empathize and consider their students when creating a curriculum that meets their needs.

Future Researchers. This study will provide information regarding the effects of parental absence on a student's academics and personal life that future researchers might be interested in within the same scope. This study will also help them refine and define their research. It can also be a basis or a starting point when conducting new research.

2. METHODOLOGY

This study utilized a descriptive-quantitative design to examine the effects of parental absence on the academic performance of Grades 9 to 12 students at San Jose Academy through a survey.

A purposive sampling method was employed, focusing on students in grades 9 to 12 who experience parental absence. Participants were selected based on specific characteristics relevant to the study, ensuring alignment with the research objectives.

The data were collected using standardized questionnaires divided into three parts. The first part gathers demographic information, including name, gender, age, and grade level, alongside a checklist of parental absence types. The second part uses a 4-point Likert Scale to assess the effects of parental absence on academics and personal situations. The questionnaires were validated by Sir EA Senique, a Humanities and Social Sciences teacher, leading to necessary revisions.

Data was analyzed using Jamovi Software. Frequencies and percentages described the demographic profile of respondents, while means assessed overall responses related to academic and personal impacts. One-Way ANOVA was used to identify variations in perceptions about parental absence.

3. RESULTS AND DISCUSSION

Profile Variables	Frequency	Percentage
Gender		
Female	68	70.1%
Male	29	29.9%
Age		
14	14	14.4%
15	23	23.7%
16	32	33%
17	18	18.6%

18	10	10.3%
Grade Level		
JHS	50	51.5%
SHS	47	48.5%

Table 1. Demographic Data

Table. Table 1 shows that most students who answered the survey were Female (68). Most respondents are 16, followed by 15, and 18 as the least number. There were 50 respondents from Junior High, divided into four sections (2 from Grade 9 and 2 from Grade 10). For Senior High School, there were 47 respondents, with a total of 9 sections from Grade 11 and 8 sections from Grade 12.

Situation	Mean	SD	I
My decision-making skills became enhanced in terms of academics	3.14	0.661	Disagree
I became more confident in achieving my academic goals	3.03	0.797	Disagree
I used their absence as a motivation to do well in school	2.94	1.029	Disagree
I prefer doing my tasks alone	3.61	0.670	Agree
I became more focused on my academics	3.06	0.719	Disagree
I became more creative in creating my outputs	2.96	0.706	Disagree
I manage to have high scores	3.07	0.725	Disagree
I have difficulties in deciding how to solve my academic problems	2.74	0.857	Disagree
I'm not confident with my capabilities	2.68	1.036	Disagree
I find it harder to study because I do not have anyone around me who I can ask	2.28	1.018	Strongly Disagree
I became dependent in terms of accomplishing my tasks	2.33	1.058	Strongly Disagree

I lost focus on my academics	1.94	0.977	Strongly Disagree
I tend to create subpar outputs	2.25	0.778	Strongly Disagree
I had lower test scores due to not having guidance around	1.77	0.797	Strongly Disagree

Table 2. Impact of Parental absence on the Students' Academic Performance.

Table 2. The data shows the impact of parental absences on students' academic performances. In terms of academic achievement, the majority of students who prefer to work alone had a mean score of 3.61 (Agree) (SD=0.670). The lowest base of students had lower test scores due to not having guidance around, with a mean of 1.77 (Disagree) (SD=0.797).

Situation	Mean	SD	I
I became more independent	3.52	0.647	Agree
I have all the time and space to myself	3.39	0.758	Disagree
I tend to think better when alone	3.54	0.678	Agree
Not having my parents around helped with my personal growth	2.72	0.965	Disagree
I tend to become more creative and have more sources of inspiration	3.05	0.795	Disagree
I often seek parental guidance	2.69	1.054	Disagree
I think I work better when I'm praised by my parents	3.01	1.036	Disagree
I find it hard communicating with my classmates	2.24	1.068	Strongly Disagree
I became reliant on anyone who fills the gap that my parents left	2.62	1.045	Disagree
I tend to not be able to do my task alone and prefer groupworks so I can rely on others	1.97	0.962	Strongly Disagree

Table 3. Impacts of Parental Absence in Relation to the Students' Personal Life.

Table 3. The data shows the impact of parental absence on the student's academic

performance concerning their personal life. The highest basis of students is that they tend to think better when alone, with a mean of 3.54 (Agree) (SD=0.678). The lowest base of students who had lower test scores tend to be unable to do the task alone and prefer group work so they can rely on others, with a mean of 1.97 (Disagree) (SD=0.962).

One-Way ANOVA (Welch's)

	F	df1	df2	p
Acads	0.695	4	24	0.602

Group Descriptive

	Kind of P.A.	N	Mean	SD	SE
Academics	Annulment	11	2.60	0.388	0.1169
	Blended	17	2.72	0.250	0.0606
	Having long working hours	31	2.67	0.325	0.0584
	Incarceration	6	2.90	0.382	0.1561
	Overseas	31	2.72	0.334	0.0600

Table 4. Results of One-Way ANOVA in Determining the Significance of Difference in the Effects of Parental Absence to the Academic Performance when Grouped According to the Types of Parental Absence

Table 4. There is a significant difference between the academic performance of the students when grouped according to the type of parental absence they experienced as determined by One-Way ANOVA F(4,24.0)= 0.695 (p=0.602). However, the least affected were those who experienced Annulment.

One-Way ANOVA (Welch's)

	F	df1	df2	p
Personal	1.10	4	28.5	0.377

Group Descriptive

	Kind of P.A.	N	Mean	SD	SE
Academics	Annulment	12	3.03	0.452	0.1305
	Blended	17	2.82	0.294	0.0714
	Having long working hours	31	2.82	0.430	0.0773
	Incarceration	6	3.00	0.219	0.0894
	Overseas	31	2.88	0.493	0.0885

Table 5. Results of One-Way ANOVA in Determining the Significance of Difference in the Effects of Parental Absence on the Personal Life of the Students when Grouped According to the Types of Parental Absence

Table 4. There is a weak significant difference in the personal lives of the students when grouped according to the type of parental absence they experienced as determined by One-Way ANOVA F(4,28.5)=1.10 (p=0.377). However, Incarceration received the highest mean, meaning that most students who have imprisoned parent/s were the most affected.

4. CONCLUSION AND RECOMMENDATION

Based on the indicated findings, the following conclusions were drawn:

1. Parental absence has both positive and negative effects on students. While it fosters independence, it may also limit academic guidance and emotional support. Statistical results indicate no significant variation in academic performance across different types of parental absence. The findings align with previous research, confirming that although parental absence presents challenges, it also encourages student self-sufficiency.
2. Students experienced different types of parental absence. The most prominent form of parental absence that grades 9 to 12 students experience is a tie between having long working hours and parental absence.
3. The most impactful effect of parental absence on the student's academic performance is their preference to work alone. While the lowest base is students receiving low test scores due to not having guidance around, this percentage strongly disagrees with this correlation.
4. The most impactful effect of parental absence on the student's personal life is they tend to think better alone. The lowest base is students being unable to do their tasks alone, tying with them preferring group work so they can rely on others
5. There is a significant difference between the academic performance of the students when grouped according to the type of parental absence they experience. However, the least affected were those who experienced Annulment.
6. There is a weak significant difference in the personal lives of the students when grouped according to the type of parental absence they experienced. However, Incarceration received the highest mean, meaning that most students who have imprisoned parent/s were the most affected.

Recommendations

In order to enhance the study, the researchers advise investigating alternative study techniques that can assist students in identifying which approaches work best for them and their academic achievement. The study, according to the researchers, would broaden and enhance the research's reach.

1. According to Table 3 on page __, there is a significant difference between the academic performance of the students when grouped according to the type of parental absence they experience, specifically in those who have annulled parents, which is why parents must be aware that their actions have an effect to their children, most especially in their academics. They must try their best to be present in whatever their children do.
2. According to Table 3, there is a significant difference between the academic performance of the students when grouped according to the type of parental absence they experience, so the teachers must take their students into consideration because of their household situations.
3. Future researchers must handle this topic with utmost sensitivity. Tackling this topic

can result in different reactions from the masses, which can make their overall research journey difficult.

4. Overall, everyone must be considerate of each other's situation. Visible in the related literature are the effects students, or people in general, go through upon experiencing a form of parental absence.

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Correlation of Peer Pressure and Social Proficiency of Grade 7 Junior High School Students of San Jose Academy

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Abstract: This study investigates the influence of peer pressure on the social proficiency of Grade 7 students at San Jose Academy. Social proficiency, encompassing verbal and non-verbal communication skills crucial for interaction with peers and adults, is examined in relation to peer influence. The research explores how peer pressure, the influence exerted by social groups on individuals, impacts students' social, behavioral, and cognitive competencies. The study considers the students' demographic profiles, including student status (old or transferee) and gender, to determine how these factors relate to the frequency and nature of peer influence on social skills. Specifically, the research aims to identify which aspects of social proficiency are most affected by peer pressure and to determine the most significant effects. The study hypothesizes a relationship between social proficiency and peer pressure. Data will be collected through student surveys, exploring both quantitative correlations and qualitative insights into student experiences. The study's scope is limited to Grade 7 students at San Jose Academy, acknowledging potential variations across grade levels and schools. The research aims to contribute to a better understanding of the dynamics between peer pressure and social proficiency, informing interventions and support systems for students navigating these challenges during adolescence.

Key Words: Social Proficiency; Peer Pressure; Grade 7 Students; Adolescent; Social Skills

1. INTRODUCTION

1.1 Background of the Study

Social Proficiency involves a range of skills and attributes that contribute to communication of a person to another. It plays a crucial role for a person, enabling students to express themselves clearly and listen actively. This includes both verbal communication and the use of non-verbal cues, facilitating conversations and interactions with peers like classmates, friends, teachers, and staff. Social skills are also a source of enjoyment and provide emotional support, since peer relationships are sources of intimacy, help, support, affection, a sense of inclusion, and feelings of belonging and acceptance (Trigueros et. al, 2020).

Social Proficiency measures and explains how the students are able to be independent on communicating with other people freely without any difficulties, and it also explains that the ability of communicating verbally and nonverbally, listening carefully when someone is speaking, able to negotiate and resolve conflicts, and the capacity to understand and perceive social cues, that these event occurs most of the time when they're in the school and on stage of adolescence. In addition, there is substantial evidence that children and adolescents interpret, negotiate, and respond to adults' (as well as peers') efforts to control, guide, or influence their behavior (Smetana, 2011).

Peer pressure is a cost-free incentive for improved student cooperation and information exchange (Mani et al., 2013). It involves members of a social group influencing others, often to do things they might resist (Mani et al., 2013). Students are highly susceptible to peer influence, especially in school settings, and often learn hobbies, language, and other preferences from classmates (Harriss, 1998, 2002; Rowe, 1994). While some argue that peer influence outweighs parental influence (Harriss, 1998, 2002; Rowe, 1994), this has been challenged (Berk, 2005).

A study by Anima et al. (2023) revealed correlations between peer pressure in school and student behavior, actions, and skills. Transitions between schools or even grade levels within the same school can be a "shock" and pose adjustment challenges that impact academic, social, emotional, psychological, and behavioral well-being (Akarowhe, 2018;

Weiss and Bearman, 2007). This is particularly true for students transitioning from elementary to junior high school, as they must navigate a new environment, new peers, and potentially new cultural norms.

Social proficiency is linked to peer influence on communication and social skills, impacting social, behavioral, and cognitive aspects (Wilson, 2016). Monitoring these relationships is crucial. Nejad (2014) highlights the importance of assessing adolescents' cognitive, behavioral, and emotional regulation, dispositional factors, and their impact on psychological well-being (self-esteem, life satisfaction, emotional instability, and sense of meaning). This is known as the 'adaptability model' or 'adaptability process' (Nejad, 2014).

Students must adapt to new environments, milestones, and the changes of adolescence, which include navigating transitions, social dynamics, and increasing pressures. Student adaptability, as measured by how they handle social and peer challenges, is linked to peer pressure and social proficiency.

1.2 Statement of the Study

This study was found from finding how student's social proficiency of Grade 7 Junior High School Students are affected and influenced by their Peers. It also wants to determine how peer pressure is a significant factor in cultivating or devolving the Social Proficiencies of a student. Specifically, this study aims to answer the following:

1. Demographic profile of the students
- Gender
- Student Status: Old and Transferee Student (Transferred from a public or private school)
2. How frequently student's social skills are presented from their peer's influence?
3. Which of the observed changes within the student's social proficiency are affected the most by peer pressure in terms of:
- Gender
- Student Status: Old or Transferee Student (Transferred from a public or private school)
4. What is the most significant effect of the peer pressure on the social proficiencies of the students?
5. Is there a significant relationship between peer pressure and social proficiency on the student?

1.3 Hypothesis

Complex Hypothesis:
There is a relationship between social proficiency and peer pressure.

Null Hypothesis:

There is no relationship between social proficiency and peer pressure.

1.4 Significance of the Study

This study examines the significant influence of peers on student behavior and communication, aiming to identify contributing factors. Its findings will inform interventions to promote positive social development and well-being. Specifically, this research will benefit:

- **Students:** By providing insights into peer pressure's impact on social proficiency and equipping them with coping strategies.
- **Parents:** By raising awareness and offering guidance on supporting their children in navigating peer influence and developing strong social skills.
- **Teachers:** By helping them understand the link between peer pressure and student well-being, enabling them to foster positive peer interactions and enhance social proficiency.
- **Guidance Counselors:** By informing tailored strategies and interventions to address peer-related challenges and support student social development.
- **Future Researchers:** By establishing a foundation for further research on peer influence and social development, including methodological insights and data collection techniques.

1.5 Scope and Delimitations

This study investigates the correlation between peer pressure and social skills among 7th-grade students at San Jose Academy. Focusing on early adolescence, it examines how peer influence (both positive and negative) impacts social proficiency (e.g., getting along with others, social confidence, adaptability). Data will be collected via student surveys, providing both quantitative and qualitative insights.

The study acknowledges limitations, including its focus on a single grade level and school, which may limit generalizability. It also notes the potential for self-reporting bias in survey responses, which will be addressed through anonymity and careful analysis. The study aims to identify connections, not causality, between peer pressure and social skills within this specific context, while acknowledging the broader applicability of the phenomenon within the school system.

2. METHODOLOGY

This part investigates the relationship between peer pressure and social proficiency among 95 Grade 7 Junior High School Students. A correlational design will be employed, utilizing simple random through and statistical analysis to examine the association between these variables.

- **DESCRIPTIVE (MEAN & STANDARD DEVIATION)** to know student's social proficiency in context of influence of peer pressure.
- **DESCRIPTIVE (PERCENTAGE & FREQUENCY)** for student's Demographic Profile.
- **CORRELATIONAL MATRIX** for Correlating student's social proficiency, peer pressure, peer interaction, and social proficiency competencies, to know whether there is a significant relationship between factors.

3. RESULTS AND DISCUSSION

Table 1. Results of descriptives of section, gender, student type and transferee student's school status

Section	Counts	% of Total	Cumulative %
St. Anne	*31*	*32.6 %*	*32.6 %*
St. Monica	*32*	*33.7 %*	*66.3 %*
St. Scholastica	*32*	*33.7 %*	*100.0 %*
Gender	**Counts**	**% of Total**	**Cumulative %**
Female	*45*	*47.4 %*	*47.4 %*
Male	*50*	*52.6 %*	*100.0 %*
Student Type	**Counts**	**% of Total**	**Cumulative %**
Old Student	*32*	*33.7 %*	*33.7 %*
Transferee Student	*63*	*66.3 %*	*100.0 %*
School Status	**Counts**	**% of Total**	**Cumulative %**
Private	*40*	*64.5 %*	*33.7 %*
Public	*23*	*35.5 %*	*100.0 %*

Table 1.1 presents the demographic profile of the respondents in terms of their strand and grade level.

Section. The data shows the respondents on Grade 7 Students, from St. Anne with 31 (32.6%), St. Monica with 32 (33.7%) participants coming from them, and St. Scholastica with the number of participants of 32 (33.7%).

Gender. A total of 45 (47.4%) Grade 7 female students participated and a total of 50 (52.6%) from grade 7 male students participated in the research's survey questionnaire.

Student Type. The data shows that the student type on Old Student had 32 (33.7%) participated in the Survey questionnaire and a total of 63 (66.3%) of transferee students participated in the survey questionnaire.

Transferee Student Status. A total of 40 (64.5%) are from private school, and 23 (100%) is from public school. In total, 63 out of 95 participated from the research survey.

Table 2. Results of correlational matrix of how frequency in student's social skills when presented from peers pressure

		Social Proficiency	Peer Pressure
Social Proficiency	**Pearson's r**	-	
	df	-	
	p-value	-	
Peer Pressure	**Person's r**	***0.539***	-
	df	*95*	-
	p-value	***<.001***	-

Table 2.1 indicates a moderate and "often" present relationship between peer pressure and the social proficiency of Grade 7 students (M=0.539). Students frequently experience peer pressure related to spending significant time socializing with peers (M=3.36, "Often") and often feel confident in social interactions (M=3.19, "Often").

Table 3. Results of mean and standard deviation of the observed changes within the student's social proficiency that are affected the most by peer pressure in terms of gender and student status

Social Proficiency Competencies	Mean	SD	Inter -pretation

BEHAVIORAL	***2.60***	***0.635***	***Agree***
COGNITIVE	***2.81***	***0.574***	***Agree***
SOCIAL	***2.99***	***0.514***	***Agree***

Grade 7 students "agree" that peer pressure affects their social proficiencies across behavioral, cognitive, and social competencies. Behaviorally, peer pressure (M=2.60, SD=0.635) influences how students deal with school problems (M=2.72) and self-expression (M=2.82). Cognitively, peer pressure (M=2.81, SD=0.574) affects students' tendency to seek peer opinions when unsure (M=3.15) and consider peer views in decision-making (M=3.09). Socially, peer pressure (M=2.99, SD=5.14) impacts students' comfort in making friends (M=3.28) and their interaction styles (M=3.04).

Table 4. Results of mean and standard of the most significant effects of peer pressure on the social proficiency of the students

Effects of Peer Pressure	Mean	SD
1. I tend to isolate myself from having conversations with my peers.	***2.31***	***1.063***
2. I resort to copying my peer's identity to fit in.	***2.08***	***0.919***
3. I find it difficult to balance my academics and social relationship.	***2.41***	***1.057***
4. I notice myself experiencing stress and anxiety due to constant pressure.	***2.69***	***1.001***
5. I feel comfortable being myself around my peers at this school, even if it means fitting in or not.	***3.04***	***0.956***

Table 4.1 shows that peer pressure significantly affects students' social proficiency. Students often feel comfortable being themselves around peers, even if it means fitting in or not (M=3.04, "Agree"), while also experiencing stress and anxiety due to peer pressure (M=2.69, "Agree"). The impact of peer pressure varies depending on the student's environment and perspective, and can manifest as positive, neutral, or negative influences.

Table 5. Results of correlational matrix of the significant relationship between peer pressure and social proficiency on student's

		Social Proficien-cy	Peer Pressure	Social Proficie-ncy: Impacts	Peer Pressu-r-e: Effects
Social Proficiency	Pearson's r	-			
	df	-			
	p-value	-			
Peer Pressure	Pearson's r	***0.539***	-		
	df	***93***	-		
	p-value	***<.001***	-		
Social Proficiency: Impacts	Pearson's r	***0.432***	***0.460***	-	
	df	93	93	-	
	p-value	***<.001***	***<.001***	-	
Peer Pressure: Effects	Pearson's r	***0.358***	***0.487***	***0.354***	-

	df	93	93	93	-
	p-value	<.001	<.001	<.001	-
	Mean	**SD**	**Interpreta -tion**		
Average mean	***2.77***	***0.405***	***Agree (Moderate Relationship)***		

Table 5.1 demonstrates a significantly moderate relationship between peer pressure and social proficiency (r=0.539). The impact of social proficiency on peer pressure also shows a moderate relationship (r=0.460). However, the effects of peer pressure on both impacts of social proficiency (r=0.354) and social proficiency itself (r=0.358) are only weakly related. Overall, the data suggests a moderately significant relationship between peer pressure and social proficiency (SD=0.405), indicating that peer pressure may or may not be a factor in students' social proficiency.

4. CONCLUSION AND RECOMMENDATION

4.1 CONCLUSIONS

- Based on the data gathered that peer pressure and social proficiency have **Significantly Moderately Relationship**, it means that whether peer pressure was present or not to the social proficiency of the student are varied to the student's ability to perceive, intervene and act on the possible effects.
- This relationship extends to students transitioning into new schools (transferees from public and private institutions), who experience shock and peer pressure similarly to old students, but the relation of peer pressure on its relation to the social proficiency is the same.
- The analyzed data also showed that peer pressure does have positive, neutral and negative effects on the student's well-being and social skills.
- While the study establishes a significant moderate relationship overall, future research should explore potential gender differences in how peer pressure is experienced and its impact on social proficiency.
- Students who spend more time socializing with their peers tend to have higher social proficiency.
- Peer pressure can lead to positive outcomes (e.g., comfortability in making friends), negative outcomes (e.g., changes in social behavior), and neutral outcomes (e.g., increased consideration of peers' opinions).
- While the relationship is not extremely strong, peer pressure significantly affects various aspects of social proficiency, including socializing, decision-making, problem-solving, self-confidence, independence, and academic-peer relations.
- Despite its potential negative impacts, peer pressure can also have positive or neutral effects, serving as a learning opportunity for students as they transition to junior high school and navigate adolescence.
- While the study identifies relationships, it doesn't delve into the mechanisms through which peer pressure influences social proficiency and well-being. Therefore, further research is likely needed to understand how these effects occur.

4.2 RECOMMENDATIONS

Recommendations for Students**:**

- Encourage cooperative learning that supports group assignments and study circles where students can learn from each other while fostering a positive atmosphere for them. In such environments, positive interactions can enhance motivation and involvement, as peers inherently demonstrate effective study practices and analytical skills.
- Students ought to be motivated to contemplate their personal experiences with peer pressure, acknowledging their unique tolerance limits and pinpointing circumstances where they feel most susceptible to influence. This includes grasping their values and beliefs and recognizing how peer pressure could challenge them.
- Students require effective techniques for countering negative peer pressure, such as mastering the art of saying "no" in a respectful yet decisive manner, and crafting alternative replies to unwelcome proposals or requests.
- Students are encouraged to find and engage with classmates who share similar values and interests, forming a supportive social circle that promotes positive behaviors and decisions. Extracurricular activities and clubs can serve as beneficial pathways.
- Students need to be informed about the available resources in the school, including guidance counselors, support groups, or peer mediation programs, where they can find assistance and support when facing peer pressure.
- The study underscores the influence of peer pressure on different social abilities. Students ought to concentrate on enhancing skills like decision-making and problem-solving.

Recommendations for Parents:

- Parents could establish open and ongoing communication with their children about peer relationships, creating a safe space for them to share

their experiences, concerns, opinions, ideas without fear of judgment.
- Parents could educate their children about peer pressure, explaining that this situation in adolescence or any age has positive and negative effects, and helping them to recognize the different forms it can take.
- Parents could play a crucial role in helping their children develop essential social skills, such as assertiveness, resilience, and decision-making, which are important when navigating peer influence.
- While respecting their child's privacy, parents could also create an open relationship with their child offering guidance and support about peer pressure.
- Parents should model healthy social behaviors and decision-making skills in their own lives, demonstrating how to maintain healthy relationships, resist negative influences, learn independence, decision-making, and others.

Recommendations for Teachers:

- Create professional learning communities assemble teams of educators who frequently work together, exchange effective strategies, and give insightful feedback. Observing peers and participating in collaborative planning meetings can assist teachers in enhancing their techniques and staying inspired.
- Educators ought to cultivate an environment that appreciates uniqueness, respect, and inclusiveness, minimizing the urge to conform and encouraging constructive peer relationships.
- Educators can weave social skills training into their lesson plans, educating students on communication, conflict resolution, and other abilities important for managing peer relationships.
- Educators can provide platforms for students to talk about peer pressure in a secure and nurturing setting, enabling them to exchange their experiences and gain insights from one another.
- Educators need to be watchful of students' social exchanges in the classroom and step in when they notice indications of adverse peer influence or harassment.
- Engage with parents and counselors: Educators must collaborate with parents and guidance counselors to meet students' social and emotional needs, ensuring a unified strategy for facilitating their growth.

Recommendations for Guidance Counselors:

- Counselors could utilize the research results to create focused interventions for students facing peer-related challenges, targeting specific aspects of social skills and overall well-being.
- Group counseling sessions can create a secure environment for students to discuss their experiences with peer pressure, acquire coping skills, and foster supportive connections with classmates.
- Counselors could provide one-on-one counseling sessions and can offer students tailored support and guidance in managing peer relationships and establishing effective coping strategies on negative effects of peer pressure.
- Counselors could work alongside teachers and parents to recognize students potentially facing peer pressure and create a unified strategy to address their needs.

Recommendations for Future Researchers:

- Future Researchers could concentrate on comprehending how peer pressure affects social skills and well-being, examining the psychological and social factors at play.
- Longitudinal studies can monitor the prolonged impacts of peer pressure on social development, offering insights into how these influences progress over time.
- Future studies could explore how the educational setting, familial interactions, and cultural elements intertwine with peer influence to affect social growth, on which the study focuses only at student status.
- Researchers could create and review interventions aimed at assisting students in managing peer pressure successfully, evaluating their effects on social skills and overall well-being.
- Although a lot of research emphasizes the negative aspects, forthcoming studies could also investigate the positive contributions of peer influence to social growth and well-being alike on what was revealed in this research.

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The Effects of Corporal Punishment on the Social Skills of Grade Eleven Students of San Jose Academy: A Correlational Study

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Abstract: This quantitative correlation research examined the effects of corporal punishment to the Grade Eleven students' social skills at San Jose Academy for the school year 2024-2025 with the objectives of raising awareness about its possibility to contributing to students' negative social skills such as the preference of not communicating, not giving full cooperation when needed, and such. While maintaining ethical procedures in mind that avoids insensitive remarks, the researchers utilized purposive sampling to properly gain relevant answers from students who had undergo corporal punishment. The sample size of 205 from a population of 417 was calculated using Slovin's formula but due to unforeseen circumstances, only 202 responses were successfully retrieved from the students of Grade Eleven. Through the respondents' answers, the researchers successfully interpreted that the students frequently experienced verbal punishment more compared to physical punishment, that it is more experienced in the past than the present, that the prevalent effect is the difficulty in opening up, and that corporal punishment and the students' social skills has a significant relationship. Due to these outcomes, the researchers gave recommendations such as the consideration of alternative disciplines for parents, collaboration of schools and parents to properly teach them about the right and harmless parenting, and the joining of extracurricular activities for students who may experience it to lessen stress and other harmful effects. The researchers hope that through this study, the usage of corporal punishment would lessen as it brings nothing but harm and instead, parents utilize the harmless parenting more than corporal punishment for it would bring a more peaceful and healthy environment, not just for the child, but for the whole family.

Key Words: Corporal punishment; Social skills; Verbal punishment; Physical punishment; Parenting; Family

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1. INTRODUCTION

1.1 Background of the Study

According to Save the Children UK (2005), 85% of the children surveyed in the Philippines experienced corporal punishment at home. The prevalence of the survey from this study shows that it is still occurring in the country which leads towards a child's development, particularly in their social skills that they might have as they grow older. Understanding its content can provide a basis for researchers deeply as how it is correlating in terms of a student's social skills. The connection between the students who have experienced corporal punishment and their social skills comes with an effect on their character since it is profoundly proven in research results that corporal punishment could hinder students' ability to recognize and manage their emotions appropriately. Despite the law associated with corporal punishment, several parents still use this as a discipline towards their child and thought that it would help their children to understand and learn the consequences for their wrong actions. As the research states, it is seen that parents are still constantly using corporal punishment on their children in this year and age, considering the studies of its effects on the social skills of each child.

Corporal punishment is a disciplining method for the behaviors of the children and this method can cause negative long-term effects (Basanillo, 2023).

Dobuwitz (2014) stated that corporal punishment thus blurs the line between acceptable punishment and abuse, especially where lasting harm occurs. In the context of discussions about child abuse, therefore, understanding corporal punishment becomes a significant issue.

Emphasizing the importance of good parenting to the development of children, Bengwasan and Bancual (2020) suggested that due to trauma and the absence of proper parental care, a child's development is not guaranteed to be successful unlike other children who did not go through trauma.

The receiving of corporal punishment is deemed to have an effect on not just externalizing behaviors but as well as prosocial behaviors (Piche, et al., 2016).

Furthermore, even just witnessing or being exposed to violence in the community was seen to have an effect on children's externalizing behaviors, proving that that mere exposure can also have an effect on the way they will eventually act (Skinner, et al., 2014).

1.2 Statement of the Problem

As this is a correlational study, it aims to find out the relationship between corporal punishment and its effects on the social skills of Grade Eleven students. In this way, researchers can further scrutinize if corporal punishment has good effects on the way children grow up. To clarify on a greater extent, here are the research questions of this study:

1. What is the profile of the respondent?
    a. Name (Optional)
    b. Sex
2. Which type of corporal punishment is often experienced by the students?
    a. Physical
    b. Verbal
3. How frequent do students experience this type of corporal punishment?
4. Which of the following is the prevalent effect of corporal punishment to the social skills of students?
5. Is there a significant relationship between corporal punishment and the social skills of a student?

1.3 Significance of the Study

To Students. Students will gain a better understanding of the effects of corporal punishment by learning about its consequences, especially on social skills. The study will also serve as an eye-opener, raising their awareness of the potential struggles that people around them may be facing due to experiences with corporal punishment

To Parents. Parents may also be considered as beneficiaries of this research, as the findings will provide them with more knowledge and understanding of the consequences or results of corporal punishment. Such insight can support parents in more informed decisions on the methods of disciplining their child.

To Future Researchers. This study will be providing a more comprehensive understanding of the field of corporal punishment and may be helpful for future researchers to explore more about the effects of corporal punishment to the people who are experiencing it.

2. METHODOLOGY

This quantitative correlational study was done to learn the effects of corporal punishment on student's social skills. The main objective is to understand how corporal punishment influences students' social well-being by collecting data to determine if the two variables really have a significant relationship.

The study examining the effects of corporal punishment on the social skills of Grade 11 students at San Jose Academy involved only Grade 11 students. The researchers used purposive sampling to choose and select students who had experienced corporal punishment, as they could provide the most relevant insights on the topic. Through this method, the researchers aim to gain deeper and meaningful insights into the relationship between corporal punishment and social skills of the students. Slovin's formula was used to calculate the sample size of 205 from a population of 417.

In this study, the researchers used questionnaires as a research instrument consisting of a set of questions or other types of prompts to collect information from respondents. The research questionnaire was typically a mix of close-ended

questions (Questionpro, 2024). The survey questionnaire was done through physical distribution to Grade 11 students from the strands of STEM, ABM, and HUMSS. It was validated by Mrs. Princess Clarisse S. Luciano on November 20, 2024, a Senior High School Teacher in San Jose Academy with 9 years of teaching experience and graduated with a Bachelor of Education in Social Science. Afterwards, the survey questionnaires were distributed on 4th of December, 2024. The researchers formally explained and handed out the questionnaires which were 23 copies to the assigned sections. Eventually, the surveys were collected within the same day. Finally, the researchers were able to interpret the results which were gathered using a survey questionnaire using the software, Jamovi while using the rating scale below. The researchers utilized **frequency and percentage** for the demographic profile of the student, type of corporal punishment they experienced, the frequency of it, and the prevalent effect of the said corporal punishment while for the significance of corporal punishment and students' social skills, it was interpreted using the **regression analysis** and **correlation analysis**.

POINT	SCALE RANGE	INTERPRETATION
4	4.00 – 3.00	Always
3	2.99 – 2.00	Occasionally
2	1.99 – 1.00	Rarely
1	1.00 – 0.99	Never

3. RESULTS AND DISCUSSION

Table 1. Frequencies of Section

Section	Counts	% of Total	Cumulative %
St. Luke	21	10.4 %	10.4 %
St. Carlo Acutis	25	12.4 %	22.8 %
St. De Sales	23	11.4 %	34.2 %
St. Francis Assisi	23	11.4 %	45.5 %
St. Isidore	19	9.4 %	55.0 %
St. Jude	23	11.4 %	66.3 %
St. Patrick	23	11.4 %	77.7 %
St. Thomas	22	10.9 %	88.6 %
St. Matthew	23	11.4 %	100.0 %

Table 2. Frequencies of Gender

Gender	Counts	% of Total	Cumulative %
Female	122	60.4 %	60.4 %
Male	80	39.6 %	100.0 %
TOTAL	202		

Section. It can be seen in Table 1 that the participants come from different sections of Grade 11 for School Year 2024-2025 namely: St. Luke (21), St. Carlo Acutis (25), St. De Sales (23), St. Francis Assisi (23), St. Isidore (19), St. Jude (23), St. Patrick (23), St. Thomas (22), and St. Matthew (23) giving a total of 202 participants.

Gender. Most of the respondents are female with a count of 122 (60.4) while the other 80 (39.6%) are males.

Table 3. Type of corporal punishment that is frequently experienced

	Mean	SD	Interpretation
Physical Punishment	1.86	0.815	Rarely
Verbal Punishment	2.76	0.962	Occasionally

Table 3 presents the type of corporal punishment that is more experienced than the other by the students with verbal punishment getting the highest mean of 2.76 (SD =0.962) while physical punishment got a low mean of 1.86 (SD = 0.815) indicating that the participants experienced verbal punishment more than physical punishment.

Table 4. Frequency of experiencing corporal punishment

	Mean	SD	Interpretation
I used to receive physical and verbal punishment.	2.26	1.019	Occasionally
Today, I still receive physical and verbal punishment	1.73	0.950	Rarely

As per Table 4, the statements identifies whether the students experience corporal punishment more in the past or in the present times. With a mean of 2.26 (SD = 1.019), corporal punishment was more experienced in the past as compared to the present due to its low mean of 1.73 (SD = 0.950).

Table 5. Prevalent effect of corporal punishment on students' social skills

	Mean	SD	Interpretation
I do not actively communicate with people.	2.16	0.981	Occasionally
I do not feel comfortable when communicating with others.	2.16	0.971	Occasionally
Opening up to other people is difficult for me.	2.86	1.039	Occasionally
I prefer to not cooperate with others.	1.99	0.964	Rarely
I do not give my full cooperation when a person approaches me about something.	1.76	0.912	Rarely

Table 5 shows the statements that tackles the prevalent effect of corporal punishment on students' social skills with the difficulty of opening up to other people attaining the highest mean of 2.86 (SD = 1.039) which describes that the students occasionally undergo this difficulty due to corporal punishment. On the other hand, the participants are seen to be cooperating fully with others when needed due to its low mean of 1.76 (SD = 0.912) which means that they rarely encounter the experience of not working with others.

Table 6. Result of the correlation matrix in determining the significant relationship between corporal punishment and the social skills of a student

		Physical	Verbal	Social Skills
Physical	Pearson's r	—		
	df	—		
	p-value	—		
Verbal	Pearson's r	0.416	—	
	df	200	—	
	p-value	< .001	—	
Social Skills	Pearson's r	0.196	0.217	—
	df	200	200	—
	p-value	0.005	0.002	—

For the significance of corporal punishment and the social skills of a student, Table 6 shows that both physical and verbal punishments' correlation to the social skills are weakly correlated with an $r(0.196)$ of physical punishment and $r(0.217)$ of verbal punishment. However, the two types of punishments are seen to be significant to the social skills of a student with physical punishment's p-value of (p.005) and verbal punishment's p-value of (p.217).

4. CONCLUSION AND RECOMMENDATION

Based on the indicated findings, the following conclusions were drawn:

1. It is seen that while corporal punishment was rampant and experienced by most of the participants, verbal punishment is the one that was being experienced frequently by the participants.

2. Most of the students received verbal and physical punishment from time to time, that is not often or regularly however it is particular and infrequently.
3. Students report they seldom experience difficulty with opening up to others. This finding solidifies the researchers' hypothesis that there is a significant relationship between corporal punishment and its effect on students' social skills.
4. Based on the conclusion in number 3, the researchers' hypothesis that there is a correlation between corporal punishment and its effects on social skills turns out to be an alternative one, proving that the two have a significant relationship.

Based on the findings of this study on corporal punishment and its effects on students, the following recommendations are presented:

1. Since corporal punishment is still being practiced occasionally by some, it is recommended that parents and guardians consider alternative forms of discipline. Such as positive reinforcement and constructive communication. These methods can effectively guide students' behavior while avoiding the negative impacts of physical and verbal punishment.
2. Schools should collaborate with parents and guardians to raise awareness about the potential long-term effects of corporal punishment, particularly on students' social skills. Schools can hold seminars to show better, non-violent ways to discipline children, encouraging more positive and caring methods of handling behavior.
3. Since the prevalent effect that was found through this study is the difficulty of communicating and opening up to other people, people from various groups may provide them with the suggestion to join extracurricular activities. In this way, it will aid them to be more connected to the people around them which will improve their communication skills.

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6.

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San Jose Academy's Grade 11 Students' Level of Satisfaction and the School Canteen's Service Quality; A Descriptive Correlational Study

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Ms. Joan Oledan

Abstract: The school canteen is important to students as it is where they purchase their food, which is what gives them the sufficient amount of energy needed in order to actively participate in class activities. For them to be properly satisfied, the quality of the canteen shall be up to their standards. The study focuses on Grade 11 Students in San Jose Academy, and their level of satisfaction regarding the quality of the school canteen, utilizing a survey that makes use of a likert scale seeking to perceive the students' degree of satisfaction regarding the school's overall canteen quality. The study showed that the students perceived the school canteen's quality as average, and that the overall quality of the school canteen significantly affects the students' satisfaction level. Overall, the study showed that the quality of the school canteen is significant, as if the quality is better, it will show through the satisfaction of students.

Key Words: student Canteen service quality; Serving size; Socioeconomic status; Staff approach; Student satisfaction rate

1. INTRODUCTION

1.1 Background of the Study

After long hours of participating and listening inside the classroom, a student tends to search for a refreshment or even a meal to relieve his/her hunger. The school cafeteria—more commonly known as the school canteen, is the facility in a school wherein food is made, to then be bought by students and school staff. The canteen also serves as an area where students can dine and eat their meals. Needless to say, the canteen is very important to students, especially to those who cannot always bring packed lunches. The canteen is undoubtedly very beneficial to students. Though, it is also important to take into consideration that the students are satisfied with the canteen's quality for these benefits to be maximized. In a study conducted by Santos (2016), it is found that there are existing problems and issues regarding the food and services that are offered by the school canteen in terms of quality, quantity, and generally , on the overall operation of the canteen.

Kotler and Clarke (1987) implied that satisfaction is the desirable outcome of a task or job that pleases one's esteem. The perceived quality is defined as ones' justification about the excellence of a product or service (Zammuto et al. 1996). According to Khan (2023), quality refers to the degree of excellence or superiority of something. It is a measure of how well a product, service, or process meets or exceeds customer expectations and requirements. The quality of a product, or in this case, a service, determines how often a person goes back to use that service. With the increasing population of students that came from varying socioeconomic statuses who signed themselves up and enrolled to the San Jose Academy in hopes for a better quality of education also arises the students' concerns regarding the school canteen's service quality more specifically in terms of: the taste of the food, its price, serving size, the variety of thee food offered, the canteen's food preparation and hygiene practices, as well as the canteen staff's approach in dealing with their customers. This study entitled "San Jose Academy's Grade 11 Students' Level of Satisfaction and the School Canteen's

Service Quality: A Descriptive Correlational Study" seeks to identify the relationship between the students' satisfaction level and the school canteen's service quality. The researchers also aim to analyze and assess the quality of San Jose Academy's school canteen to formulate evidence-based recommendations for the betterment of their operations.

1.2 Statement of the Problem

This study aims to determine the relationship between San Jose Academy's Grade 11 students' satisfaction level and the school's canteen service quality. The researchers aim to identify whether the canteen's service quality influences the satisfaction level of students to the services that are offered by the school canteen.

This study will look for answers to the following questions provided by the researchers:

1. What is the profile of the respondents?
   a. Name (Optional)
   b. Sex
   c. Section; and
   d. Socioeconomic Status (SES)
2. What is the quality of San Jose Academy's school canteen services?
3. What is the level of satisfaction of the Grade 11 students in San Jose Academy's school canteen services?
4. Is there a significant relationship between the students' level of satisfaction and the school canteen's service quality?
5. Is there a significant difference in Grade 11 students' level of satisfaction to the school canteen when grouped according to their socioeconomic status?

1.3 Significance of the Study

The outcome of this study will benefit the following:

The Students. The students are the main benefactors of this study, for they will gain more knowledge about their school's canteen's meaning they will be more aware of the canteen and the process that occurs behind the counters. Also, they will be the ones to benefit from the improvements the canteen could make because of this paper.

The Parents and Guardians. The parents and guardians of the students will also benefit, as they will be given knowledge as to the situation at the school's canteen, wherein their children purchase and consume every day.

The Canteen Staff and Management. Having this study, it can help the canteen staff and management through the recommendations of students on what part of their services needs improvement. This study will serve as a guide for them to distinguish specific gaps about their skills, and how they will develop it to meet their students' satisfaction.

The School Administrators. This study may become an instrument for the school administrators in making decisions on how to improve the services of their canteens. Based on the students' satisfaction rating and financial capacity, they can use this to identify changes they need to apply which can build a healthy space for students that will help them enhance their engagement and performance in school.

The Future Researchers. This study can serve as a foundation or reference paper for future researchers that intend to delve deeper into the concept of socioeconomic status and its relationship with the student's satisfaction rate.

2. METHODOLOGY

This descriptive correlational study was conducted in order to identify the relationship between the level of satisfaction of students and the quality of the school canteen. Collection of data took place in order to have the sufficient information needed in determining if the two variables show a significant relationship.

The study is limited to only Grade 11 students, utilizing the stratified random sampling method in order to gain representatives from every section in the Grade 11 level. With a scattered sample, all sections are given a chance to have answers regarding the level of their satisfaction with the canteen service quality of San Jose academy. Slovin's formula was used to calculate the sample size of 205 from a population of 417.

Survey questionnaires formulated by the researchers were the instruments utilized in gathering information. The survey contained the respondents' demographics including their socioeconomic status, a four-point and five-point likert scale system used to determine their level of satisfaction and quality of school canteen services.

After Ms. Shy Coreen Relata, a Guidance Counselor in San Jose Academy validated the survey, the researchers personally administered and distributed them to Grade 11 students in every section on the 9th day of December, 2024. After the surveys were collected on the same day, the researchers interpreted the results through the use of Jamovi software while using the rating scale below.

POINT	SCALE RANGE	INTERPRETATION
5	5.00-5.99	Excellent
4	4.0-4.99	Very Good
3	3.00-3.99	Good
2	2.00-2.99	Poor
1	1.00-1.99	Bad

POINT	SCALE RANGE	INTERPRETATION
4	4.00-4.99	Very Satisfied
3	3.00-3.99	Satisfied
2	2.00-2.99	Dissatisfied
1	1.00-1.99	Very Dissatisfied

3. RESULTS AND DISCUSSION

Table 1. Frequencies of Sex

Sex	Counts	% of Total	Cumulative %
F	124	60.5 %	60.5 %
M	81	39.5 %	100.0 %

Table 1.2 Frequencies of Section

Section	Counts	% of Total	Cumulative %
St. Matthew	24	11.7 %	11.7 %
St. Jude	24	11.7 %	23.4 %
St. Patrick	19	9.3 %	32.7 %
St. Luke	24	11.7 %	44.4 %
St. Francis de Sales	24	11.7 %	56.1 %
St. Thomas	22	10.7 %	66.8 %
St. Isidore	23	11.2 %	78.0 %
St. Francis of Assisi	23	11.2 %	89.3 %
St. Carlo Acutis	22	10.7 %	100.0 %

Table 1.3 Frequencies of SES

SES	Counts	% of Total	Cumulative %
lower mid	52	25.4 %	25.4 %
upper mid	16	7.8 %	33.2 %
middle	68	33.2 %	66.3 %
rich	8	3.9 %	70.2 %
low inc but not poor	33	16.1 %	86.3 %
lower	18	8.8 %	95.1 %
upper mid but not rich	10	4.9 %	100.0 %

Sex. Table 1.1 shows that most respondents are female, with a total of 124 (60.5%), followed by male respondents with 81 (39.5%).

Section. Table 1.2 revealed that most of the respondents are from *Grade 11 St. Matthew, St. Jude, St. Luke, and St. Francis de Sales*, with a total of 24 counts (11.7%) each. *St. Isidore* and *St. Francis of Assisi* both have a total of 23 counts (11.2%). *St. Thomas the Apostle* and *St. Carlo Acutis* both have a total of 22 counts (10.7%), and *St. Patrick* with 19 counts (32.7%).

Socioeconomic Status. Table 1.3 shows that most of the respondents belong to the middle class with a total count of 68 (33.2%). Students that came from lower-middle class obtained a total count of 52 (25.4%), while students with lower income but not poor class have a total count of 33 (16.1%). Those from lower class have a total count of 18 (8.8%), upper middle class with a total count of 16 (7.8%), upper-middle but not rich class with a total count of 10 (4.9%), and rich class with a total count of 8 (3.9%).

Table 2 The Quality of San Jose Academy's School Canteen Services

	Mean	SD	I
Taste	3.85	0.895	Good
Food Variety	3.81	0.850	Good
Price	3.12	1.050	Good
Serving Size	3.38	1.004	Good
Staff Approach	4.02	1.026	Very Good
OVM	3.63	1.206	Good

Table 2 shows that the quality of San Jose Academy's school canteen services is "average" with the total mean of 3.63 (SD=1.206). The "staff approach" obtained the highest mean score of 4.02 (*very good*) (SD=1.026). The "taste of the food" has a mean score of 3.85 (average) (SD=0.895). "Food variety" obtained a mean score of 3.81 (average)

(SD=0.850), "serving sizes" got a mean score of 3.38 (average) (SD=1.004). While the "price" received a total mean score of 3.12 (average) (SD=1.026).

This result have a lower mean score compared to the study of Cano (2024) in a private school in Davao City, which had a mean score of 4.11 with a high descriptive level.

Table 3 The Satisfaction Level of the Students to the School Canteen Service Quality

	Mean	SD	I
Level of Satisfaction in Taste	3.19	0.603	Satisfied
Level of Satisfaction in Food Variety	3.13	0.583	Satisfied
Level of Satisfaction in Price	3.00	0.701	Satisfied
Level of Satisfaction in Serving Sizes	3.02	0.670	Satisfied
Level of Satisfaction in Staff Approach	3.18	0.617	Satisfied
OVM	**3.14**	**0.634**	**Satisfied**

Table 3 shows that the satisfaction level of the students at San Jose Academy's canteen service quality is "satisfied" with a total mean of 3.14 (SD=0.634). The students' level of satisfaction in "taste" obtained the highest mean score of 3.19 (satisfied) (SD=0.603). "Staff approach" got a mean score of 3.18 (satisfied) (SD=0.617). "Food variety" got a mean score of 3.13 (satisfied) (SD=0.583). "Serving sizes" got a mean score of 3.02 (satisfied) (SD=0.670). "Price" got a mean score of 3.00 (satisfied) (SD=0.701).

This result showed similar results from the study of Delcampo et al. (n.d.) wherein the respondents from Junior High School had the level of satisfaction with the school canteen service quality as "moderate", however in their study, the "food variety" obtained the highest mean score of 3.30 (SD=0.67). Additionally, the data collected from the guidance office of San Jose Academy is visibly higher. The overall satisfaction rating of the senior high school students of San Jose Academy for the school year 2023-2024 obtained an overall mean score of 4.26 (*very good*).

Table 4 Results of Correlation in Determining the Significance of the Relationship Between the Students' Level of Satisfaction and the School Canteen's Service Quality

		Quality of School's Canteen Services	Satisfaction Level of Students
Quality of School's Canteen Services	Pearson's r	—	
	df	—	
	p-value	—	
Satisfaction Level of Students	Pearson's r	0.411	—
	df	203	—
	p-value	< .001	—

Table 4 shows that there is a significant relationship between the students' level of satisfaction and the school canteen's service quality as determined by the correlation test. It is revealed that the students' level of satisfaction and the school canteen's service quality were moderately positively correlated, $r(203)=0.411$, and were significant ($p<.001$).

This result correlates similarly with the study of Htang (2021) wherein the quality of service of a school canteen was highly correlated to the students' level of satisfaction. The better the quality, the more satisfied students were.

Table 5 Results of One-Way ANOVA in Determining the Difference in Students' Level of Satisfaction When Grouped According to their Socioeconomic Status.

	F	df1	df2	p
Level of Satisfaction in Taste	0.937	6	43.4	0.479
Level of Satisfaction in Food Variety	1.408	6	43.5	0.233

	F	df1	df2	p
Level of Satisfaction in Price	0.419	6	41.8	0.862
Level of Satisfaction in Serving Sizes	1.953	6	42.0	0.094
Level of Satisfaction in Staff Approach	0.942	6	41.9	0.476

Table 5 shows that the lower class got the highest mean score of 3.43 (SD=0.541) in terms of level of satisfaction in food variety . There was no statistically significant difference among the satisfaction level of Grade 11 students when grouped according to their socioeconomic status as determined by One-Way ANOVA F(6,43.5)=10.4, p<.233.

This result showed similar results from the study of Licudan et. al (2023) wherein students' level of satisfaction had no statistically significant difference when also grouped according to their socio-economic status, and no significant difference was found in the level of their satisfaction regarding the school canteen.

4. CONCLUSION AND RECOMMENDATION

In line with the presented data and results, the researchers are able to formulate the following conclusions:

1. San Jose Academy's school canteen service quality, as perceived by the Grade 11 students falls on *average.* The quality of the school canteen's service quality, particularly in the way the staff interacts with the customers obtained a great level of appraisal from the students. However, it is observed that the prices and serving sizes of the products offered at the school canteen receive concerns regarding its reasonableness.
2. The Grade 11 students from the school year 2024-2025 were overall satisfied with the canteen service quality of San Jose Academy. In particular, they expressed the highest level of satisfaction in food taste and freshness, which means that the canteen successfully provided meals that met their expectations in terms of flavor and quality. However, there is a visible decrease in satisfaction rate of students to the canteen service quality as recorded by San Jose Acdemy's guidance office last school year 2023-2024.
3. San Jose Academy's school canteen service quality plays a great role in influencing the satisfaction level of Grade 11 students. The greater the quality of the services offered by the school canteen, the more satisfied the students are.
4. The socioeconomic status of Grade 11 students of San Jose Academy does not pose a significant difference in their satisfaction level to the school canteen service quality. Students, regardless of their socioeconomic background, base their satisfaction level to the quality of the services they receive when purchasing products and interacting with the school canteen staff.

With the conclusions presented above, the researchers extends their recommendations to the following:

1. **To the students,** continue purchasing products from the school canteen as a way to support the kind staff that works as a part of canteen management. Be encouraged to raise concerns and recommendations, for it can serve as the canteen management's basis for their improvement.
2. **To the parents and guardians,** with the given knowledge about the school canteen's current service quality, the parents and guardians of the students may work into adjustments or even prepare the students meal for the day themselves.
3. **To the canteen staff and management,** the prices of the food served at the school canteen needs to be negotiated and tailored more affordably for the students' benefit. In the same way, serving sizes of the food also needs to be considered to fit and be reasonable for the price that the students are purchasing it for. The exemplary performance or way of the staff and management's way in communicating with the students should remain consistent to maintain the students' satisfaction'
4. **To the school administrators,** work in collaboration with the school canteen management in improving the prices and the serving sizes of the products offered at the school canteen for the betterment of the students' satisfaction level to the school canteen service quality.

5. **To the future researchers,** this research study may serve as a reference into solidifying or validating the results of succeeding studies that also delve deeper into the topic of canteen service quality and the students' satisfaction level.

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Inside Out: Interpersonal Relationships of Senior High School Students at San Jose Academy and Its Effects on their Academic Performance

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Abstract: Interpersonal relationship is a primitive norm that is bounded in social interactions. It provides emotional support, enhances both physical and mental health, and contributes to personal growth by the use of communication skills. Consequently, frequent social interaction provides strong relationships, including the ones that students often have inside their classrooms. It has an immense impact on their academic performances based mainly on the quality of interpersonal relationships that they have. The most affected by these interactions are the Senior High School students who, by the time they graduate, will need to socialize more in order to sort out their careers. Thus, this study was conducted to determine the effects of interpersonal relationships of Senior High School students in San Jose Academy for the researchers to know its outcomes on their academic performance. With the goal of improving the accuracy and validity of this study, survey questionnaires were distributed to a total of 140 students both from Grade 11 and Grade 12 to examine the outturn of their social relationships within their classrooms. The researchers have proven that the most influential is the teacher-student relationship because of the constant interaction and the desire of academic validation of students, and frequent social interaction contributes to improve the academic outcome of the students. This paper aims to help Senior High School students in identifying what social relationship works best for them inside the perimeters of their classrooms.

Key Words: Interpersonal relationship; teacher-student; peer-student; social interaction; communication

1. INTRODUCTION

1.1 Background of the Study

Interpersonal interactions are often regarded as the foundation of humanity. It fosters emotional support, collaboration, and communication which is a good contribution to personal growth. Interpersonal skills are a necessity in the school function. It directly affects one's academic performance, including the good and the bad. It is the main reason why trust is built, through everyday interactions. Oros (2024) indicated that trust promotes joy, sympathy, gratitude, serenity, and personal satisfaction, while distrust inhibits joy but increases sympathy. In most cases, positive influence results in higher achievement levels of students, while the negative causes a more crucial impact.

Opic (2016) stated that other people interact with each other and leave an indelible mark. Through everyday interactions, human advancement in terms of cooperation became an evolutionary development. This relates to the findings of Wentzel (1999) who claimed that socialization experiences can play a critical role in students' success. The underlying reason behind this phenomenon is the foundation of trust in each other using everyday communication thus interpersonal connections. These interactions could lead to students being influenced in studying, seeing their peers strive for the betterment in terms of academics. It may also result in negative impacts in which the said students could feel unmotivated, invalidated, and unseen by their peers. These instances would likely happen in their interpersonal relationships inside the classroom.

1.2 Statement of the Problems

This paper aims to explore the interpersonal aspects of learning environments and the various ways in which the relationships formed there exert a direct influence on senior high school students' academic performance. Furthermore, the researchers seek to answer the following questions:

1. Demographic profile of the respondents:
   1.1 Name (optional);
   1.2 Age;
   1.3 Strand; and
   1.4 Grade Level

2. Which of the two different types of interpersonal relationships is more influential to the academic performance of senior high school students in San Jose Academy?
   2.1 Peer-Student
   2.2 Teacher-Student

3. What is the quality of relationships that senior high school students have developed within their classrooms?

4. How does social engagement in the school climate affect the academic performance of senior high school students in San Jose Academy?

1.3 Scope and Delimitation

This study focuses on determining the quality of interpersonal relationships of senior high school students in San Jose Academy and its effects on their academic performance. The researchers aim to identify which of the two interpersonal relationships that are mostly observed in a classroom are more influential, how social engagement in school affects the academic performance of students, and how robust are the relationships of students with their peers and teachers. Using this study, the researchers hope to contribute valuable insights to social dynamics in the field of education. The other grade levels were no longer covered in this study as well as the students from other schools.

1.4 Scope and Delimitation

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1.5 Conceptual Framework



Fig.1. Conceptual Framework of the Study

Figure 1 shows *interpersonal relationships* branching out into the *quality of peer-student and teacher-student relationships* and their *social engagement*—the two interactional aspects through which the students' academic performance is presumed to be influenced. Through this framework, the interpersonal relationships developed inside a classroom can be recognized as a means to improve the academic performance of students. Therefore, identifying its quality is crucial in distinguishing the other psychological ways in which students can further enhance their academic performance.

1.6 Significance of the Study

To Students. This study can assist them in becoming aware of the psychological factors that can affect their academic performance—one of which is the quality of relationships that they develop within their classes. When proven influential, these factors can serve as a means to improve the academic performance of senior high school students by reinforcing a more positive and respectful learning environment. Consequently, students will become more mindful about their actions, words, and commentaries toward their peers and be able to correlate their negative and positive interpersonal encounters and relationship on their study habits, motivation, and overall academic performance.

To Teachers. As one of the students' primary sources of emotional support in the school climate, they can make use of this study's findings in assessing whether or not the class lacks support and involvement and subsequently gain sufficient knowledge on the ways

they can boost it. With this, they will also be able to ponder the effects of each learning activity in a more profound way, especially the ones that require collaboration and teamwork. Moreover, they can apply it in their teaching strategies to ensure that the students are constantly encouraged to participate and become more productive—allowing them to easily generate more enjoyable and efficacious classes.

To School Guidance Counselors. As, this study represents most of their lived experiences and perceptions. Therefore, this study can raise awareness on the significance of interpersonal skills to the academic performance of the senior high school students in San Jose Academy. In such a manner, they can gain a broader knowledge on peer and teacher support, peer and teacher influence, as well as the positive and negative effects of the interactions they offer, which they can now utilize to achieve their psychological and social needs as well as their academic goals.

To Future Researchers. For them to be able to use this paper as the foundation for more exploration about the topic of interpersonal relationships inside the classroom and its impact on the academic performance of students. The provided valuable insights and data can be refined to a broader and deeper future research and will allow them to highlight the areas that needed further investigations and address the gaps of this research.

1.7 Definition of Terms

Academic Performance – In this study, this term is determined by the attendance, participation, productivity, outputs, and examination results of the students. These factors are usually the ones being monitored regularly in class in order to measure student performance.

Interpersonal Relationship – This refers to the interactions or connections that humans form with other people. In this study, the interpersonal relationships are only limited to the ones primarily observed in a classroom—the peer-student and teacher-student relationships.

Peer-Student – As used in this study, this term refers to peer to student interactions or companionship, particularly in the school climate.

Teacher-Student – This term refers to the teacher to student interactions, particularly in the school climate.

Social Engagement – In this study, this term refers to the involvement of the students in their school community. This includes regular meetings, group study sessions, and constant communication with peers and teachers.

2. METHODOLOGY

2.1 Research Design

The researchers used a descriptive approach. A descriptive research approach is a method of gathering and analyzing data to describe a certain characteristic. It is often used to gain perspective and insights into a series of phenomena. This type of research design was used in order to describe the qualities of interpersonal relationships of students in their learning environment and identify its effects on their academic performance.

2.2 Research Population and Sampling

The participants of this study included 142 senior high school students of San Jose Academy. The sample size was derived from the overall population of 806 Senior High School students with the use of the Slovin's formula. The researchers used a simple random sampling method to ensure that all students had an equal chance to be selected and to be able to gather reasonable, precise dispersion, and aid the study to attain a uniform and equal distribution of the research instrument.

2.3 Research Instrument

The researchers used a standardized questionnaire to gather the necessary information in meeting the objectives of this study. Along with the research instrument, informed consent is given together to conform the ethics of research. Aside from the informed consent and introductory section, the research instrument was composed of four (4) parts; the first part being the demographic profile of the respondents, which sought to identify the respondents by their name, age, strand, and grade level; the second part was entitled *More Influential Type of Relationship* and it sought to determine which of the peer-student and teacher-student relationship was more influential when it comes to the academic performance of the students; the third part was entitled *Quality of Interpersonal Relationship Inside*

the Classroom and it aimed to ascertain the quality of peer-student and teacher-student relationship through the extent of emotional support, academic aid, and encouragement; lastly, the *Social Engagement and Academic Performance* which the goal was to examine the effects of social engagement to the academic performance of the students. All parts were based on the research questions of the study. The second and third part of the survey questionnaire had two tables each—one for the peer-student relationship and the other for the teacher-student. Meanwhile, the last part only had one table comprising of statements regarding the effects of social engagement in the school climate to the academic performance of students.

A four-point Likert Scale was utilized in a form of statements and questions where respondents are required to rate a degree based on their perceptions. The four-point Likert scale was used to avoid respondents in giving a neutral answer which could cause the paper to become invalid once statistical treatment and interpretation is applied.

2.3 Data Gathering Procedure

The initial consultation and approval started on November 25, 2024. By November 26, the survey questionnaire and the validation tool were already under Ms. Shy Coreen Relata, one of San Jose Academy's guidance counselors. On December 1, the survey questionnaire was returned to the researchers approved. The distribution of the survey happened on December 5 and the questionnaires were retrieved on December 6. Unfortunately, there were two missing responses.

2.4 Methods of Data Analysis

Research Questions	Statistical Treatment
1. Demographic profile of the respondents: 1.1. Name (optional); 1.2 Age; 1.3 Strand; and 1.4 Grade Level	Descriptives Frequency, Percentage
2. Which of the two different types of interpersonal relationships is more influential to the academic performance of senior high school students in San Jose Academy? 2.1 Peer-Student 2.2 Teacher-Student	Mean, Standard Deviation
3. What is the quality of relationships that senior high school students have developed within their classrooms?	Mean, Standard Deviation
4. How does social engagement in the school climate affect the academic performance of senior high school students in San Jose Academy?	Mean, Standard Deviation

The following are the quantitative descriptions that were adopted to be able to quantify the responses of the respondents in each item in the Likert scale.

Scale	Interpretation
1	Strongly Disagree
2	Disagree
3	Agree
4	Strongly Agree

To allow the researchers to interpret the weighted mean, the following scale is used.

Weighted Mean	Interpretation
1.00 - 1.75	Strongly Disagree
1.76 - 2.50	Disagree

2.51 - 3.25	Agree
3.26 - 4.00	Strongly Agree

The interval in this scale is computed as: (4−1) 4 = 0.75 where 4 being the highest and 1 being the lowest number in the Likert Scale utilized by the study.

3. RESULTS AND DISCUSSION

1. What is the Demographic Profile of the Respondents?

TABLE 1.1
Age, Strand, and Grade Level

Age	**Counts**	**% of Total**	**Cumulative %**
16	62	44.3%	44.3%
17	62	44.3%	88.6%
18	16	11.4%	100.0%
Strand	**Counts**	**% of Total**	**Cumulative %**
ABM	33	23.6 %	23.6 %
GAS	5	3.6 %	27.1 %
HUMSS	17	12.1 %	39.3 %
STEM	85	60.7 %	100.0 %
Grade Level	**Counts**	**% of Total**	**Cumulative %**
Grade 11	72	51.4%	51.4%
Grade 12	68	48.6%	100.0%

Table 1.1 presents the demographic profile of the respondents in terms of their age, strand, and grade level.

Age. The results have shown that majority of the respondents were 16 and 17 years old, with 62 (44.3%) participants coming from each of them. Meanwhile, 16 (11.4%) of the total number of participants were 18 years old.

Strand. The results revealed that the majority of the respondents were from the Science, Technology, Engineering, and Mathematics (STEM) strand with 85 (60.7%) participants coming from them. Meanwhile, General Academic Strand (GAS) had the lowest number of responses, consisting of 5 (3.6%).

Grade Level. A total of 72 (51.4%) grade 11 students participated in the data gathering procedure while 68 (48.6%) of the responses were from the grade 12 students.

2. Which of the two different types of interpersonal relationships is more influential to the academic performance of senior high school students in San Jose Academy?

TABLE 2.1
More Influential Type of Interpersonal Relationship

	Mean	**SD**
Peer-Student Relationship	3.27	0.499
Teacher-Student Relationship	3.30	0.435

Table 2.1 shows the influence of interpersonal relationships on the academic performance of Senior High School students. The results indicate that *teacher-student* relationships were more influential to students when it comes to their academic performance obtaining an average mean of 3.30 (SD=0.435) than *peer-student* relationships which had an average mean of 3.27 (SD=0.499).

The results concur with the study of Wentzel and Wigfield (1998, as cited in Aoyagi, 2020) wherein they found that teachers' informative practices and interpersonal relationships with students have potential factors influencing students to be motivated to do good in their academics.

3. What is the quality of relationships that senior high school students have developed within their classrooms?

TABLE 3.1
Quality of Relationships

	Mean	**SD**	**I**

Peer-Student Relationship	2.98	0.532	Moderately High
Teacher-Student Relationship	3.10	0.467	Moderately High

Table 3.1 presents the quality of interpersonal relationships that students have developed within their classrooms. *Teacher-student* relationships received an average mean of 3.10 (SD=0.467) which was higher compared to *peer-student* relationships that had an average mean of 2.98 (SD=0532).

This result correlates to the study of Pinyu (2024) that positive *teacher-student* relationships can help hone students' learning skills while also improving emotional regulation skills and classroom participation. On top of that, Pinyu (2024) also found that teachers could provide students a sense of understanding of their psychological needs and eventually help them achieve their academic goals.

4. How do social interactions among students affect the academic performance of senior high school students in San Jose Academy?

TABLE 4.1
Effects of Social Engagement

Statements	Mean	SD	I
1. I can effectively communicate my ideas in class due to my interactions with my peers every school day.	3.05	0.733	**Agree**
2. I participate and recite more often in class because of the comfortable atmosphere we have created through our daily interactions.	2.96	0.743	**Agree**
3. Being surrounded by my peers and teachers inside the classroom drives me to be more productive.	3.15	0.656	**Agree**
4. I partake in group study sessions with my peers which helps me achieve better test results.	2.96	0.804	**Agree**
5. I was able to improve my public speaking skills by being involved in numerous social engagements at school.	3.01	0.822	**Agree**
AVERAGE MEAN	**3.03**	**0.553**	**Agree**

Table 4.1 shows how the frequency of social interactions among Senior High School students can affect their academic performance. As shown in table 4.1, the average mean was 3.03 (SD=0.553) which indicates that students perceive frequent social interactions as a means to improve their academic performance.

This result correlates to the study of Gallardo et al. (2016) in which they found that interpersonal relationships with peers observed in the classroom demonstrates that such interactions reflect processes of learning social behavior, which are linked to peer acceptance and modeling. Thus, commitment and satisfaction of the school experience are critical to inspiration and academic achievement (Kingery et al., 2021).

4. CONCLUSION AND RECOMMENDATION

4.1 Conclusion

1. Majority of the students perceive the teacher-student relationship as the most influential type of interpersonal relationship as they tend to desire for teachers' validation and guidance in terms of their activities and performances.

2. Both the quality of peer-student and teacher-student relationships were positively high. However, teacher-student was still higher as students rely more on their teachers in terms of guidance and support in their academics than their peers.

3. Students recognize their social engagements as a means to improve their academic performances given that they communicate, participate, and become more involved in class due to the support of their teachers and peers as well as being accustomed to their company.

4.2 Recommendation

1. ***To Students.*** Being the primary focus of this study, the researchers suggest individuals to cultivate their own study methods in order to create a more balanced study routine and more independent ways to foster their own skills inside the class and be ready for potential challenges of isolation in the near future.

2. ***To Teachers.*** As the role model of the students to foster a kinder environment which focuses on collaborative activities inside the class and help them alleviate potential social challenges in the classroom. Using the findings of this paper, it could help them implement a more effective strategy that addresses conflicts and promotes more positive interactions.

3. ***To School Guidance Counselors.*** As an educational institution to implement social-focused programs that develop and improve the interaction of students and boost their academic achievements.

4. **To Future Researchers.** As individuals who are more likely to test the limit of what is known and unknown in various fields of research, the researchers of this study recommend further exploration to the relationship of students inside the classroom with their peers to identify the underlying reasons behind their academic difficulties inside the four corners of their room.

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NO MORE DELAYS: THE INFLUENCE OF ACTIVE AND PASSIVE PROCRASTINATION ON ACADEMIC PERFORMANCE AMONG GRADE 10 STUDENTS AT SAN JOSE ACADEMY

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Abstract: Procrastination is a common issue among students, affecting academic performance and well-being. This study examines the influence of active and passive procrastination among Grade 10 students at San Jose Academy and their impact on academic performance. As students transition to senior high school, academic demands increase, making procrastination more problematic. Active procrastinators delay tasks but perform well under pressure, whereas passive procrastinators struggle with avoidance and stress, leading to lower achievement. Using a descriptive correlational research design and survey questionnaires, the study explores how both types of procrastination influence academic performance, considering academic stress as a key factor. While previous research associates procrastination with academic difficulties, few studies differentiate its effects on student populations. Findings suggest that active procrastination is more common and may enhance performance under deadlines, whereas passive procrastination correlates with higher stress and poorer outcomes. Addressing procrastination through improved time management and self-regulation is essential to support student success, especially as academic challenges increase.

Key Words: Procrastination; Active Procrastination; Passive Procrastination; Academic Performance; Time Management

1. INTRODUCTION

1.1 Background of the study

Procrastination is a widespread problem that has been found to affect students of all educational levels around the world. It is defined as the intentional delay of planned tasks, despite the individual's awareness of potential implications of such postponement. This behavior is not a minor issue; it involves a complex interaction of cognitive, emotional, and behavioral factors that can substantially affect students' academic performance and overall well-being. Thus, academic research has received a great deal of attention to this tendency, particularly regarding academic achievement, productivity, and mental health.

Understanding the effect of procrastination on academic productivity is essential, especially since Grade 10 is a crucial year in a student's education, with increased responsibilities and a greater need for effective time management. This study focuses on how procrastination impacts the academic performance of Grade 10 students. Academic success is closely tied to self-regulation, but many students find it challenging to manage their schoolwork, extracurricular activities, and personal lives.

This phenomenon extends beyond mere time management issues. Procrastination is frequently associated with deeper psychological elements such as anxiety and low self-efficacy. Procrastination can lead to significant reductions in academic productivity and create a self-reinforcing cycle. The stress of unfinished work can make it even harder to tackle tasks, leading to a decline in confidence and motivation. By encouraging students to embrace a growth mindset, educators can help them see challenges as opportunities for growth rather than threats. This mindset can reduce procrastination, increase focus on goals, and improve overall well-being. Additionally, implementing effective time management strategies and breaking down large tasks into smaller, more manageable steps can also help students overcome procrastination and achieve their academic goals.

Students frequently engage in procrastination, which is defined as delaying planned work despite potential implications. Academic research has been paying increasing significance to this tendency, especially in relation to academic achievement and productivity. Procrastination is not just a problem with time management. Anxiety and low self-efficacy are some of the psychological factors frequently associated with it. Procrastination can lead to significant reductions in academic productivity.

Active procrastination, as described by Kooren et al. (2024), is an approach to delaying tasks that, in some cases, can enhance motivation and lead to improved outcomes. In contrast, passive procrastination, characterized by avoidance, often results in anxiety and poor academic performance. This type of procrastination is closely tied to fear of failure, which significantly impacts students' productivity and emotional well-being. The delay in academic tasks directly affects procrastination by reducing the time available for studying and completing projects, thereby restricting the ability to use strategies like distributed practice that improve memory retention. This often leads to cramming, which can reduce sleep quality and further lower performance. Additionally, procrastination has indirect

effects on academic performance, contributing to low motivation, poor learning strategies, increased anxiety, stress, decreased productivity, social rejection, and inadequate self-control. Additionally, procrastination has indirect effects on academic performance, contributing to low motivation, poor learning strategies, increased anxiety, stress, decreased productivity, social rejection, and inadequate self-control. Procrastination, particularly academic procrastination, is also recognized as a self-regulation issue, where students delay tasks despite knowing the negative consequences. This delay leads to anxiety, depression, and a failure to manage distant academic rewards, ultimately impairing both academic and personal success. This cycle of procrastination results in poor time management and reduced productivity, which exacerbates the negative outcomes associated with this behavior (Liguori et al., 2018).

In line with previous studies, procrastination significantly impacts students' academic performance by leading to delayed task initiation and increased stress levels, particularly in high-pressure academic settings. Students who procrastinate frequently struggle to manage their time effectively, resulting in last-minute cramming and rushed completion of assignments. This behavior not only affects the quality of their work but also increases feelings of anxiety and overwhelm. Procrastination can eventually create a cycle of academic underachievement, making it increasingly difficult for students to meet deadlines and stay productive. Addressing procrastination is essential for improving both academic performance and overall well-being among students.

Grade 10 students, who are navigating a critical stage of their academic journey, are particularly susceptible to procrastination, as they face increasing academic demands and pressure. At San Jose Academy, the influence of active and passive procrastination on academic performance is of significant concern, as the ability to manage time and academic responsibilities becomes essential for success. Understanding the prevalence of each type of procrastination among Grade 10 students and how these behaviors affect their academic performance is crucial for both educators and students in developing strategies to combat procrastination and improve overall academic outcomes.

This study aims to explore which type of procrastination is more prevalent among Grade 10 students at San Jose Academy and how these procrastination tendencies impact their academic performance. By identifying the relationship between procrastination behaviors and academic achievement, the study seeks to provide insights that could guide the development of targeted interventions to help students manage procrastination effectively and enhance their academic success. Through this research, educators and students alike will gain a deeper understanding of procrastination’s effects, ultimately leading to better strategies for academic improvement and personal growth.

1.2 Statement of the Problem

This study explores the influence of active and passive procrastination on the academic performance of Grade 10 students at San Jose Academy, as well as the determinants that lead students to engage in procrastination. The following research questions will guide the investigation:

1. What is the profile of the respondent?
   a. Sex
   b. Section
   c. Academic Achievement (e.g., without honors, with honors, high honors, highest honors)

2. Which type of procrastination is more prevalent among Grade 10 students at San Jose Academy?

3. How does the effects of active and passive procrastination affect the academic performance of Grade 10 students at San Jose Academy?

4. Is there a significant difference on the effect of active and passive procrastination when group according to sex and academic achievement?

1.3 and Scope Delimitation

This study aims to examine the influence of active and passive procrastination on the academic performance of Grade 10 students at San Jose Academy during the academic year 2024-2025. The research will focus on understanding the prevalence of these two types of procrastination and exploring their effects on students' time management, self-regulation, task initiation, and emotional well-being (such as stress and motivation). The study will use self-reports to gather data from students about their procrastination habits and how these habits impact their academic success. The study will not measure traditional academic performance (grades, assignments) but will focus on the indirect effects of procrastination, such as task initiation and self-regulation.

In terms of delimitation, the research is confined to 76 respondents, representing 84% of the total Grade 10 population at San Jose Academy. It will concentrate on the relationship between procrastination and academic performance, as well as the factors influencing students' procrastination behaviors. However, the study will not explore the psychological causes of procrastination or external influences such as family background, socioeconomic status, or mental health. Additionally, topics unrelated to academic performance and procrastination are outside the scope of this research.

2. METHODOLOGY

2.1 Research Design

This study utilized a descriptive correlational approach to investigate the influence of active and passive procrastination on the academic performance of Grade 10 students at San Jose Academy, as well as significant factors that lead students to engage in procrastination. The descriptive correlational approach is suited for this study because the descriptive aspect provides a comprehensive overview of respondents' profiles, while the correlational aspect facilitates the relationship between procrastination types: active and passive and academic performance. This design enables the drawing of insightful conclusions regarding how these factors are related.

The researchers used survey questionnaires as the primary instrument for data collection. This instrument is essential for obtaining detailed information on the respondents' procrastination, academic performance, and various factors influencing their procrastination.

2.2 Research Population and Sampling

This research centers on Grade 10 students, a key point where academic responsibilities and effective time management play a crucial role in their development and academic performance. At this point, students encounter various challenges, such as managing tasks, adhering to deadlines, and navigating procrastination tendencies, which can either negatively impact or enhance their academic outcomes. Exploring the effects of active and passive procrastination on their academic performance is vital, as it sheds light on their time management abilities, motivation, and capacity to cope with academic pressures.

The participants in this study were selected from two Grade 10 sections at San Jose Academy.; St. Augustine, which consists of 39 students, and St. Benedict, which has 37 students, making up a total population of 76 students. A census sampling approach ensures the inclusion of all students from both sections, providing a comprehensive perspective on the experiences of the respondents, with each section's size appropriately represented.

2. 3 Research Instrument

To assess procrastination behaviors and their effects on the academic performance of Grade 10 students, the study utilized a survey questionnaire as its primary research tool, incorporating a Likert scale to capture varying levels of agreement or disagreement with specific statements. Recognized for its effectiveness in measuring subjective experiences, the Likert scale allowed participants to convey detailed viewpoints.

The survey questionnaire was divided into three main sections: demographic data, Likert-scale items related to procrastination. The demographic section collected essential information about participants, including their name (optional), sex, section, and academic achievement. Academic achievement was categorized into "Without Honors" (average below 89), "With Honors" (average 90-94), "With High Honors" (average 95-97), and "With Highest Honors" (average 98-100).

The second section focused on procrastination behaviors and the third section focused on their effects on academic performance. Participants rated their agreement with each statement on a four-point scale: 4 - Strongly Agree, 3 - Agree, 2 - Disagree, and 1 - Strongly Disagree. This format allowed the researchers to capture both the prevalence and intensity of procrastination behaviors among students and their influence on academic outcomes.

INTERPRETATION	POINT	RANGE
Strongly Agree	4	4.00-3.00
Agree	3	2.99-2.00
Disagree	2	1.99-1.00
Strongly Disagree	1	1.00-0.99

2. 4 Data Gathering Procedure

The researchers prepared a survey questionnaire focusing on demographic information, procrastination behaviors, and academic performance. After drafting, the questionnaire was reviewed and validated by a qualified validator to ensure accuracy, clarity, and alignment with the study’s

objectives. The final validation was completed on December 11, 2024, and feedback from the validator was incorporated to finalize the instrument.

The survey was administered to Grade 10 students from St. Augustine and St. Benedict sections at San Jose Academy on December 18, 2024, immediately after their final exams. This timing minimized disruptions to their studies. Clear instructions were provided, and confidentiality was emphasized to encourage honest and accurate responses.

Once collected, the data was systematically organized and analyzed using Jamovi software. Descriptive statistics were applied to summarize demographic profiles, while inferential tests explored the relationship between active and passive procrastination and academic performance. This analysis provided valuable insights into how procrastination behaviors influenced the academic outcomes of the respondents.

3. PRESENTATION, ANALYSIS, AND INTERPRETATION OF DATA

This chapter presents the survey data, as well as statistical analysis and interpretation. The results gathered are analyzed and are presented in correspondence to the research presented problem.

1. What is the profile of the respondents?

TABLE 1
DEMOGRAPHIC PROFILE OF RESPONDENTS

Sex	Counts	% of Total	Cumulative
Female	37	52.1%	52.1%
Male	34	47.9%	100.0%
Section			
10- St. Augustine	36	50.7%	50.7%
10- St. Benedict	35	49.3%	100.0%
Academic Achievement			
With Highest Honors	3	4.2%	29.6%
With High Honors	18	25.4%	25.6%
With Honors	32	45.1%	74.6%
Without Honors	18	25.4%	100.0%

Gender. It was categorized by two groups, female and male. As shown in Table 1, 37 (52.1%) respondents were *Female*, while 34 respondents (47.9%) were *Male*.

Section. The respondents were distributed between two sections. A total of 36 students (50.7%) were from 10 - St. Augustine, whereas 35 students (49.3%) were from 10 - St. Benedict.

Academic Achievement. The respondents' academic achievements were categorized into four levels. With Honors, With High Honors, With Highest Honors, and Without Honors. A total of 32 respondents (45.1%) were recognized as With Honors. This was followed by 18 respondents (25.4%) who received High Honors and another 18 respondents (25.4%) who did not receive honors. The smallest group, consisting of 3 respondents (4.2%), achieved With Highest Honors.

2. Which type of procrastination is more prevalent among Grade 10 students at San Jose Academy?

TABLE 2
TYPES OF PROCRASTINATION

Types of Procrastination	Mean	SD	INTERPRETATION
Active Procrastination	2.84	0.650	Agree
Passive Procrastination	2.42	0.796	Agree

Table 2 yielded, the survey results indicate that Active Procrastination is more prevalent among Grade 10 students at San Jose Academy, with a mean score of 2.84 (SD = 0.650), than Passive Procrastination, which has a mean of 2.42 (SD = 0.796). The findings show that, on average, students are more likely to be active procrastinators than passive procrastinators.

In contrast to the review of related literature (RRL), the survey findings are consistent with previous research. According to Thangavel (2024), active procrastination can have a positive impact on performance, especially when students are under academic tensity, as they tend to work better under pressure. This is consistent with the higher mean scores in the survey for statements reflecting active procrastination behaviors (working better under pressure, energized by deadlines).

Thus, the findings from the survey align with the RRL, supporting the idea that active procrastination is more prevalent and can have positive effects on performance, especially under pressure, while passive procrastination is less of an issue for these students.

3. How does the effects of active and passive procrastination affect the academic performance of Grade 10 students at San Jose Academy?

TABLE 3.1
EFFECTS OF ACTIVE PROCRASTINATION ON ACADEMIC PERFORMANCE

Effects of Active Procrastination	Mean	SD	INTERPRETATION
It gives me a sense of accomplishment	2.82	0.899	Agree
I feel more motivated	2.77	0.988	Agree
I ended up doing a much better outcome when I did my task	2.80	0.950	Agree
I generate more creative ideas	2.90	0.848	Agree

Table 3.1 shows the effects of passive procrastination. Which “I generate more creative ideas” obtained the highest mean score of 2.90 (SD=0.848) with the interpretation of agree . On the contrary, “I feel more motivated” got the lowest mean score of 2.77 (0.988) with the interpretation of agree.

TABLE 3.2
EFFECTS OF PASSIVE PROCRASTINATION ON ACADEMIC PERFORMANCE

Effects of Passive Procrastination	Mean	SD	INTERPRETATION
I experience a decline in self-confidence	2.446	0.876	Agree
I feel less productive	2.32	0.841	Agree

It increases my stress levels.	**2.66**	**0.999**	**Agree**
I do my task poorly	**2.07**	**0.884**	**Agree**

Table 3.2 shows the effects of passive procrastination. Which "It increases my stress levels" obtained the highest mean score of 2.66 (SD=0.999). On the contrary, " I do my task poorly" got the lowest mean score of 2.07 (0.884).

This result aligns with the study of Adeel et al. (2023), which showed that procrastination is not always harmful to students. Active procrastination may contribute to improved work efficiencies in generating creative ideas. It affects students' academic performance in a positive way that helps them generate more creative ideas and help them to be motivated as the students are under procrastination. Furthermore, active procrastination can sometimes provide students with a sense of urgency, leading to heightened focus and productivity. However, the passive procrastination increases the stress levels of the students and it results in them to do their task poorly. As a result, when managed well, procrastination can be a useful tool for improving academic outcomes, especially in tasks requiring innovation and original thinking.

4. Is there a significant difference in academic performance based on the demographic profile of Grade 10 students at San Jose Academy?

TABLE 4.1
THE RESULT OF INDEPENDENT T-TEST ON THE EFFECTS OF ACTIVE AND PASSIVE PROCRASTINATION WHEN GROUPED ACCORDING TO SEX

	Sex	Mean	Median	SD	SE
Effects of Active Procrastination	**Female**	**2.89**	**3.00**	**0.786**	**0.135**
	Male	**2.84**	**2.75**	**0.778**	**0.128**
Effects of Passive Procrastination	**Female**	**2.45**	**2.38**	**0.743**	**0.127**
	Male	**2.32**	**2.25**	**0.620**	**0.102**

		Statistic	df	p	Mean Difference	
Effects of Active Procrastination	**Student's t**	**-0.156**	**69.0**	**0.876**	**-0.0290**	**-0.0371**
Effects of Passive Procrastination	**Student's t**	**0.809**	**69.0**	**0.0.421**	**0.1310**	**0.1921**

Table 4.1 shows that there is no significant difference between sexes for either type of procrastination, as the $t(69.0)=-0.156$, $p=0.876$ for Active Procrastination and $t(69.0)=0.809$, $p=0.421$ for Passive Procrastination, are both greater than the limit for significance. Females score slightly higher than males in both Active with a mean score of 2.89 (SD=0.786) and a mean score of 2.45 (SD=0.743) for Passive Procrastination.

The findings indicate that women exhibit higher levels of procrastination compared to men, which can be attributed to several key factors associated with personality traits. Specifically, women reported elevated levels of anxiety and perfectionism, both of which are closely linked to increased procrastination behaviors (Zhou, 2018).

TABLE 4.2
THE RESULT OF ANOVA ON THE EFFECTS OF ACTIVE AND PASSIVE PROCRASTINATION WHEN GROUPED ACCORDING TO ACADEMIC ACHIEVEMENT

	Academic Achievement	N	Mean	SD	SE
Effects of Active Procrastination	Without Honors	18	2.81	0.684	0.161
	With Honors	32	2.81	0.741	0.131
	With High Honors	18	2.83	0.895	0.211
	With Highest Honors	3	3.00	1.323	0.764
Effects of Passive Procrastination	Without Honors	18	2.43	0.727	0.171
	With Honors	32	2.41	0.637	0.113
	With High Honors	18	2,38	0.703	0.166
	With Highest Honors	3	1.75	0.750	0.433

	F	df1	df2	p
Effects of Active Procrastination	0.0202	3	8.91	0.996
Effects of Passive Procrastination	0.6671	3	9.19	0.593

Table 4.2 shows that despite these variations, there is no significant difference in the effect of either Active or Passive Procrastination based on academic performance, with $F(3, 8.91)=0.0202$, $p=0.996$ for Active Procrastination and $F(3, 9.19)=0.6671$, $p=0.593$ for Passive Procrastination. The mean scores for Active Procrastination remain consistent across academic achievement groups, ranging from 2.81 ($SD=0.684$) to 3.00 ($SD=1.323$). However, for Passive Procrastination, the mean scores decrease with higher academic achievement, with the lowest mean score of 1.75 ($SD=0.750$) in the With Highest Honors group, while those without honors had a mean of 2.43 ($SD=0.727$).

This study aligns with the findings of Kooren and Paas (2024), who explored the link between procrastination and academic performance. While most studies found little to no impact, recent research suggests the type of procrastination matters. Active procrastination, where students delay tasks but still perform well, may positively affect academic performance, while passive procrastination, marked by avoidance, tends to have a negative impact. The study confirmed a modest negative correlation overall but highlighted that active procrastinators showed a small positive effect, while passive procrastinators experienced a negative effect. It also emphasized the role of individual differences in how procrastination affects academic success.

4. CONCLUSION

To conclude the data gathering on the study on The Influence of Active and Passive Procrastination on Academic Performance Among Grade 10 students at San Jose Academy. Several conclusions have been

captured based on the interpreted data.

1. Students are more prone to active procrastination. This concludes that students are engaged in active procrastination more than passive procrastination. Students may be more inclined to delay the task in a productive way, rather than simply avoiding them.

2. Active procrastination is likely to have a more positive effect on academic performance, with students feeling accomplished, motivated, and creative. Conversely, the passive procrastination tends to have more negative effects on academic performance, with the students feeling stress, lower productivity, and poor task performance. Thus, active procrastination seems more manageable and potentially beneficial for students compared to the damaging effects of passive procrastination on their academic lives.

3. The findings of this study indicate that there is no statistically significant difference between male and female students in terms of active and passive procrastination. This suggests that procrastination tendencies are not inherently influenced by gender but may be shaped by other factors such as individual differences, academic pressures, and personal coping mechanisms.

5. RECOMMENDATION

This research paper can be further improved and enhanced within the following recommendation.

1. It is recommended that interventions for passive procrastinators focus on enhancing self-regulation skills, including time management, goal setting, and the development of implementation intentions. Strategies such as scheduling, task breakdown, and "if-then" planning should be taught and practiced to improve task initiation and completion.

2. To advance education, the current studies and results underscore the need for greater awareness of procrastination. We should work to promote education about the subject and make sure that people are aware of this issue. This could involve the development of workshops, online courses, or educational programs that provide strategies for managing procrastination and promoting productivity

3. The future studies may examine how school-wide awareness campaigns can help students better understand and manage procrastination. Studies can also explore the benefits of integrating procrastination education into the curriculum to improve time management and academic performance. Additionally, investigating personalized strategies for different procrastination types could provide more effective solutions for students.

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The Correlation of Family Involvement to the Academic Performance of Senior High School Students of San Jose Academy

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Abstract: This study explores the impact of family involvement on the academic performance of senior high school students. Family support, including emotional encouragement, plays a crucial role in shaping students' self-esteem and resilience, particularly as they prepare for higher education. Research shows that family involvement positively influences students' confidence and academic outcomes by providing a nurturing home environment. On the other hand, a lack of involvement or excessive pressure can undermine students' confidence and performance. The study aims to examine the relationship between family involvement and academic performance, considering factors like age, gender, and academic status. Focusing on senior high school students from San Jose Academy, the research evaluates both the positive and negative effects of family involvement, excluding other external factors. The findings will offer valuable insights for students, parents, teachers, and schools, highlighting how family involvement can correlate to academic performance. The study's conceptual framework links family involvement and demographic factors as independent variables that influence students' academic performance, the dependent variable.

Key Words: Family Involvement; Academic Performance; Senior High School Student;

1. INTRODUCTION

1.1 Background of the Study

Academic performance significantly impacts a student's future, especially in senior high school. Family involvement—through emotional support and encouragement—plays a crucial role in boosting motivation, self-esteem, and academic success.

A supportive home environment fosters resilience, focus, and discipline, helping students navigate school challenges. Family engagement enhances a student's confidence and self-belief, shaping their perspective on learning and academic growth. Active family participation creates a nurturing environment where students feel understood and empowered to excel

1.2 Review of Related Literature

Parental involvement is key to student success, but its impact is complex. Demographic factors influence the extent and type of involvement (Naite, 2021). Both home-based support (Jaiswal & Choudhuri, 2017) and school-based participation (Eldeeb, 2012) are vital, with a focus on building social and emotional relationships between parents and schools (Hanif & Alwin, 2019). Active engagement, including teacher communication, is especially effective (Deutcher & Ibe, 2000). Socioeconomic status also plays a role, particularly in metropolitan areas (Li & Qui, 2018). A comprehensive approach to parental engagement is needed to maximize academic outcomes.

1.3 Objectives

The objectives shall indicate the goals with regards to investigating the correlation of family involvement and academic performance. The following objectives are as follows:

- Determine the demographic profile of the respondents (Age, Gender and Academic Status).
- Acquire the level of family involvement with the students.
- Investigate the most significant effect of family involvement to the academic performance.
- Define whether family involvement and academic performance has a significant relationship.

1.4 Scope and Delimitations

This study focuses on Senior High School students from San Jose Academy, specifically Grades 11 and 12, exploring the effects of family involvement on their academic performance. It examines both positive and negative influences of family involvement, excluding other personal factors like physical, mental, and spiritual aspects.

1.5 Significance of the Study

This study examines the impact of family involvement on the academic performance of senior high school students, providing valuable insights to enhance results for students, parents, schools, and future researchers..

- Students: Improves academic achievement and overall welfare by recognizing the importance of family involvement.

- Parents: Emphasizes the significance of their influence on their child's academic performance.

- Schools: Advocates for policies that promote parental involvement in education.

- Teachers: Offers advice on monitoring student progress and engaging parents in enhancement initiatives.

- Future Researchers: Provides information for upcoming investigations into family involvement and academic performance.

2. METHODOLOGY

This part investigates the methods that were used in acquiring data in order to formulate results and gain statistics about the correlation between family involvement and academic performance.

- **DESCRIPTIVES, PERCENTAGE AND FREQUENCY :** To determine the mean, standard deviation, percentage and frequency of the demographic profile of the respondents.

- **DESCRIPTIVES (MEAN AND STANDARD DEVIATION) :** For gathering the average level of family involvement to the students.
- **DESCRIPTIVES (MEAN AND STANDARD DEVIATION) :** To analyze what is the most significant effect of family involvement to the academic performance of the students.
- **CORRELATION MATRIX :** To correlate if there is a relationship between family involvement and academic performance.

3. RESULTS AND DISCUSSION

1. Demographic Profile

Table 1.1 Descriptive Statistics of Age

	Age
Mean	16.8
Standard deviation	0.758

Table 1.1 presents that the average age of the 152 students is 16.8 (SD = 0.758). The results appear to be that most respondents were mostly 16 year old students.

Table 1.2 Frequency and Percentage of Age

Frequencies of Age

Age	Counts	% of Total	Cumulative %
15	2	1.3 %	1.3 %
16	51	33.6 %	34.9 %
17	74	48.7 %	83.6 %
18	24	15.8 %	99.3 %
20	1	0.7 %	100.0 %

Table 1.2 frequency analysis shows that most of the respondents were 17 years old with 74 counts that make up 48.7% of the total respondents, followed by 16 years old with 51 (33.6%), next is 18 years old with 24 counts (15.8%), after is 15 years old with 2 counts (1.3%) and lastly, scoring the lowest is 20 years old with 1 (0.7%).

Table 1.3 Frequencies of Gender

Gender	Counts	% of Total	Cumulative %
Female	106	69.7%	69.7%
Male	46	30.3%	100.0%

Table 1.3 indicates that most survey respondents are female (106), while there are 46 males. The percentage of females was 69.7%, whereas the percentage of males was 30.3%. The cumulative percentage for females stood at 69.7%, on the other hand, males reached 100.0%.

Table 1.5 Frequency of academic status

Frequencies of Academic Status

Academic Status	Counts	% of Total	Cumulative %
No Honor	34	22.4 %	22.4 %
With Honor	95	62.5 %	84.9 %
With High	23	15.1 %	100.0 %

Table 1.5 illustrates the frequency of academic status of the respondents. The table shows that the majority of the students are With Honor with 95 counts, rating up to 62.5% of the total respondents, followed by No Honor with 34 counts, with a rate of 22.4%. Finally, With High scoring the lowest with 23 counts and a rate of 15.1%.

Level Of Family Involvement 4 Point Likert Scale

Point	Mean	Interpretation
1	1 - 1.99	Lowest
2	2 - 2.99	Low
3	3 - 3.99	High
4	4 -4.99	Highest

2. What is the level of family involvement with the students?

TABLE 2

RESULTS OF DESCRIPTIVE STATISTICS IN DETERMINING THE LEVEL OF FAMILY INVOLVEMENT WITH THE STUDENTS

	Mean	SD	**Interpretation**
My family encourages me to do well in my studies.	3.32	0.881	**High**
My family shows interest in my academic progress.	3.24	0.822	**High**
I receive help from my family when I struggle with my schoolwork.	2.53	1.067	**Low**
My family regularly helps me set academic goals and plans to achieve them.	2.72	0.999	**Low**
My family provides a conducive environment for studying at home.	2.78	1.073	**Low**

	Mean	SD	Interpretation
Level of Family Involvement	2.92	0.772	Low

According to Table 2.1, Statement 1 “My family encourages me to do well in my studies” had the highest mean score of 3.32, reflecting a high correlation among respondents about family encouragement. Conversely, Statement 3 “I receive help from my family when I struggle with my schoolwork” had the lowest mean of 2.53. Overall, with an average mean of 2.92 (SD=0.772), the data indicates a relatively low level of family involvement in academic performance.

3. Significant Effect of Family Involvement to the Academic Performance of Senior High School Students

Point	Mean	Interpretation
1	1 - 1.99	Strongly Disagree
2	2 - 2.99	Disagree
3	3 - 3.99	Agree
4	4 -4.99	Strongly Agree

TABLE 3

RESULTS OF DESCRIPTIVE STATISTICS OF THE MOST SIGNIFICANT EFFECT OF FAMILY INVOLVEMENT TO THE ACADEMIC PERFORMANCE OF SENIOR HIGH SCHOOL STUDENTS

	Mean	SD	Interpretation
I feel less motivated when my family doesn't show interest in my studies.	2.69	1.129	Disagree
I often lack productivity if I see my family not concerned with my academic performance.	2.60	1.069	Disagree
Whenever my family encourages me, it boosts my confidence in my academic abilities.	3.23	0.910	Agree
Anytime my family participates in school events and activities, it motivates me to excel.	3.07	0.940	Agree
My productivity increases when I see my family immerse themselves in my education.	3.25	0.878	Agree

Table 3 highlights that Statement 10, indicating increased productivity from family involvement in education, achieved the highest mean score of 3.25 (SD=0.878), while Statement 7 showed the lowest mean of 2.60 (SD=1.069), revealing decreased productivity when family is indifferent toward academic performance. Overall, family involvement's perceived effects is low, evidenced by an average mean of 2.97, indicating respondents' generally disagree on its influence.

4. Is there a relationship between the level of family involvement and academic performance of Senior High School students?

TABLE 4

RESULTS OF CORRELATION MATRIX IN DETERMINING THE RELATIONSHIP BETWEEN THE LEVEL OF FAMILY INVOLVEMENT AND ACADEMIC PERFORMANCE OF SENIOR HIGH SCHOOL STUDENTS

Correlation Matrix

		Level of Family Involvement	Effects of Family
Level of Family Involvement	Pearson's r	—	
	df	—	
	p-value	—	
Effects of Family	Pearson's r	0.578	—
	df	150	—
	p-value	< .001	—

Table 4 shows the correlation matrix of relationship between family involvement and academic performance, the results are as follows:

As reflected in the table, there was a moderately strong correlation r(0.578) and a significant result (p = < .001) between level of family involvement with the student and significant effect of family involvement to academic performance.

4. CONCLUSION AND RECOMMENDATION

4.1 Conclusion

This research investigated the correlation of family involvement on the academic performance of senior high school students. The study finds that the level of family involvement is relatively low. On the other hand, the study determined that students' productivity increases when their family immerse themselves in students'. Acquiring a low mean, concluding that perceived effects are low hence the

general dissensus of the respondents. Lastly, correlating the level of family involvement to the significant effects of it to the academic performance shows a moderately strong correlation and a significant relationship. In conclusion, these findings highlight the role of family involvement in students' success in performance and emphasize the need for schools and educators to develop strategies to encourage greater family engagement in education.

4.2 Recommendation

Students:

- Have more regular discussions with family members about education and progress.

Parents:

- Help more with education by participating in school functions, attending parent-teacher meetings, and providing adequate support emotionally and academically at home.

Teachers:

- Initiate communication with parents concerning their child's school performance and behavior to recruit family support.

School:

- Create family involvement programs and workshops that encourage school related benefits and promote student success.

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Evaluating the Synergistic Effects of Trichoderma harzianum and Cow Manure on the Mycoremediation of Petroleum-Contaminated Soil by Using Radish (*Raphanus sativus*) and Mung Beans (*Vigna radiata*) as a Bioindicator.

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Abstract: Petroleum contamination of soil is a major threat to terrestrial ecosystems as it reduces soil fertility and inhibits plant growth. In this study, the possibilities of *Trichoderma harzianum* in combination with cow manure for mycoremediation of petroleum-contaminated soil were investigated. The study included four treatment groups: clean soil control (Control A), petroleum-contaminated control (Control B), and petroleum-contaminated soil treated with *T. harzianum* (Treatment A); and petroleum-contaminated soil treated with *T. harzianum* and cow dung (Treatment B). Soil health parameters (pH and moisture content) were investigated together with plant bioindicators, namely radish (*Raphanus sativus*) and mung bean (*Vigna radiata*), to measure germination rates, root length, root count, plant height, leaf count, and biomass. The result showed that while Treatment A failed to improve soil conditions and plant growth, Treatment B gave slightly improved pH together with better soil moisture retention. Treatment B also significantly improves the plant growth in terms of germination and root development, however, both plant biomass and height remained less than in Control A, which indicates only partial remediation. The abovementioned results indicate that though *T. harzianum* did not prove to be sufficient; its application with cow manure is more effective and restored the soil health to near normal state. Further studies are suggested in order to analyze the rates of application and duration of treatment for added efficiency.

Key Words: Mycoremediation, *Trichoderma harzianum*, petroleum contamination, soil remediation, cow manure, bioindicators

1. INTRODUCTION

Oil, being the primary energy source for anthropogenic activities worldwide, has seen continuous increases in both its production and consumption (Odell, 2013). Along with its usage, however, comes its detrimental impact. Oil spills or pollution—defined as the release of liquid petroleum hydrocarbons into bodies of water—continue to prevail as an environmental issue globally, with aquatic oil spills capable of disrupting biological diversity and ecological health by affecting wildlife and their habitats (NOAA, n.d.).

While the impacts of petroleum pollution on aquatic environments are often highlighted, it is just as crucial to recognize that it also poses a significant threat in that contamination hampers the soil's ability to absorb water and nutrients, as well as cause enhanced levels of concentration of toxic metals such as nickel, copper, and lead (Onojake & Frank, 2013; Yuniati, 2018). These, in turn, can lead to polluted farmlands and stunted, contaminated plant growth, reducing agricultural activities. Moreover, Ramiz (2021) found that petroleum hydrocarbons can create hazardous chemicals with carcinogenic and mutagenic properties. These substances are distinguished by their capacity to enter plants, which greatly lowers the quality of crops and presents a major risk to human and animal health.

Being a developing country, the Philippines is no exception to the increasing trend in petroleum consumption, driven mainly by continued economic growth and steadily rising needs. According to Statista (2024), the country's oil consumption by December 2023 is approximately 471.403 barrels per day, with the transportation sector accounting for a significant portion. To address the escalating issue of petroleum contamination in the soil, innovative solutions are necessary, and among the options, the researchers chose to study the potential of bioremediation and its subset, mycoremediation, in detoxifying the pollutants using natural processes. Mycoremediation, as a subset of bioremediation, is a very similar process; apart from that, it utilizes fungi instead of bacteria or other microorganisms.

According to Mitchell (2024), bioremediation is a branch of biotechnology that involves living organisms—typically microbes and bacteria—instead of toxic chemicals in the process of eliminating contaminants, including oil, solvents, and pesticides, from the environment, such as water and soil. Microorganisms, like bacteria and cells, go through several metabolic processes to convert or modify compounds to obtain energy and nutrients to grow and reproduce. Conveniently, they can make use of contaminants as a source of carbon and energy because the contaminants, specifically crude oil or petroleum, are made up of hydrocarbons, which, as the name suggests, consist of mostly hydrogen (about 13 percent by weight) and carbon (approximately 85 percent), as stated by Atwater et al. (2024).

Among the well-known fungi species capable of mycoremediation, *Trichoderma harzianum* has shown exceptional potential and is used within industries due to its versatility in remediating various pollutants. *Trichoderma* is a genus of diverse, soil-inhabiting filamentous fungi known for its number of capabilities with consequential industrial and agricultural significance (Tripathi et al., 2013). As a species under this genus, *T. harzianum* contributes significantly to improving soil quality and fertility, increases plant health and growth, and can adapt to different environmental conditions. Moreover, a study by Akpasi et al. (2023) has shown that *T. harzianum* is resistant to organic and inorganic contaminants including petroleum, and helps in the degradation of said pollutants through remediation.

In a study by Vinale et al. (2013), *T. harzianum* has been shown to synthesize extracellular hydrolytic enzymes capable of mineralizing a wide range of organic compounds. It is one among other Trichoderma species known to biodegrade Polycyclic Aromatic Hydrocarbons (PAHs), a persistent organic pollutant present within crude oils. *T. harzianum* metabolizes PAHs with the involvement of cytochrome P450 monooxygenases and epoxide hydrolases, enzymes that take part in the process of cellular metabolism of organisms (Zafra & Cortés-Espinosa, 2015a). Its enzymatic variability due to its alternate enzyme system uncommon in fungi gives the species an advantage over others outside the Trichoderma spp., making it capable of xenobiotic degradation.

To boost the remediation capabilities of *T. harzianum*, the proponents intend to incorporate the benefits of mixing cow manure within the soil. Cow manure is a natural organic matter that is a byproduct of the digestion of grass, water, and gut bacteria by cows. It is a natural waste of cattle farming and is widely utilized in the agriculture field as a fertilizer and soil amendment as it contains the essential nutrients for plant growth—not only NPK, but micronutrients like iron, carbon, calcium, magnesium, and sulfur. Additionally, it also improves soil structure, therefore increasing its moisture and nutrient retention. The organic matter present in the feces also

encourages the growth of beneficial microorganisms, further improving the plant's health (Eric, 2024).

Gonzales et al. (2019) investigated the effects of sewage sludge-based compost on the phytoremediation of arsenic (As)-contaminated soil using wheat (*Triticum aestivum*) and barley (*Hordeum vulgare*). The study found that incorporating compost improved soil fertility and facilitated As immobilization. Barley showed better remediation potential due to its higher biomass, greater As displacement, and beneficial rhizobacterial community. While wheat was less effective, both plants demonstrated phytoremediation potential. Similarly, cow manure, like sewage sludge compost, contains essential nutrients (NPK), enhances microbial activity, and improves soil quality. It can stabilize contaminants and reduce petroleum bioavailability, making the soil more suitable for plant growth. Given its biostimulant properties, cow manure is expected to enhance remediation when combined with Trichoderma harzianum, supporting the current study's hypothesis.

To assess the soil health and effectiveness of mycoremediation the researchers planned on utilizing the radish plant (*Raphanus sativus*) and the mung bean plant (*Vigna radiata*) as bioindicators. According to Parmar et al. (2016), bioindicators are living organisms such as plants, animals, microbes, and plankton that are used to assess the health of the natural ecosystem and the positive and/or negative changes taking place in our environment. A bioindicator is also defined as "an organism or biological response that reveals the presence of the pollutants by the occurrence of typical symptoms or measurable responses" (Kovalchuk & Kovalchuk, 2016). These beings indicate changes or alterations in the environment, such as the presence of pollutants, either physiologically, chemically, or behaviorally.

In this study, the plants' changes in their properties, health, and growth patterns will be used as bioindicators to indicate the soil recovery or remediation after the introduction of treatments. Traits of the plants that are necessary to monitor include root length and biomass.

Raphanus sativus, known commonly as radish, is a root crop cultivated in high-elevation areas in the Philippines and is enjoyed locally in numerous traditional dishes. They are small root vegetables that range in red, white, purple, or pink hues. The ideal soil pH for it to grow is the pH range of 5.8 to 6.8 and it germinates exceptionally well at lower temperatures. Radish has been examined in several studies as a model for studying plant responses to pollutants, with the crop showing potential as bioindicators for its capacity to intake toxic pollutants such as selenium and zinc (Hladun et al., 2013; Davies, n.d). Its rapid growth cycle, typically able to mature in 3-5 weeks, makes it an ideal plant for quick soil health assessments. Furthermore, radishes are able to accumulate material into their roots, leaves, pollen, and nectar, and their sensitivity to shifts in soil health allows them to reflect the changes effectively through their morphology.

Mung beans are fuzzy, brown pods widely grown in the Philippines. Similarly, the ideal soil pH for it to grow ranges from 5.8 to 6.8 and can be grown in various seasons (Department of Agriculture, n.d.). Mung beans, similar to radishes, have been used in studies tackling plant responses when exposed to toxicities of different metals and pollutants. Mung beans, aside from being sensitive to pollution, germinate rapidly, usually taking 2-5 days, and then grow remarkably fast, making them ideal for evaluating the effects of pollutants in a short period of time (Van Den Broeck et al., n.d).

One of the research objectives of this study is to know how the combined application of *Trichoderma harzianum* and cow manure affects the physical and chemical properties of oil-contaminated soil in terms of soil pH, moisture content during mycoremediation. Before experimenting and exploring the parameters, it is significant that the proponents explain why the three are important properties of soil that must be observed.

Starting with the soil pH, which, according to Queensland (2013), is the measure of acidity and alkalinity of soil using a scale of 1 to 14, with 1 being the most acidic, 14 representing the most alkaline, and 7 being neutral. Additionally, the article stated that most soil has pH values ranging from 3.5 to 10. Typically, higher rainfall areas have a pH range of 5 to 7, while drier and hotter environments range from 6.5 to 9. Soil pH is a key parameter because it affects the amount of nutrients and chemicals present and soluble in soil water, hence influencing the nutrients available to the plants. Although the availability of nutrients varies in pH, most are prevalent in neutral pH. Dewangan et al. (2024), backed this claim and built on it by connecting the pH to the microbial activity and soil structure. As mentioned in their study, the required pH for a diverse microbial activity must range from 6.0 to 7.5 since too much acidity or alkalinity decreases the activity, which leads to the accumulation of organic matter, release of greenhouse gases, poor nutrient recycling, and accumulation of toxic compounds that eventually leads to poor soil health. Lasly, pH also influences the soil structure or the arrangement of particles in the soil and the spaces between it. Similarly, the optimal range is also 6.0 to 7.0, as too high or too low pH may lead to soil erosion, reduced capacity in water retention, or the opposite, compaction and reduced water infiltration.

Soil moisture is the moisture present in the active, top-most layer of the soil. It is a parameter important to plant growth and agriculture in general, as it is the main source of hydration, enabling vegetation and microecosystems to thrive. In instances of water insufficiency, plants undergo different stress responses, often leading to stunted plant growth or abnormalities in their characteristics. A plant's ability to survive drought situations differs between species; however, more often than not, water shortage limits plant development and is detrimental to the overall health.

Furthermore, a study by Abosede (2013) reveals that the presence of crude oil in soil impacts its properties, particularly its liquid capacity due to the oil's hydrophobic property. Higher concentrations of hydrocarbon contamination in soil induce geostructural changes and equate to a lower liquid limit, plasticity index, and silt content, leading to the deterioration of overall soil quality and microbial & vegetative survivability. By monitoring soil pH and moisture content, this study aims to give significant findings into improving the health of crude oil-contaminated soils through natural means.

Considering all that, this study aims to learn how Trichoderma harzianum can help address the damage caused by petroleum pollution. Specifically, this study aims to answer the following specific questions:

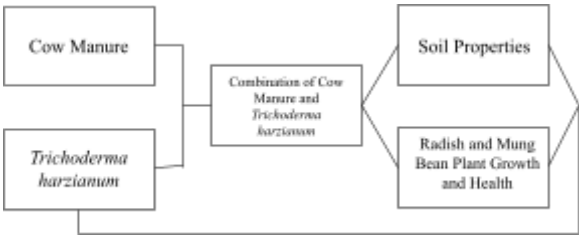
1. How does the combined application of Trichoderma harzianum and cow manure affect the properties of petroleum-contaminated soil in terms of
    a. Soil pH
    b. Moisture content

2. How does the combined application of Trichoderma harzianum and cow manure influence the growth and development of radish (Raphanus sativus) and mung bean (Vigna radiata) plants as bioindicators in petroleum-contaminated soil in terms of:
    a. Germination rate
    b. Root length
    c. Root count
    d. Plant height
    e. Leaf count
    f. Biomass

The study will focus on how this combination affects the soil's properties, particularly soil pH and moisture content, during the remediation process. Additionally, the research will examine the germination rate, root count, root length, and overall growth of radish and mung bean plants. Observable changes in radish and mung bean plant health, such as plant height, leaf count, and biomass, will also be assessed to determine the remediation effects of Trichoderma harzianum and cow manure.

Due to cost constraints, the study is unable to measure the reduction of petroleum content in the soil through Total Petroleum Hydrocarbon (TPH) testing. Instead, the plants will be utilized as an alternative bioindicator to assess the effects of the remediation process. The samples will be observed for a maximum of 21 days rather than allowing them to grow to their full maturity due to time limitations. The research will focus specifically on the soil properties of pH and moisture content, excluding other factors like soil texture, structure, and nutrient availability. Other variables, such as microbial diversity and environmental factors, including temperature and humidity, will not be considered. Lastly, the proponent will also not investigate the long-term effects of the treatments on plant or soil health beyond the immediate remediation process.

Figure 1. Research Framework



The figure above presents the variables in this study. The independent variables are: (a) the utilization of *Trichoderma harzianum* for mycoremediation on its own, and (b) the incorporation of cow manure into *Trichoderma harzianum*. The dependent variables are: (a) soil properties, specifically the soil pH and soil moisture; and (b) the plants' growth, specifically their germination rate, root length, root count biomass, plant height, and leaf count. The paradigm also depicts the relationships between the variables: *Trichoderma harzianum* influences both the concentration of petroleum and the properties of the soil. When cow manure is introduced and combined with the fungi, the researchers hypothesize that it can enhance the remediation process.

This study is significant as it explores the interaction between *Trichoderma harzianum* and cow manure in remediating petroleum-contaminated soil, potentially offering a more effective and cost-efficient alternative to existing methods. If proven successful, this approach could improve soil decontamination strategies for environmental NGOs, the Bureau of Soils and Water Management, and agricultural

industries, benefiting both small and large-scale remediation projects. Farmers and landowners could also adopt this method to restore soil health affordably, reducing dependence on chemical treatments. Additionally, applying this method to contaminated environments could minimize the harmful effects of oil spills, leading to healthier soil and improved agricultural productivity. The study also contributes valuable data to the academic community, serving as a reference for future research in bioremediation and mycoremediation. Lastly, San Jose Academy benefits from this initiative by reinforcing its commitment to environmental sustainability while inspiring students and researchers to explore innovative remediation strategies.

2. Methodology

2.1 Research design

This study makes use of the experimental research design, specifically the true experimental design. Through the application of a true experimental design, the researchers are capable of establishing a cause-and-effect relationship between treatment variables such as *Trichoderma harzianum* and cow manure and the changes occurring within the soil's physical and chemical properties precisely and ultimately checking whether their hypotheses are true.

2.2 Research Instruments

A data collection checklist is used in this study as the research instrument in order to regularly monitor all these critical factors during the experiment. It is similar to an observational checklist, but unlike a traditional observational checklist that may focus more on qualitative observations, this study's instruments will make use of specific, measurable measurements like soil pH, moisture content, nutrient levels, petroleum concentration, and the growth of *Trichoderma harzianum*, including the extent and area coverage. Yet another section is included in this instrument to record any unusual observations or extraneous variables that may not be anticipated but could influence the outcome.

2.3 Gathering of Materials

In this part of our research, the proponents will gather the materials they will need for the experiment. This will include the loam soil samples, the radish seeds, the *Trichoderma harzianum* strain, cow manure, and a petroleum hydrocarbon source, specifically crude oil, to contaminate the soil. Other materials required soil analysis equipment, soil moisture sensors, Arduino Uno, shovels, gloves, lab coats, masks, and other tools.

2.3.1 Loam Soil and Cow Manure

The researchers will make use of loam soil because it's more convenient to use and easy to find since it is available online. Researchers will purchase loam soil and cow manure at Pot Daddy PH | Tindahan ni Kuya Berto, located at 97-B N Vicencio St., Malabon Metro Manila. The owner or seller sells soil and manure through a physical store at a very budget-friendly price.

2.3.2 Petroleum Hydrocarbon Source

The researchers will use petroleum hydrocarbons (crude oil) to contaminate the soil samples, which will be acquired in Caltex.

2.3.3 Trichoderma harzianum strain

The researchers acquired *Trichoderma harzianum* by submitting an official request to the Bureau of Soil and Waste Management (BSWM). The request was granted, and the researchers collected the specimen from the institution

2.3.4 Radish Seed and Mung Beans

The researchers will utilize radish seeds (*Raphanus sativus*) for the experiment. These seeds were specifically chosen due to their fast germination rate and ability to grow in a variety of soil types. The radish seeds will be purchased in Lazada from Samuel Delos Reyes Online Shop, a trusted seller with a 94% positive rating. For the mung bean seeds, the researchers simply bought them in the supermarket.

2.3.5 Soil Analysis Equipment

The researchers will acquire essential equipment, including a 4-in-1 soil tester from JG Superstore that measures soil pH, light intensity, temperature, and moisture content. Additionally, they will use a soil moisture sensor from MakerLab and an

Arduino Uno, which will be provided by the school, to further assess soil moisture levels.

2.3.6 Additional Laboratory equipment

The researchers will acquire additional laboratory equipment, including plastic containers for soil samples from plastic factories and a weighing scale from the school laboratory to ensure consistent sample quantities. For safety, they will wear lab coats, goggles, masks, and gloves, purchasing the necessary gear from Divisoria, except for lab coats, which they already have. Data collection materials, such as phones and logbooks, are already available to the researchers.

2.4 Data Gathering

2.4.1 Experimental Setup

The experiment will be conducted in a laboratory to maintain consistency across treatments, but temperature, humidity, and light exposure will not be controlled and unfortunately be an extraneous variable that influences the results. Soil samples bought from the same shop will be used for the controlled and treated groups and will be artificially contaminated with petroleum to stipulate contamination.

2.4.2 Experimental Groups

The experimental setup of four groups was prepared by adding petroleum to the three groups, and after the soil was thoroughly mixed and homogenized, the researchers applied the corresponding treatments:

- **Control Group A:** 200 g of soil free from petroleum contamination and without the addition of *Trichoderma harzianum* and cow manure. The dirt was placed in a ½ L sample container to ensure adequate volume for the treatment. This group will serve as the baseline for comparing the effects of *Trichoderma harzianum* and cow manure.
- **Control Group B:** A 200 g of soil was contaminated with petroleum contamination (10mL) but also without the addition of *Trichoderma harzianum* and cow manure. The dirt was placed in a ½ L sample container to ensure adequate volume for the treatment. This group will serve as the baseline for comparing the effects of the *Trichoderma harzianum* and cow manure.
- **Treatment Group A:** 200 g of petroleum-contaminated soil (10 mL of petroleum) was treated with *Trichoderma harzianum* alone. The treated soil was placed in a ½ L sample container to ensure sufficient volume for the treatment. To apply *Trichoderma harzianum*, one pack was dissolved in 4 liters of water and thoroughly mixed. The solution was then transferred into a spray bottle, and each pot received 25 sprays to ensure even distribution.
- **Treatment Group B**: A 133 g sample of petroleum-contaminated soil (10 mL of petroleum) was treated with Trichoderma harzianum and cow manure. First, 67 g of cow manure was added to the contaminated soil and thoroughly mixed. The mixture was then placed in a ½ L sample container and sprayed 25 times with the Trichoderma harzianum solution.

Each group will have five (5) replicates to ensure statistical reliability, so the researchers will prepare a total of 20 contaminated soils.

2.5 Data Analysis

The proponents would collect soil samples from each treatment group over the duration of 21 days and measure the soil properties—soil pH and moisture. Also, the plant growth (height and leaf count) will be measured on a daily basis. While the biomass, root count, and root length will be measured at the end of the growth period. After the data gathering, the proponents will compare the changes across the different treatments. This way, the researchers could determine the effectiveness of *T.*

harzianum, as well as the integration of cow manure, in petroleum biodegradation through the health and development of radish plants.

Table 1. Variables for Data Analysis

Dependent Variables	**Independent Variables**	
Control and Treatment Groups	Daily Measurements:	One-Time Measurements
CA: Control (no petroleum, no treatment)	Plant height	Root length
CB: Petroleum only (no treatment)	Leaf count	Biomass
TA: Petroleum + *Trichoderma harzianum*	Soil pH	Root Count
TB: Petroleum + *Trichoderma harzianum* + cow manure	Soil moisture	Germination Rate

The analysis of the data is conducted through statistical tests, and since all independent variables are continuous, they will utilize descriptives—including mean, standard deviation and Shapiro Wilk—One-Way ANOVA test and Tukey Post-Hoc test to evaluate the effects of the treatments across various groups and measurements.

3. Results and Discussion

This chapter provides the presentation of statistical data relative to the problems posited. The corresponding analysis and interpretation of data are incorporated in this portion of the study.

3.1 Effect of the combined application of Trichoderma harzianum and cow manure on the properties of petroleum-contaminated soil in terms of Soil pH

Table 2. Soil pH Level Intepretation

pH Range	Classification
< 4.5	Extremely acidic
4.5 – 5.0	Strongly acidic
5.1 – 5.5	Moderately acidic
5.6 – 6.0	Slightly acidic
6.1 – 6.5	Near neutral
6.6 – 7.3	Neutral
7.4 – 8.4	Slightly alkaline
> 8.5	Strongly alkaline

Table 3. Standard Deviation Interpretation of Variability

SD Value	**Variability**
< 0.2	Very Low
0.2 – 0.5	Low
0.5 – 1.0	Moderate
≥ 1.0	High

Table 4. Collective Descriptives of Soil Ph

	X of Soil pH CA	X of Soil pH CB	X of Soil pH TA	X of Soil pH TB
Mean	5.68	5.69	5.47	5.70
Standard deviation	0.257	0.205	0.186	0.246
Shapiro-Wilk W	0.909	0.956	0.927	0.899
Shapiro-Wilk p	0.459	0.783	0.575	0.404

Table 5. Descriptives of Soil Ph of Control Group A

	Control A1	Control A2	Control A3	Control A4	Control A5
Mean	5.41	5.51	5.58	5.89	6.01
Standard deviation	0.565	0.510	0.491	0.647	0.714
Shapiro-Wilk W	0.912	0.944	0.934	0.922	0.853
Shapiro-Wilk p	0.109	0.372	0.258	0.162	0.012

The mean of soil pH values in Control Group A in the span of 3 weeks—17 days subtracting 4 weekends—are CA1: 5.41 (SD = 0.565, p = 0.109), CA2: 5.51 (SD = 0.510, p = 0.372), CA3: 5.58 (SD = 0.491, p = 0.285), CA4: 6.01 (SD = 0.714, p = 0.162), and CA5: 5.89 (SD = 0.647, p = 0.012). These values indicate that the soil is generally moderately to slightly acidic. The

standard deviations show low variability, while the p-values suggest that most datasets follow a normal distribution, except for CA5 (p = 0.012), indicating non-normality. When taken collectively, the overall mean soil pH is 5.68, with an overall SD of 0.257, reflecting a consistent moderately acidic soil condition.

Table 6. Descriptives of Soil Ph of Control Group B

	Control B1	Control B2	Control B3	Control B4	Control B5
Mean	5.98	5.82	5.64	5.56	5.47
Standard deviation	0.630	0.859	0.676	0.816	0.496
Shapiro-Wilk W	0.922	0.891	0.952	0.922	0.905
Shapiro-Wilk p	0.162	0.049	0.493	0.158	0.083

The mean soil pH values in Control Group B over a 3-week period—spanning 17 days, excluding 4 weekends—are as follows: CB1: 5.98 (SD = 0.630, p = 0.162), CB2: 5.82 (SD = 0.859, p = 0.049), CB3: 5.64 (SD = 0.676, p = 0.493), CB4: 5.56 (SD = 0.816, p = 0.158), and CB5: 5.47 (SD = 0.496, p = 0.083). These values indicate that the soil pH fluctuates between slightly and moderately acidic. The standard deviations suggest moderate variability across the samples, while the p-values indicate that most datasets follow a normal distribution, except for CB2 (p = 0.049), suggesting possible non-normality. Collectively, the overall mean soil pH is 5.69, with an overall SD of 0.205, reflecting a slightly acidic soil condition with moderate variability.

Table 7. Descriptives of Soil Ph of Treatment Group A

Descriptives

	Treatment A1	Treatment A2	Treatment A3	Treatment A4	Treatment A5
Mean	5.26	5.61	5.39	5.39	5.72
Standard deviation	0.677	0.820	0.676	0.587	0.734
Shapiro-Wilk W	0.919	0.928	0.916	0.945	0.940
Shapiro-Wilk p	0.142	0.199	0.127	0.384	0.324

The mean soil pH values in Treatment Group A over a 3-week period—spanning 17 days, excluding 4 weekends—are as follows: TA1: 5.26 (SD = 0.677, p = 0.142), TA2: 5.61 (SD = 0.820, p = 0.199), TA3: 5.39 (SD = 0.676, p = 0.127), TA4: 5.39 (SD = 0.587, p = 0.384), and TA5: 5.72 (SD = 0.734, p = 0.324). These values indicate that the soil is generally moderately acidic, with some being slightly acidic. The standard deviations suggest moderate variability across individual measurements, while the p-values suggest that all datasets follow a normal distribution (p > 0.05). Collectively, the overall mean soil pH is 5.47, classifying the soil as moderately acidic, with a stable pH condition due to low overall variability (SD = 0.186).

Table 8. Descriptive of Soil Ph of Treatment Group B

	Treatment B1	Treatment B2	Treatment B3	Treatment B4	Treatment B5
Mean	5.88	5.79	5.93	5.52	5.36
Standard deviation	0.798	0.907	0.617	0.597	0.570
Shapiro-Wilk W	0.890	0.881	0.908	0.919	0.912
Shapiro-Wilk p	0.046	0.033	0.093	0.142	0.109

The mean soil pH values in Treatment Group B over a 3-week period—spanning 17 days, excluding 4 weekends—are as follows: TB1: 5.88 (SD = 0.798, p = 0.046), TB2: 5.79 (SD = 0.907, p = 0.033), TB3: 5.93 (SD = 0.617, p = 0.093), TB4: 5.52 (SD = 0.597, p = 0.142), and TB5: 5.36 (SD = 0.570, p = 0.109). These values indicate that the soil pH in Tb is mostly slightly acidic aside from TB5. The standard deviations suggest moderate variability across individual measurements, while the p-values indicate that TB1 and TB2 may have non-normal distributions (p < 0.05), whereas the remaining datasets follow a normal distribution (p > 0.05). Collectively, the overall mean soil pH is 5.7, classifying the soil as slightly acidic, with a stable pH condition due to moderate overall variability (SD = 0.246).

The soil pH data from both control and treatment groups remained within the slightly to moderately acidic range. Control Group A had an overall mean pH of 5.68 (SD = 0.257), while Control Group B had a slightly higher mean of 5.69 (SD = 0.205). The moderate standard deviations suggest stable soil conditions with minor fluctuations.

Among the treatment groups, Treatment Group A had the lowest overall mean pH at 5.47 (SD = 0.186) and a low variability indicating a more consistent moderately acidic condition. Meanwhile, Treatment Group B had the highest mean at 5.7 (SD = 0.246), indicating a slightly acidic soil condition.

Table 9. Descriptive of the Mean Soil pH in All Groups.

Group Descriptives

	A	N	Mean	SD	SE
Tukey Post-Hoc Test – Soil pH					
		CA	TA	TB	CB
CA	Mean difference	—	0.206	−0.0160	−0.01400
	p-value	—	0.492	0.999	1.000
TA	Mean difference		—	−0.2220	−0.22000
	p-value		—	0.429	0.437
TB	Mean difference			—	0.00200
	p-value			—	1.000
CB	Mean difference				—
	p-value				—

The Tukey Post-Hoc Test for soil pH was conducted to compare the mean differences between treatment conditions (CA, TA, TB, and CB). The results indicate that there were no statistically significant differences in soil pH among the treatment groups, as all *p*-values exceeded 0.05. Some groups, such as CA-CB and CB-TB, even had a *p*-value of 1.000, suggesting that their soil pH levels were nearly identical.

Compared to CA (5.68), TB showed a 0.35% increase (p = 1.000), CB a 0.18% increase (p = 1.000), while TA exhibited a 3.69% decrease (p = 0.492), making TA the only treatment that lowered soil pH relative to the control. The largest difference was observed between TA and TB, where TA had a 4.04% lower soil pH than TB (p = 0.437).

3.2 Effect of the combined application of Trichoderma harzianum and cow manure on the properties of petroleum-contaminated soil in terms of Soil Moisture

Table 11. Soil Moisture Level Interpretation

Moisture Value	Soil Condition
0 – 75	Very Dry
76 – 125	Dry
126 – 175	Moist
176 – 250	Very Moist

Table 12. Collective Descriptives of Soil Moisture

	X of Soil Moisture CA	X of Soil Moisture CB	X of Soil Moisture TA	X of Soil Moisture TB
Mean	75.6	77.6	97.9	117
Standard deviation	7.42	8.47	9.86	25.1
Shapiro-Wilk W	0.866	0.942	0.802	0.948
Shapiro-Wilk p	0.252	0.683	0.084	0.721

	Control A1	Control A2	Control A3	Control A4	Control A5
Mean	69.4	67.3	83.1	83.6	75.1
Standard deviation	18.1	10.9	25.4	31.0	28.4
Shapiro-Wilk W	0.936	0.961	0.883	0.915	0.948
Shapiro-Wilk p	0.269	0.659	0.036	0.124	0.430

The mean soil moisture values in Control Group A over 3 weeks (excluding weekends) are CA1: 69.4 (SD = 18.1, p = 0.296), CA2: 67.3 (SD = 10.9, p = 0.659), CA3: 83.1 (SD = 25.4, p = 0.036), CA4: 83.1 (SD = 31.0, p = 0.124), and CA5: 75.1 (SD = 28.4, p = 0.430). These values indicate very dry to dry soil moisture level. The standard deviations show moderate to high variability, specifically in CB4. The p-values suggest that most datasets follow a normal distribution, except for CA3 (p = 0.036), which is below the significance threshold (0.05). When taken collectively, the overall mean soil moisture is 75.6, with an SD of 7.42, indicating low variability in soil moisture levels over time.

Table 14. Descriptive of Soil Moisture of Control Group B

	Control B1	Control B2	Control B3	Control B4	Control B5
Mean	77.4	67.5	87.4	71.2	84.5
Standard deviation	23.6	25.2	31.5	24.6	30.3
Shapiro-Wilk W	0.870	0.878	0.870	0.931	0.927
Shapiro-Wilk p	0.022	0.029	0.022	0.228	0.194

The mean soil moisture values in Control Group B over 3 weeks are CB1: 77.4 (SD = 23.6, p = 0.022), CB2: 67.5 (SD = 25.2, p = 0.029), CB3: 87.4 (SD = 31.5, p = 0.022), CB4: 71.2 (SD = 24.6, p = 0.228), and CB5: 84.5 (SD = 30.3, p = 0.194). These values show a slight increase and fluctuation in soil moisture over time, but nonetheless very dry to dry soil moisture levels. The standard deviations indicate moderate to high variability, particularly in CB4. The p-values suggest that CB1, CB2, and CB3 do not follow a normal distribution (p ≤ 0.05), while CB4 and CB5 do (p > 0.05). Collectively, the overall mean soil moisture is 77.6, with an SD of 8.47, indicating low variability similar to Control Group A.

Table 14. Descriptive of Soil Moisture of Treatment Group A

	Treatment A1	Treatment A2	Treatment A3	Treatment A4	Treatment A5
Mean	89.1	93.7	89.6	108	109
Standard deviation	27.7	17.6	21.0	14.6	16.7
Shapiro-Wilk W	0.855	0.883	0.967	0.865	0.975
Shapiro-Wilk p	0.013	0.036	0.757	0.018	0.900

The mean soil moisture values in Treatment Group A are TA1: 89.1 (SD = 27.7, p = 0.013), TA2: 93.7 (SD = 17.6, p = 0.036), TA3: 89.6 (SD = 21.0, p = 0.757), TA4: 108 (SD = 14.6, p = 0.018), and TA5: 109 (SD = 16.7, p = 0.900). These values indicate that soil moisture levels are dry but nearing the moist soil moisture levels, specifically TA5. The standard deviations show moderate variability, with TA1 having slightly higher fluctuation. The p-values suggest that TA1, TA2, and TA4 do not follow a normal distribution (p ≤ 0.05), while TA3 and TA5 do (p > 0.05). Collectively, the overall mean soil moisture is 97.9, with an SD of 9.86, also indicating low variability.

Table 15. Descriptive of Soil Moisture of Treatment Group B

Descriptives

	Treatment B1	Treatment B2	Treatment B3	Treatment B4	Treatment B5
Mean	95.5	89.0	133	116	149
Standard deviation	33.9	33.6	40.3	42.0	48.9
Shapiro-Wilk W	0.917	0.893	0.878	0.939	0.882
Shapiro-Wilk p	0.132	0.052	0.029	0.307	0.034

The mean soil moisture values in Treatment Group B are TB1: 95.5 (SD = 33.9, p = 0.132), TB2: 89.0

(SD = 33.6, p = 0.052), TB3: 133 (SD = 40.3, p = 0.029), TB4: 116 (SD = 42.0, p = 0.307), and TB5: 149 (SD = 48.9, p = 0.034). These values show a substantial increase in soil moisture over time and indicate dry to moist soil moisture levels, particularly TB5. The standard deviations indicate high variability, particularly in TB3 to TB5, with TB5 indicating the highest variability. On the other hand, the p-values suggest that TB3 and TB5 do not follow a normal distribution ($p \leq 0.05$), while TB1, TB2, and TB4 likely do ($p > 0.05$). When taken collectively, the overall mean soil moisture is 117, with an SD of 25.1, indicating moderate variability.

The descriptives imply that the treatment groups (A and B) exhibited significantly higher soil moisture levels compared to the control groups (A and B). The overall mean soil moisture increased from Control Group A (75.6) and Control Group B (77.6) to Treatment Group A (97.9) and Treatment Group B (117), demonstrating the effectiveness of the treatment in retaining soil moisture.

Variability in soil moisture levels was generally moderate across all groups, though Treatment Group B exhibited the highest variability, which suggests that while the treatment increased soil moisture, its effects were not uniform across all samples. Also, the normality tests (p-values) indicate that some datasets deviate from a normal distribution and indicate that external factors may have influenced moisture retention, such as environmental variations.

Table 16. Descriptive of the Mean Soil Moisture in All Groups.

Group Descriptives

	A	N	Mean	SD	SE
Soil Moisture	CA	5	75.6	7.42	3.32
	CB	5	77.6	8.47	3.79
	TA	5	97.9	9.86	4.41
	TB	5	116.5	25.13	11.24

Table 17. Tukey Post-Hoc Test for Soil Moisture

Tukey Post-Hoc Test – Soil Moisture

		CA	CB	TA	TB
CA	Mean difference	—	−2.00	−22.3	−40.9
	p-value	—	0.996	0.115	0.002
CB	Mean difference		—	−20.3	−38.9
	p-value		—	0.167	0.003
TA	Mean difference			—	−18.6
	p-value			—	0.224
TB	Mean difference				—
	p-value				—

The Tukey Post-Hoc Test for soil moisture was conducted to compare the mean differences between treatment conditions (CA, CB, TA, and TB). The results indicate that there were significant differences in soil moisture between certain groups. Compared to CA (75.6), TB exhibited a 54.11% increase (mean difference = 40.9, p = 0.002), TA showed a 29.48% increase (mean difference = 22.3, p = 0.115), and CB had a 1.32% increase (mean difference = 2.0, p = 0.996), though the latter two were not statistically significant. Similarly, TB had a 50.06% higher soil moisture than CB (mean difference = 38.9, p = 0.003), while TA was 25.89% higher than CB (mean difference = 20.3, p = 0.167). However, no significant difference was found between TA and TB (19.03% decrease in TA relative to TB, mean difference = -18.6, p = 0.224). These findings suggest that TB significantly increased soil moisture compared to both CA and CB, whereas the other treatments did not show statistically significant effects.

3.3 Effect of the combined application of Trichoderma harzianum and cow manure on the growth and development of mung bean plants (*Vigna radiata)* in petroleum-contaminated soil in terms of germination rate

Table 18. Germination rate - Mung bean samples

Group	CA	CB	TA	TB
Sample 1	1	0	0	1
Sample 2	1	0	0	1
Sample 3	1	1	0	1
Sample 4	1	0	0	1
Sample 5	1	1	1	1
Total Germinated	5	2	1	5
Germination Rate (%)	100	40	20	100

Results reveal clear differences in seed germination between mung bean sample groups depending on the varying soil conditions and treatments applied. In Control A, where mung bean

seeds were planted in clean and untreated soil, a germination rate of 100% was observed, establishing that the seeds are able to grow and exhibit germination under optimal conditions.

The introduction of petroleum in the soil of Control B samples induced a decline in the germination rate of the seeds (40%), allowing only 2 seeds to sprout. Results suggest that the petroleum contaminating the soil negatively hinders seed germination due to its inherent toxicity.

In Treatment Group A, where *Trichoderma harzianum* was introduced to petroleum-contaminated soil, the germination rate further went down to 20%, implying that *T. harzianum* alone wasn't able to offset the impact of petroleum contamination. Although *T. harzianum* has been known to promote plant growth and enhance soil microbial activity as shown in the study of Vinale et al. (2013), the lack of organic amendments present within the soil may have inhibited its effectiveness in the contaminated soil.

Treatment Group B samples, despite being in a petroleum-contaminated environment, had a 100% germination rate. The samples received both *T. harzianum* and cow manure, indicating that the combination of both components effectively mitigated the effects of petroleum contamination within the soil samples. The cow manure likely contributed more to the overall soil health, specifically in boosting microbial activity and affecting *T. harzianum,* an addition previously absent in the previous sample group. The synergistic effects of *T. harzianum* and cow manure were able to restore the condition in a petroleum-contaminated environment needed for germination, highlighting the potential of the bioremediation strategy.

3.4 Effect of the combined application of Trichoderma harzianum and cow manure on the growth and development of radish plants (*Raphanus sativus)* in petroleum-contaminated soil in terms of germination rate

Table 19. Germination rate - Radish samples

Group	CA	CB	TA	TB
Sample 1	0	0	0	1
Sample 2	1	0	0	1
Sample 3	1	1	0	1
Sample 4	1	0	0	1
Sample 5	1	1	1	1
Total Germinated	4	2	1	5
Germination Rate (%)	80	40	20	100

Findings in Table X closely aligns with Table Y, accentuating the adversary effects brought by petroleum contamination and the effectiveness of the bioremediation treatments. Control Group A (clean, untreated soil) exhibited a germination rate of 80%, showing favorable germination conditions. Control Group B (petroleum-contaminated) showed a 40% germination rate, confirming the inhibitory effects of petroleum on plant health and development.

Similarly, Treatment Group A showed consistent results, with the previous data, indicating that *T. harzianum* alone isn't enough to offset the impact of petroleum. On the other hand, Treatment Group B further solidifies the synergistic effects of *T. harzianum* and cow manure as bioremediation treatment, having a 100% germination rate.

3.5 Effects of cow manure to Trichoderma harzianum on the growth and health of radish and mung bean plants during the remediation process

Table 20. One-Way ANOVA of All Groups on Mung Bean Plants

One-Way ANOVA (Welch's)

	F	df1	df2	p
Root Length	3.78	3	8.02	0.059
Root Count	6.09	3	8.45	0.017
Biomass	25.57	3	8.53	< .001
Plant Height	14.10	3	8.60	0.001
Leaf Count	6.79	3	8.48	0.012

A One-Way ANOVA (Welch's test) was conducted to determine whether different treatment conditions had significant effects on the growth parameters of mung bean plants. The results showed no significant difference in root length, $F(3, 8.02) = 3.78$, $p = 0.059$. However, significant differences were observed in root count, $F(3, 8.45) = 3.83$, $p = 0.017$, biomass, $F(3, 8.53) = 25.57$, $p < 0.001$, plant height, $F(3, 8.60) = 14.10$, $p = 0.001$, and leaf count, $F(3, 8.48) = 6.79$, $p = 0.012$.

Table 21. Tukey Post-Hoc Test of Root Count for Mung Bean Plants

Tukey Post-Hoc Test – Root Count

		CA	CB	TA	TB
CA	Mean difference	—	3.60	3.200	−1.40
	p-value	—	0.094	0.155	0.762
CB	Mean difference		—	−0.400	−5.00
	p-value		—	0.992	0.014
TA	Mean difference			—	−4.60
	p-value			—	0.025
TB	Mean difference				—
	p-value				—

A Tukey post-hoc test was conducted to further analyze these results. It showed that root count was highest in TB, followed by CA, TA, and CB. TB had a significantly higher root count than CB ($p = 0.014$), while TA was also higher than CB ($p = 0.994$). It also showed that TB has a higher root count than TA; however, the difference between TB and TA was not significant ($p = 0.315$), suggesting that both *T. harzianum* alone and in combination with cow manure enhanced root development in petroleum-contaminated soil, but adding cow manure did not provide a statistically significant improvement over *T. harzianum* alone.

Table 22. Tukey Post-Hoc Test of Root Length for Mung Bean Plants

Tukey Post-Hoc Test – Root Length

		CA	CB	TA	TB
CA	Mean difference	—	2.60	3.200	0.960
	p-value	—	0.120	0.043	0.815
CB	Mean difference		—	0.600	−1.640
	p-value		—	0.945	0.458
TA	Mean difference			—	−2.240
	p-value			—	0.210
TB	Mean difference				—
	p-value				—

For root length, although TB had the longest roots on average, second to CA, the difference among other groups was not significant, indicating that petroleum contamination, *T. harzianum*, and cow manure did not substantially influence root elongation.

Table 23. Tukey Post-Hoc Test of Biomass for Mung Bean Plants

Tukey Post-Hoc Test – Biomass

		CA	CB	TA	TB
CA	Mean difference	—	0.650	0.990	0.6180
	p-value	—	0.020	< .001	0.028
CB	Mean difference		—	0.340	−0.0320
	p-value		—	0.338	0.998
TA	Mean difference			—	−0.3720
	p-value			—	0.267
TB	Mean difference				—
	p-value				—

For biomass, CA had the highest value, followed by TB, while CB and TA had the lowest and were not significantly different from each other. Biomass in CA was significantly higher than in CB ($p = 0.020$), TB ($p = 0.028$), and TA ($p < 0.001$), confirming that petroleum contamination reduced biomass. Since CB and TA or CB and TB were not significantly different ($p = 0.340$), *T. harzianum* alone and with cow manure did not significantly improve biomass in petroleum-contaminated soil. Lastly, although not significant, TB had higher biomass than TA ($p = 0.267$), indicating that adding cow manure improved plant biomass in petroleum-contaminated soil compared to *T. harzianum* alone.

Table 24. Tukey Post-Hoc Test of Plant Height for Mung Bean Plants

Tukey Post-Hoc Test – Plant Height

		CA	CB	TA	TB
CA	Mean difference	—	7.98	8.240	6.44
	p-value	—	< .001	< .001	< .001
CB	Mean difference		—	0.260	−1.54
	p-value		—	0.994	0.445
TA	Mean difference			—	−1.80
	p-value			—	0.315
TB	Mean difference				—
	p-value				—

For plant height, CA is the highest followed by TB, CB and TA. The untreated control (CA) was significantly taller than CB, TA, and TB (all $p < 0.001$). This suggests that petroleum contamination negatively affected plant height, and while treatments with T. harzianum (TA, TB) provided some benefit, they did not fully restore growth to the level of untreated plants. While it shows that TB is greater than CB, which indicates success in soil remediation, it is not statistically significant ($p = 0.445$). Lastly, since TB is also greater than TA, it suggests that the combination treatment is more effective but, again, is not statistically significant.

Table 25. Tukey Post-Hoc Test of Leaf Count for Mung Bean Plants

Tukey Post-Hoc Test – Leaf Count

		CA	CB	TA	TB
CA	Mean difference	—	1.40	1.800	0.00
	p-value	—	0.050	0.010	1.000
CB	Mean difference		—	0.400	−1.40
	p-value		—	0.846	0.050
TA	Mean difference			—	−1.80
	p-value			—	0.010
TB	Mean difference				—
	p-value				—

For leaf count, CA and TB had the highest mean values, followed by CB, while TA had the lowest. The post-hoc Tukey test revealed that TA had significantly fewer leaves than CA ($p = 0.010$) and TB ($p = 0.010$), but no significant difference was observed between TA and CB. Additionally, CB had significantly fewer leaves than TB ($p = 0.050$), suggesting that petroleum contamination alone (CB) negatively impacted leaf development, though not as severely as TA. The addition of cow manure in TB restored leaf count to a level comparable to the control, implying that cow manure played a role in mitigating the negative effects of both petroleum and *T. harzianum* on leaf production. These suggest that petroleum contamination alone reduced leaf count significantly compared to TB, while *T. harzianum* with petroleum had the most detrimental effect. However, the combination of *T. harzianum* and cow manure counteracted these negative effects, bringing leaf production back to the level observed in the control group.

The findings of this study demonstrate that petroleum contamination negatively impacts mung bean growth, as indicated by significant reductions in biomass, plant height, root count, and leaf count. The application of *Trichoderma harzianum* alone (TA) did not significantly improve growth parameters and even resulted in the lowest leaf count, suggesting that its introduction under petroleum stress may have imposed additional challenges on plant development. However, when *T. harzianum* was combined with cow manure (TB), root count, biomass, and leaf count showed improvements, with leaf count being fully restored to the level of the untreated control (CA). This indicates that cow manure played a crucial role in mitigating the adverse effects of petroleum contamination and *T. harzianum*, making TB the most effective treatment in promoting plant recovery.

Although TB consistently outperformed TA, the differences were not always statistically significant, particularly for root length and plant height, suggesting that while the combination of *T. harzianum* and cow manure provided benefits, they did not fully restore all growth parameters to control levels. Furthermore, biomass remained significantly lower in all petroleum-contaminated groups compared to the untreated control, confirming that petroleum exposure had a lasting negative effect on plant development, even with remediation efforts.

Table 26. Group Decriptives of Root Length, Root Count, Biomass, Plant Height and Leaf Count of Mung Beans Plants

Group Descriptives

	A	N	Mean	SD	SE
Root Length	CA	5	3.5200	2.200	0.9841
	CB	5	0.9200	1.354	0.6053
	TA	5	0.3200	0.716	0.3200
	TB	5	2.5600	2.166	0.9688
Root Count	CA	5	4.4000	2.191	0.9798
	CB	5	0.8000	1.304	0.5831
	TA	5	1.2000	2.683	1.2000
	TB	5	5.8000	2.588	1.1576
Biomass	CA	5	1.0500	0.194	0.0865
	CB	5	0.4000	0.548	0.2449
	TA	5	0.0600	0.134	0.0600
	TB	5	0.4320	0.167	0.0749
Plant Height	CA	5	8.5600	2.878	1.2871
	CB	5	0.5800	0.801	0.3583
	TA	5	0.3200	0.716	0.3200
	TB	5	2.1200	0.850	0.3800
Leaf Count	CA	5	2.2000	0.447	0.2000
	CB	5	0.8000	1.095	0.4899
	TA	5	0.4000	0.894	0.4000

One-Way ANOVA (Welch's)

	F	df1	df2	p
Root Length	17.82	3	8.21	< .001
Root Count	13.65	3	7.41	0.002
Biomass	12.54	3	8.14	0.002
Plant Height	7.96	3	7.68	0.010
Leaf Count	NaN	3	NaN	NaN

The one-way ANOVA (Welch's) results indicate significant differences in root length ($p < 0.01$), root count ($p = 0.002$), biomass ($p = 0.002$), and plant height ($p = 0.010$) among the different treatment groups. However, there was no significant difference observed in the leaf count, as the ANOVA could not be computed for this parameter.

Table 28. Tukey Post-Hoc Test of Root Count for Radish Plants

Tukey Post-Hoc Test – Root Count

		CA	CB	TA	TB
CA	Mean difference	—	2.00	2.800	−2.20
	p-value	—	0.261	0.070	0.193
CB	Mean difference		—	0.800	−4.20
	p-value		—	0.868	0.005
TA	Mean difference			—	−5.00
	p-value			—	0.001
TB	Mean difference				—
	p-value				—

For the root count, the average counts were: TB (5.200), CB (3.800), CA (3.600), and TA (0.200). Then, the post-hoc analysis showed that TA had significantly fewer roots than TB ($p = 0.001$). While CB had significantly fewer root counts than TB ($p = 0.005$). This indicates that TA may have inhibited root development, but TB has the opposite effect and promoted root formation.

Table 29. Tukey Post-Hoc Test of Root Length for Radish Plants

Tukey Post-Hoc Test – Root Length

		CA	CB	TA	TB
CA	Mean difference	—	1.16	1.580	0.0800
	p-value	—	0.063	0.009	0.998
CB	Mean difference		—	0.420	−1.0800
	p-value		—	0.757	0.090
TA	Mean difference			—	−1.5000
	p-value			—	0.013
TB	Mean difference				—
	p-value				—

In the descriptives, mean root lengths, in descending order, were: CA (1.700), TB (1.680), CB (1.500), and TA (0.120). Tukey's post-hoc test revealed that TA had significantly lower root length compared to CA ($p = 0.009$) and TB ($p = 0.013$), suggesting that the TA treatment negatively impacted root development. In contrast, CA and TB had similar effects on root length ($p = 0.998$). These results suggest that TA inhibited root growth, while TB were more favorable for root elongation and even compared to the root length of CA.

Table 30. Tukey Post-Hoc Test of Biomass for Radish Plants

Tukey Post-Hoc Test – Biomass

		CA	CB	TA	TB
CA	Mean difference	—	1.61	1.6580	1.490
	p-value	—	0.075	0.065	0.108
CB	Mean difference		—	0.0460	−0.122
	p-value		—	1.000	0.997
TA	Mean difference			—	−0.168
	p-value			—	0.992
TB	Mean difference				—
	p-value				—

In terms of biomass, although the ANOVA did not reveal statistically significant differences among treatments, the mean biomass values were: CA (1.6740), TB (1.6700), CB (1.6600), and TA (0.0160). Although CA showed higher biomass compared to CB ($p = 0.075$), TA ($p = 0.065$), and TB ($p = 0.108$), these differences were not statistically significant. Similarly, CB, TA, and TB did not significantly differ from one another ($p > 0.05$).

Table 31. Tukey Post-Hoc Test of Plant Height for Radish Plants

Tukey Post-Hoc Test – Plant Height

		CA	CB	TA	TB
CA	Mean difference	—	4.30	4.540	3.780
	p-value	—	< .001	< .001	0.002
CB	Mean difference		—	0.240	−0.520
	p-value		—	0.992	0.929
TA	Mean difference			—	−0.760
	p-value			—	0.813
TB	Mean difference				—
	p-value				—

The descriptive statistics show that CA had the highest plant height (4.6200), followed by TB (0.8400), CB (0.3200), and TA (0.0800). The Tukey post-hoc test confirms that CA was significantly different from CB, TA, and TB ($p < 0.001$ and 0.002), indicating that CA led to superior plant growth. However, there were no significant differences between CB, TA, and TB (p-values = 0.929, 0.813, and 0.992), even though TB had a higher mean than CB and TA. This suggests that both treatments CB and TA had similarly limited effects on plant height.

Table 32. Tukey Post-Hoc Test of Leaf Count for Radish Plants

Tukey Post-Hoc Test – Leaf Count

		CA	CB	TA	TB
CA	Mean difference	—	1.60	1.60	−1.80
	p-value	—	0.005	0.005	0.002
CB	Mean difference		—	0.00	−3.40
	p-value		—	1.000	< .001
TA	Mean difference			—	−3.40
	p-value			—	< .001
TB	Mean difference				—
	p-value				—

The descriptive statistics show that TB had the highest leaf count (3.4000), followed by CA (1.6000), while CB and TA had no leaves (0.0000). The Tukey post-hoc test indicates that CA had significantly more leaves than CB and TA ($p = 0.005$), and TB had significantly more leaves than all other treatments ($p \leq 0.002$). Additionally, CB and TA did not differ from each other ($p = 1.000$), confirming their equally poor leaf production. This suggests that TB was the most

effective treatment for promoting leaf growth even surpassing the CA.

Table 33. Group Decriptives of Root Length, Root Count, Biomass, Plant Height and Leaf Count of Radish Plants.

Group Descriptives

	A	N	Mean	SD	SE
Root Length	CA	5	1.7000	0.9747	0.4359
	CB	5	0.5400	0.8050	0.3600
	TA	5	0.1200	0.2683	0.1200
	TB	5	1.6200	0.3564	0.1594
Root Count	CA	5	3.0000	2.4495	1.0954
	CB	5	1.0000	1.4142	0.6325
	TA	5	0.2000	0.4472	0.2000
	TB	5	5.2000	1.6432	0.7348
Biomass	CA	5	1.6740	1.9239	0.8604
	CB	5	0.0620	0.0934	0.0418
	TA	5	0.0160	0.0358	0.0160
	TB	5	0.1840	0.0472	0.0211
Plant Height	CA	5	4.6200	2.6329	1.1775
	CB	5	0.3200	0.4868	0.2177
	TA	5	0.0800	0.1789	0.0800
	TB	5	0.8400	0.4219	0.1887
Leaf Count	CA	5	1.6000	0.8944	0.4000
	CB	5	0.0000	0.0000	0.0000
	TA	5	0.0000	0.0000	0.0000
	TB	5	3.4000	0.8944	0.4000

The results indicate that petroleum contamination (CB) negatively impacted radish plant growth, as shown by the reduced root length, plant height, and leaf count compared to the control (CA). The addition of *Trichoderma harzianum* alone (TA) did not significantly improve plant growth and, in some cases, inhibited root development, suggesting that *Trichoderma* alone may not be sufficient to mitigate petroleum toxicity. However, when combined with cow manure (TB), *Trichoderma harzianum* significantly enhanced root count and leaf production, surpassing even the control in these aspects. While TB and CA showed comparable root lengths, CA had the greatest plant height, indicating that petroleum contamination still had residual negative effects despite the remediation attempts. Biomass differences were not statistically significant, suggesting that while TB and CA had slightly higher values, the treatments did not drastically alter overall biomass accumulation.

3.6 Enhancement effects of cow manure to Trichoderma harzianum

Table 34. One-Way ANOVA of All Parameters in Treatment Groups

One-Way ANOVA (Welch's)

	F	df1	df2	p
Soil pH	2.59	1	7.46	0.149
Soil Moisture	2.38	1	5.20	0.181
m - root length	4.82	1	4.86	0.081
m - root count	7.61	1	7.99	0.025
m - biomass	15.04	1	7.64	0.005
m - plant height	13.13	1	7.77	0.007

The One-Way ANOVA (Welch's) results provide insight into the statistical significance of differences in various plant and soil parameters present in the treatment groups. The analysis of soil pH and soil moisture yielded p-values of 0.149 and 0.181, respectively, indicating that the variations in these factors among groups were not statistically significant. Similarly, root length in the "m" category showed a p-value of 0.081, suggesting a lack of significant difference, though it may exhibit a weak trend.

On the other hand, several parameters demonstrated statistically significant differences. In the "m or mung bean" category, root count, biomass, plant height, and leaf count had p-values of 0.025, 0.005, 0.007, and 0.007, respectively, suggesting that these variables varied significantly across groups. Likewise, the "r or radish" category showed strong statistical significance in root length, root count, biomass, and plant height, with p-values of less than 0.001, 0.002, less than 0.001, and 0.012, respectively. These findings indicate substantial differences in these parameters among groups.

However, leaf count in the "r" category could not be analyzed properly, as reflected by the insufficient value (too little data gathered) in the results. Overall, the analysis suggests that while soil pH, soil moisture, and mung bean root length do not show significant variation, the other measured parameters reveal meaningful differences, particularly in root structure, biomass, and plant height. To see whether which of the treatments is higher or lower, the researcher will go back to the prior Tuckey Post-Poc test conducted on the soil and plant parameters.

4. Conclusion and Recommendation

This chapter presents the summary and conclusion derived in the conduct of the study, which is to evaluate the synergistic effects of *Trichoderma harzianum* and cow manure on the remediation of petroleum-contaminated soil using radish (*Raphanus*

savinus) and mung beans (*Vigna radiata)* as bioindicators.

This study was conducted at San Jose Academy. It employed quantitative research and utilized the quasi- experimental method. Relevant data were obtained through experimentation and daily parameter measurement. The statistical tools used were mean, standard deviation, Shapiro Wilk, One-Way ANOVA test, and Tukey Post-Hoc test.

4.1 Summary of Findings

The summary of findings is presented in alignment with the research questions outlined in Chapter 1. It includes the following:

1. How does the combined application of Trichoderma harzianum and cow manure affect the properties of petroleum-contaminated soil in terms of

a. **Soil pH**
b. **Moisture content**

Over the course of the 3-week experiment, the soil pH values across all control and treatment groups remained relatively along the slightly to moderately acidic range.

Control Groups

Control A had an overall mean soil pH of 5.68 (SD = 0.257), while Control B had a slightly higher mean of 5.69 (SD = 0.205), suggesting stable soil conditions with minor fluctuations along the duration of the experiment. Most datasets followed a normal distribution, with only some of the sets suggesting non-normality.

Treatment Groups

Treatment A had the lowest mean of 5.47 (SD = 0.186), indicating a consistent moderately acidic soil pH condition. In contrast, Treatment B had the highest mean at 5.7 (SD = 0.246), suggesting that the treatment of *Trichoderma harzianum* and cow manure had a slight stabilizing effect on soil pH to varying degrees, keeping it slightly acidic. Some datasets in TB1 and TB2 showed potential non-normality, which could indicate variations in how the treatment influenced the soil.

On the other hand, the soil moisture levels across all control and treatment groups varied over the duration of the experiment, fluctuating as it went.

Control Groups

Control A had an overall mean soil moisture of 75.6 (SD = 7.42), indicating very dry soil moisture. Control B had an overall mean of 77.6 (SD = 8.47), indicating a dry soil condition.

Treatment Groups

Treatment A had an overall mean soil moisture of 97.9 (SD = 9.86), significantly higher than the control groups. Data indicates that Treatment A had improved and consistent soil moisture retention. Meanwhile, treatment B had an overall mean of 117 (SD = 25.1), exhibiting the highest soil moisture levels out of all sample groups. It also shows the highest variability in soil moisture across all samples, suggesting that the treatments affected soil moisture distribution.

The synergy of *T. harzianum* and the cow manure affected the composition of the soil, as evident in the treatment groups, wherein Group A maintained a more stable soil acidity with the introduction of *T. harzianum* to the soil and Group B shifting towards a less acidic soil pH with the addition of cow manure. Moreover, the treatment groups revealed improved and higher soil moisture retention upon the incorporation of the treatments.

2. How does the combined application of Trichoderma harzianum and cow manure influence the growth and development of radish (Raphanus sativus) and mung bean (Vigna radiata) plants as bioindicators in petroleum-contaminated soil in terms of:

a. **Germination rate**
b. **Root length**
c. **Root count**
d. **Plant height**
e. **Biomass**

The germination rate of all samples across groups varied depending on the condition of the soil.

Control Groups

Control A, which had clean, untreated soil, had germination rates of 100% for mung beans and 80% for radishes, confirming optimal germination conditions. Control B, which had petroleum in the soil, had the germination rates dropped to 40%, indicating that the toxicity hindered soil germination.

Treatment Groups

Treatment A, which had petroleum-contaminated soil and *T. harzianum*, resulted in a further decline in germination (20%), suggesting that the fungi was not enough to counteract the toxicity. Treatment B, which had cow manure alongside *T. harzianum* had a 100% germination rate, indicating that the combination of the two treatments was enough to offset the contamination and restore soil conditions.

Meanwhile, the root length data showed different results between the two plant species.

Mung Beans

There are no statistically significant differences in root length among the treatment groups, despite Treatment B having the longest roots on average, followed by Control A, suggesting that neither the contamination nor treatments did not influence the root growth.

Radishes

Control A and Treatment B had the longest root lengths among samples, while Treatment A had shorter roots than both. indicating that the treatment in Treatment A negatively impacted root growth, while in Treatment B, it supported it instead.

Similarly, root count data differs depending on the species of the plants.

Mung Beans

Treatment B had the highest root count, followed by Control A, Treatment A, and then Control B. There are no statistically significant differences in root count between the two treatment groups, indicating that although *T. harzianum* provided a boost in increasing root count; the addition of cow manure did not provide any significant difference.

Radishes

Likewise, Treatment B had the highest root count, followed by Control B, Control A, and then Treatment A. As with the previous parameter, the treatment in Treatment A once more negatively impacted root count while in Treatment B, it facilitated it.

In a similar fashion, biomass data also differs between the two species of plants.

Mung Beans

Biomass was significantly higher in Control A than the rest of the groups, indicating that petroleum contamination has an effect on biomass. Treatment B showed a slightly higher biomass than Treatment A, suggesting that the cow manure improved biomass but is still not comparable to control levels.

Radishes

Control A had the highest mean biomass, followed by Treatment B, Control B, and then Treatment A. There are no statistically significant differences in biomass among the treatment groups, indicating that the treatments were not enough to improve biomass back to control levels.

Lastly, the plant height of all samples across groups varied depending on the condition of the soil.

Mung Beans

Control A had the tallest plants, significantly higher than all other groups, indicating that petroleum contamination negatively affects growth. Results reveal that Treatment B, although having higher plants than Control B and showing some success in remediation, has no statistically significant difference.

Radishes

Once again, Control A had the tallest plants compared to all other groups. Similarly, although not statistically significant, Treatment B had higher plants than Control B, showing a slight success in remediation.

Overall, petroleum contamination within the soil evidently negatively impacts the growth of the plants, as shown in all the measured parameters. Among all the results, *T. harzianum* alone—in Treatment Group A—showed stunted growth, indicating that the fungi on its own is not enough to remediate petroleum-contaminated soil. However, the addition of cow manure alongside the fungi in Treatment Group B showed improvements, particularly in germination rates, root count, and biomass. The second null hypothesis stating that the treatments will not affect the 4 parameters is partially rejected. The combined application of the treatments

influenced root count in both plants; however, the biomass and plant height of only the mung bean plants were significantly affected by the treatments and not the radishes.

4.2 Conclusion

The findings of the experiment led to the following conclusions:

1. Petroleum contamination severely deteriorates soil health and deters plant growth. The contamination significantly reduces soil health and fertility, inhibiting its ability to provide an environment sufficient for plant development due to the toxicity brought by the petroleum. Consequently, plants able to germinate and grow in petroleum-contaminated conditions exhibited stunted growth and poor overall development.
2. The data from this study revealed the synergy of *T. harzianum* and cow manure show potential and effectiveness in remediating petroleum-contaminated soil. The integration of both treatments into the petroleum-contaminated soil improved its quality, helping in restoring conditions that facilitated both plant germination and development. Although the combined treatment did not fully restore conditions to where it is comparable to uncontaminated soil, its ability to mitigate the negative effects of petroleum contamination and promote recovery indicates its potential as a viable remediation strategy.
3. The effectiveness of *T. harzianum* as a standalone treatment for soil is limited. The application of the fungi to soil does not significantly improve its overall health and composition nor does it show potential in significantly improving plant growth. Results reveal that *T. harzianum* alone may even have inhibitory effects on the growth of plants This indicates that while the fungi has beneficial applications in agriculture and bioremediation, its effectiveness is either hindered in contaminated environments, by the lack of additional complementary soil amendments, or by the short time frame of the experiment.

4.3 Recommendations

Based on the findings of this study, several recommendations can be made to the key beneficiaries to maximize the application and impact of the research.

For Farmers and Landowners, since the combination of *Trichoderma harzianum* and cow manure has successfully remediated petroleum, it is recommended farmers and landowners should consider the use of *Trichoderma harzianum* and cow manure in the soil in order to improve the quality of soil. Aside from that, farmers could use this combination as alternatives to remediate soil instead of using chemical treatments. Since this is also cheaper, the researchers also suggest expanding their existing efforts on soil remediation.

The Bureau of Soil and Water Conservation, given that this study provides benefit to the farmers and landowners that, the BSWM, must use the combination of *Trichoderma harzianum* and cow manure as alternatives for soil remediation since the combination could restore the polluted soil into its near uncontaminated state. They also suggest that BWSM should support studies regarding bioremediation that could enhance soil.

For Environmental Non-Governmental Organizations, based on the result of this research, it is recommended that the environmental NGOs, should use *Trichoderma harzianum* and cow manure to reduce soil pollution. NGOs could use this combination to enhance soil's health. They also suggest that the NGOs educate local communities or organizations on this technique so that the information can be utilized by other people and ultimately benefit from it too.

For San Jose Academy, they can launch an initiative either individually or in collaboration with LGUs or NGOs led by the faculty or student researchers focusing on soil remediation utilizing the combination of *Trichoderma harzianum* and cow manure. An educator of SnJA could also use this study as a case-sample of real-world environmental problem solving and inspire other students to do a similar action.

For Students and Future Researchers, based on the result of this study, the researchers suggest that future researchers who will conduct any related soil studies could use cow manure if they aim for a much healthier soil. They also recommend expanding the parameters measured in this study, such as measuring the nutrients available in the soil during mycormediation and the amount of petroleum present in the soil after the treatments. They also suggest controlling the extraneous variables, including sunlight, humidity, and temperature of the environment. Additionally, they recommend adding another treatment group that uses cow manure only to investigate its mycoremediation properties without the Trichoderma and learn if there are any significant

findings. Lastly, further studies are suggested in order to analyze the rates of application and duration of treatment for added efficiency.

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Submitted by Alis, Lorene A., De Lara Alexandra B., Faustino, John Lloyd B., Marquez, Kyle Meinard V., Pantonial, Lysa Erika T., and Sambahon, Mart Benczel D in partial fulfillment of the requirements for Inquiries, Investigations, and Immersion for Academic Year 2024-2025

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Comparison Study on the Growth of *Hibiscus rosa-sinensis* and *Solanum lycopersicum* to *Musa acuminata balbisiana* Peel as Fertilizer

Shania Gabrielle, Ashlene Acuin, Chris David Alejandrino, Christie Ann Naval

ABSTRACT

The study aims to recognize the effects of *Musa acuminata x balbisiana* (banana) peel as a fertilizer on the growth of *Hibiscus rosa-sinensis* (gumamela) and *Solanum lycoperiscum* (tomato) seedlings. As both ornamental and agricultural plants, these species require nutrients for optimal growth, typically provided by synthetic fertilizers. However, growing concerns about the environmental impact and high costs of these chemicals have led to increasing interest in organic alternatives.

The study is significant for agricultural communities, local gardeners, and government initiatives promoting sustainable farming practices. By repurposing banana peels, this method could reduce reliance on synthetic fertilizers, improve soil health, and provide an eco-friendly solution to organic waste management. It also lays the groundwork for future research into the long-term effects of *Musa acuminata x balbisiana* peel fertilizer on different plant species and soil health.

Musa acuminata x balbisiana peels are rich in essential nutrients like potassium, calcium, phosphorus, and magnesium, making them a promising option for organic fertilization. This research focused on observing whether plants treated with *Musa acuminata x balbisiana* peel fertilizer would exhibit visible growth compared to untreated plants. The study was conducted in a controlled environment with potted plants to maintain consistent conditions.

The results suggest that *Musa acuminata x balbisiana* peel fertilizer may support the growth of *Solanum lycoperiscum* seedlings but had no positive impact on *Hibiscus rosa-sinensis* seedlings. This indicates that the effectiveness of *Musa acuminata x balbisiana* peel fertilizer may vary based on the plant species and their specific nutrient requirements.

Keywords: *Musa acuminata x balbisiana* peel fertilizer, *Hibiscus rosa-sinensis*, *Solanum lycoperiscum*, eco-friendly fertilizers

INTRODUCTION

The use of organic fertilizers has gained significant attention due to concerns over the environmental impact and rising costs of synthetic fertilizers. Among the many organic alternatives, banana peels *Musa acuminata balbisiana* have emerged as a potential natural fertilizer due to their high nutrient content. Banana peels are rich in essential macronutrients such as potassium (K), phosphorus (P), calcium (Ca), and magnesium (Mg), which play a crucial role in plant growth and development. This study focuses on evaluating the effects of composted banana peels as an organic fertilizer for *Hibiscus rosa-sinensis* (gumamela) and Solanum lycopersicum (tomato), two widely cultivated plants with ornamental and agricultural importance.

Hibiscus rosa-sinensis is commonly grown for its vibrant flowers, often used for medicinal and decorative purposes, while *Solanum lycopersicum* is a globally significant crop with high nutritional value. Both plants require sufficient nutrients to sustain their growth, which is typically supplied by chemical fertilizers. However, synthetic fertilizers contribute to soil degradation, water pollution, and increased production costs. As a response to these challenges, exploring organic waste materials such as banana peels as an alternative fertilizer presents an opportunity to promote sustainable agricultural practices.

The general objective of this study is to determine whether composted *Musa*

acuminata balbisiana peels can serve as an effective organic fertilizer for Hibiscus rosa-sinensis and *Solanum lycopersicum*. Specifically, the study aims to compare the growth rate of plants treated with banana peel fertilizer to those grown without any fertilizer. It also seeks to identify any noticeable differences in plant development, such as height and overall health. Furthermore, the research evaluates the cost-effectiveness of banana peel fertilizer in comparison to commercial chemical fertilizers, assessing its potential as a viable alternative for both home gardeners and agricultural producers.

This study holds significant implications for multiple sectors. Farmers and gardeners can benefit from cost-effective fertilization methods that reduce reliance on synthetic fertilizers while improving soil health. Local communities, particularly urban gardeners and small-scale farmers, can learn to repurpose organic waste, thereby promoting eco-friendly gardening practices. Moreover, government bodies such as the Department of Agriculture may find value in incorporating banana peel-based fertilizers into sustainability programs aimed at reducing agricultural waste and promoting organic farming techniques. Additionally, future researchers can build on this study by investigating the long-term effects of banana peel fertilizer, its impact on different plant species, and methods for optimizing composting techniques.

The scope of this research is limited to evaluating the initial growth response of Hibiscus rosa-sinensis and Solanum lycopersicum under controlled conditions using composted banana peels. The study does not incorporate synthetic fertilizers or other organic amendments, ensuring that the effects of banana peels can be observed in isolation. Additionally, while plant growth will be monitored, parameters such as root development, soil composition changes, and long-term yield performance are beyond the study's scope. The research also does not account for external environmental factors such as varying weather conditions, as plants will be grown in a controlled setting.

By focusing on the potential of banana peel compost as a natural fertilizer, this study contributes to the ongoing shift toward sustainable agriculture. The findings could help farmers, gardeners, and policymakers adopt environmentally friendly fertilization techniques while addressing the issue of organic waste management. If proven effective, banana peel fertilizer could serve as a practical and low-cost solution for plant cultivation, aligning with global efforts to promote greener agricultural practices.

MATERIALS AND METHODS

Research Environment

The research was conducted at home in a controlled environment to observe the growth of Hibiscus rosa-sinensis (gumamela) and Solanum lycopersicum (tomato) plants. The plants were grown in pots, ensuring consistent management of environmental factors like sunlight, temperature, and watering. The study used Musa acuminata balbisiana (banana) peels as an organic, eco-friendly fertilizer sourced from household waste. The main focus of the study was to monitor whether the plants showed growth over time with the banana peel fertilizer, such as measuring specific growth parameters like height or leaf count.

Research Design

This study employed an experimental research design to evaluate the potential of ***Musa acuminata balbisiana*** (banana peels) as an organic fertilizer for Hibiscus rosa-sinensis (gumamela) and ***Solanum lycopersicum*** (tomato) plants. The experiment aimed to assess the general effectiveness of banana peels in promoting plant growth without focusing on detailed measurements.

The research sought to determine whether plants treated with banana peel fertilizer would exhibit visible growth over time compared to those without fertilizer. The study aimed to contribute to sustainable horticultural practices by exploring a natural, cost-effective fertilizer alternative.

Research Locale

The research was conducted in Navotas City under the Science, Technology, Engineering, and Mathematics (STEM) strand. The experiments and trials were performed in a residential setting, ensuring convenience and accessibility for the researchers. The home-based environment allowed for easy monitoring and provided the necessary resources and materials.

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Research Instrument

The study relied on qualitative observations rather than quantitative measurements. Researchers monitored the general growth of gumamela and tomato plants, recording whether they exhibited noticeable development over time. Unlike traditional plant studies, this research did not measure variables such as plant height, number of leaves, stem diameter, or flowering rate.

To ensure uniform conditions, the following controlled factors were maintained:

- Equal sunlight exposure for all plants
- Consistent pot size and soil type
- Regular watering schedule
- Standardized preparation and application of banana peel fertilizer

The banana peels were dried, ground, and mixed into the soil at consistent intervals. Researchers recorded observations on whether the plants grew or failed to grow over the study period.

Method of Data Analysis

The study employed a systematic approach to analyze the effects of banana peel fertilizer on plant growth. The steps involved were:

- **Preparation of Fertilizer**

  Fresh banana peels were collected, washed, and dried under direct sunlight until brittle.

  The prepared banana peels were mixed with soil before planting.

- **Experimental Setup**

  A home-based experimental environment was established to ensure controlled and consistent conditions.

- **Observation Criteria**

  Instead of measuring specific growth parameters, researchers monitored whether the plants exhibited visible growth over time.

- **Data Collection**

  Observations were recorded systematically throughout the study period.

  Researchers noted if the plants grew or failed to grow when treated with banana peel fertilizer.

- **Data Analysis**

  Researchers compared the growth patterns of plants treated with banana peel fertilizer against those without fertilizer.

  The study analyzed trends to determine whether banana peels had a noticeable impact on plant development.

- **Evaluation of Sustainability**

  The study examined the feasibility of using *Musa acuminata balbisiana* (banana peels) as an eco-friendly alternative to chemical fertilizers.

  The results aimed to highlight the potential of banana peel fertilizer in reducing organic

waste while promoting plant growth.

Photo Documentation

To support the recorded observations, photos of the seedlings were taken weekly to visually track any growth changes. The images provide a clear comparison between the control group and the fertilized groups for *Solanum lycopersicum*.

Week 1:
In Week 1, small leaves have started to grow on the *Solanum lycopersicum* seedling, indicating early development. Further observations in the following weeks will determine if the fertilizer has any significant impact.



Week 2:
The seedlings continue to grow healthily, with expanded leaves and no signs of nutrient deficiency. The plants maintain a vibrant green color.



Week 3:
The tomato seedlings show further development, with longer sprouts and larger leaves.



Week 4:
The seedlings have fully grown, with stronger stems and abundant leaves, indicating successful development.





Hibiscus rosa-sinensis:
No visible growth was observed in the gumamela seedlings during the four-week period, regardless of fertilizer application.

RESULTS AND DISCUSSION

This section presents the recorded observations of *Hibiscus rosa-sinensis* (gumamela) and *Solanum lycopersicum* (tomato) seedlings, focusing on whether they grew when treated with *Musa Acuminsta x balbisiana* peel fertilizer. The main goal of this study was to determine if *Musa Acuminsta x balbisiana* peel fertilizer could support the growth of these plants compared to a control group that did not receive fertilizer.

To assess the effects, two different concentrations of *Musa Acuminsta x balbisiana* peel fertilizer were applied: 10% concentration for one group and 20% concentration for another group. These fertilizers were applied weekly, and plant growth was monitored to determine their response over time.

Presentation of Data

Growth of Hibiscus rosa-sinensis (Gumamela)

Table 1 shows the number of leaves or sprouts shown over the weeks to indicate if the banana peel fertilizer (BPL) is capable.

No. of weeks	Control group	10% BPL	20% BPL	Average
Week 1	0	0	0	0
Week 2	0	0	0	0
Week 3	0	0	0	0
Week 4	0	0	0	0

The data shows that over the four-week observation period, *Hibiscus rosa-sinensis* (gumamela) did not show any sign of growth, regardless of the treatment—control (no fertilizer), 10% banana peel fertilizer, or 20% *Musa acuminata* × *balbisiana* peel fertilizer. There was no increase in height, new leaf growth, or any significant changes in development. This indicates that the *Musa acuminata* × *balbisiana* peel fertilizer may not be sufficient for gumamela growth in this timeframe. The plants might need a longer period to develop, and factors like soil quality, water, and additional nutrients could also be vital for growth.

Growth of Solanum lycopersicum (Tomato)

Table 2 shows the number of leaves or sprouts shown over the weeks to indicate if the banana peel fertilizer (BPL) is capable.

No. of weeks	Control group	10% BPL	20% BPL	Average
Week 1	6	9	13	9.33
Week 2	9	16	23	16
Week 3	12	23	30	21.67
Week 4	27	30	46	34.33

Tomato seedlings showed consistent growth across all treatment groups, including both the control and fertilized groups, with increased height, new leaves, and healthy coloration. This suggests that *Musa acuminata* × *balbisiana* (banana) peel fertilizer may positively impact tomato growth, or at least does not hinder it. The data also revealed that the concentration of banana peel fertilizer (10% vs. 20%) had a significant effect on plant growth. Both concentrations supported normal development in tomatoes, but neither concentration improved gumamela growth. This indicates that higher fertilizer concentration does not necessarily boost plant growth within the four-week period.

Analysis and Interpretation of Data

Growth of Hibiscus rosa-sinensis (Gumamela)

Based on the recorded observations, gumamela did not grow throughout the four-week period, regardless of the type of treatment it received. This includes the control group (no fertilizer), the group treated with 10% banana peel fertilizer, and the group treated with 20% *Musa Acuminsta x balbisiana* peel fertilizer. Despite weekly fertilizer application, there was no visible increase in height, no new leaves, and no significant changes in the plant's overall development.

This suggests that:

- *Musa acuminata* × *balbisiana* peel fertilizer alone may not be sufficient for the growth of gumamela seedlings.
- These plants might require a longer period of growth before showing any significant development.
- Other factors such as soil quality, water intake, and additional nutrients may play a crucial role in ensuring that gumamela thrives.

Growth of Solanum lycopersicum (Tomato)

Unlike gumamela, tomato seedlings showed consistent growth across all treatment groups. Both the control group and the fertilized groups exhibited steady development over the four weeks. The seedlings:

- Increased in height
- Developed new leaves
- Maintained healthy coloration

This indicates that *Musa Acuminsta x balbisiana* (banana) peel fertilizer might have a positive effect on tomato plant growth, or at the very least, it does not hinder their development.

Effect of 10% vs. 20% Musa Acuminsta x balbisiana Peel Fertilizer

The data also show that the concentration of banana peel fertilizer did not significantly affect plant growth. Both the 10% and 20% groups had similar outcomes:

- For gumamela, neither concentration helped stimulate growth.
- For tomatoes, both concentrations supported normal development, but there was no clear advantage between 10% and 20%.

This suggests that increasing the banana peel fertilizer concentration does not necessarily enhance plant growth, at least within the four-week period observed.

The results of this study demonstrate that *Hibiscus rosa-sinensis* (gumamela) seedlings did not grow, regardless of whether they were given 10% or 20% banana peel fertilizer, or no fertilizer at all. This suggests that *Musa acuminata x balbisiana* peel fertilizer alone may not be suitable for promoting the early growth of gumamela plants (Marschner, 2012).

On the other hand, *Solanum lycopersicum* (tomato) seedlings showed steady growth in both control and fertilized groups, indicating that they were able to develop under normal conditions, with or without the addition of banana peel fertilizer. The results suggest that banana peels might provide some beneficial nutrients for tomato growth but are not necessarily required for their development (Brady & Weil, 2008). Additionally, the difference in concentration (10% vs. 20%) did not significantly impact plant growth, meaning that increasing the amount of *Musa acuminata x balbisiana* peel fertilizer does not necessarily lead to better results (Rengel, 2002).

Conclusion

To further investigate the effects of *Musa acuminata x balbisiana* peel fertilizer, future studies could:

- Extend the observation period to determine if gumamela seedlings will eventually show growth.
- Experiment with different types of organic fertilizers or combine banana peels with other nutrients to see if it enhances gumamela development (Keeney & Nelson, 1982).
- Analyze the chemical composition of the soil before and after fertilizer application to determine how banana peels affect soil nutrient levels (Brady & Weil, 2008).

CONCLUSION AND RECOMMENDATIONS

This study investigated the effects of **Musa acuminata** × **balbisiana** (banana peel) fertilizer on the growth of **Hibiscus rosa-sinensis (gumamela)** and **Solanum lycopersicum (tomato)** seedlings. The plants were divided into three groups: a control group (no fertilizer), a group treated with **10% banana peel fertilizer**, and another group treated with **20% banana peel fertilizer**. Additionally, a hydroponic-like setup was used to test banana peel extract in water. Over a

four-week observation period, the **gumamela seedlings showed no signs of growth**, including no increase in height, no new leaves, and no visible development, regardless of the treatment applied. In contrast, **tomato seedlings displayed consistent growth**, with an increase in height, new leaf formation, and healthy coloration across all groups, including the control. This suggests that **banana peel fertilizer does not promote early growth in gumamela but does not hinder tomato growth either**. Moreover, the difference in concentration between 10% and 20% **did not significantly affect plant development**, indicating that increasing the amount of banana peel fertilizer does not necessarily lead to better results. Furthermore, using banana peel extract in a hydroponic setup **did not enhance gumamela growth**, suggesting that this fertilizer may not be effective for all plant species.

Based on these findings, it is concluded that **banana peel fertilizer is not suitable for promoting gumamela growth in its early stages**, possibly due to the plant's specific nutrient requirements or longer growth response time. On the other hand, tomato plants appear to be more adaptable and capable of growing even without fertilizer, highlighting that while banana peel fertilizer is not essential, it does not negatively impact their growth. To further explore the effectiveness of banana peel fertilizer, several recommendations are proposed. Extending the duration of the study **could determine whether gumamela plants require more time to respond to the fertilizer**. Conducting a **soil analysis before and after applying the fertilizer** would help assess its impact on nutrient composition and whether it lacks essential elements needed for gumamela growth. Additionally, testing alternative organic fertilizers or combining banana peels with **other organic materials such as eggshells or compost** may provide a **more balanced nutrient mix** that could support gumamela development.

Further research should also **experiment with different plant species** to determine which plants respond best to banana peel fertilizer. Modifying the **application method**, such as fermenting banana peels longer or using composted banana peels instead of fresh ones, could improve nutrient availability. Additionally, **controlling environmental factors**, including **light exposure, temperature, and watering schedules**, is crucial to ensure that **growth limitations are not caused by external conditions** rather than the fertilizer itself. Finally, further investigation into **banana peel extract with different concentrations and application methods** may provide insights into whether **liquid fertilizers** are more effective for certain plant species.

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Laurentii Sansevieria Snake Plant: A Natural Air Purification Solution for Healthier Classrooms at San Jose Academy

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Abstract: Poor indoor air quality is a considerable concern, particularly in schools, where students and teachers spend extended hours in enclosed environments. This study investigates the effectiveness of Laurentii Sansevieria (snake plant), specifically L. Sansevieria, as a natural air purifier in classroom settings. It analyzes the plant's capacity to remove common indoor air pollutants like formaldehyde and benzene and its possible advantages for the health and well-being of the entire school, not just individual students. The research was conducted in selected school classrooms over the second semester of the 2024–2025 academic year. The study focused exclusively on L. Sansevieria, excluding other snake plant species and indoor spaces beyond classrooms. Results indicate that snake plants contribute to improved air quality by filtering harmful toxins, making them a sustainable, affordable, and low-maintenance solution for air purification. Their capacity to absorb toxins and release oxygen supports a healthier learning environment. Despite these positive outcomes, the study acknowledges certain limitations, including excluding other plant species, the confined research setting, and the short duration of data collection. To further explore the potential of snake plants in air purification, future research should expand to other indoor environments, analyze long-term effects, and compare different plant species. The psychological and cognitive advantages of adding greenery to learning areas could be the topic of future research. Overall, this study emphasizes the possible use of snake plants in schools to create a better atmosphere for children and teachers, highlighting their function as a practical and natural way to enhance indoor air quality.

Keywords: Laurentii Sansevieria; Air Quality; Pollutants; Air Concentration; Formaldehyde; Purification; Potted Plants

1. INTRODUCTION

Concern over indoor air pollution is growing, particularly in confined areas like classrooms, where teachers and students spend a lot of time. Poor air quality can result in discomfort, allergies, and respiratory problems (Liu et al., 2017). Unfortunately, many schools do not have adequate air filtration systems due to a lack of funding, awareness, or other factors. Plants should be integrated indoors, particularly in schools, where concerns about air pollution are rapidly growing. NASA claims that snake plants are among the plants that can help improve air quality. (Das, 2017), implying that they can eliminate air pollutants like formaldehyde and benzene, offering a natural air-cleaning option.

This study examines the efficacy of the Snake Plant, or Laurentii Sansevieria, as a sustainable and natural way to enhance classroom air quality. Research shows this plant can purify the air, making it a viable substitute for costly air filters. We aimed to find out if putting snake plants inside classrooms may significantly decrease harmful air pollutants and improve the quality of learning environments.

This research explores the impact of incorporating snake plants into indoor spaces, particularly in educational settings, and highlights a sustainable and cost-effective solution for improving air quality. The San Jose Academy stands to benefit significantly from this study, as improved air quality can help protect students, teachers, and personnel from the adverse effects of indoor air pollution. A healthier indoor environment may contribute to better respiratory health,

increased focus, and enhanced overall well-being within the school community. Beyond the academy, this research also holds significance for the broader community, including future researchers. It is a foundation for further studies on natural air purification methods and their potential applications in various settings. Through raising awareness of environmentally friendly ways to reduce air pollution, this study encourages sustainable environmental habits that can help the entire community.

The study is limited in several ways. First, it only considers *L. Sansevieria*, leaving out other snake plant species that might have air-purifying qualities. Second, the study looks at classrooms; it doesn't consider indoor spaces like offices, hallways, or labs. Lastly, the study was carried out during the first semester of the 2024–2025 school year. Because of this, the results are based on a specific period and might not consider long-term changes in plants' effectiveness or air quality under various circumstances.

2. MATERIALS AND METHODS

2.1 Research Design

This study utilizes a quantitative-experimental research design. Five controlled indoor environments of equal size will be used. Each room will undergo a pre-test and post-test to evaluate changes in air quality. For the pre-test phase, pollutant levels will be measured in each room for over three days without Snake Plants. After this baseline measurement, researchers will place three Snake Plants in each room for a one-hour post-test. Pollutant levels will be monitored daily for six days using an air quality monitoring device, Total Volatile Organic Compounds (TVOC).

2.2 Equipment and Tools Used

TVOC Sensor: A portable sensor (e.g., Aeroqual Series 200) will measure the concentration of Total Volatile Organic Compounds (TVOCs) in the air. This sensor will be calibrated regularly and used to measure TVOCs in parts per billion (ppb).

Data Recording Tools: Data will be recorded manually and stored in a secure digital format for analysis.

Plant Care Supplies: Standard care tools for maintaining the plants, including watering schedules, fertilizers, and pruning tools.

2.3 Data Gathering

This data collection aims to evaluate the efficacy of the Laurentii Sansevieria Snake Plant in improving indoor air quality in San Jose Academy's classrooms. This research specifically aims to quantify the reduction in Total Volatile Organic Compounds (TVOCs), which are commonly found indoor pollutants, and assess the overall impact on the air quality within the classroom environment.

After collecting the data, the following statistical methods will be applied:

•Average TVOC Levels: Calculate the average TVOC levels for each classroom and compare them between baseline and post-planting data.

•TVOC Reduction Analysis: Measure the percentage change in TVOC levels after introducing Snake Plants in each classroom.

•Comparison Between Experimental and Control Groups: Use t-tests or ANOVA to determine whether the reduction in TVOCs in classrooms with Snake Plants is statistically significant compared to the control classroom.

2.4 Data Analysis

During the experiment, the researchers collected air quality samples from each of the five classrooms at predetermined intervals to monitor and measure the air concentration over time. This systematic sampling allowed for a comprehensive analysis of the indoor air quality within each environment. The primary objective was to assess the effectiveness of snake plants (L. Sansevieria) in reducing air pollutants, specifically focusing on their impact on Total Volatile Organic Compounds (TVOCs).

Total Volatile Organic Compounds (TVOCs) encompass various organic chemicals that can evaporate into the air from multiple sources, such as paints, cleaning supplies, and building materials. The concentration of TVOCs is typically quantified in parts per million (ppm) or milligrams per cubic meter (mg/m^3). Specialized sensors and air quality monitors were employed to accurately capture and analyze these measurements. Understanding the levels of TVOCs is crucial for evaluating indoor air quality, as elevated concentrations can pose significant health risks and impact overall well-being. The researchers analyzed the gathered data to determine whether snake plants could purify the air, providing insights into their potential benefits for indoor environments.

3. RESULTS AND DISCUSSION

The table presents air quality measurements collected before and after introducing the snake plant in each section. Assessments were conducted over three days for both the pre-trial and post-trial phases.

Table 1. Evaluating air quality in various classroom environments with and without L. Sansevieria.

	PRE- TEST			POST-TEST		
TRIAL	1	2	3	1	2	3
ST. PEREGRINE ~~LAZIOSI~~ (SN203)	1.0 mg/m3	1.0 mg/m3	0.4 mg/m3	0.01 mg/m3	0.01 mg/m3	0.01 mg/m3
ST. CLARE OF ASSISI (SN204)	0.5 mg/m3	1.0 mg/m3	0.4 mg/m3	0.01 mg/m3	0.01 mg/m3	0.01 mg/m3
ST. AGATHA OF SICILY (IC201)	0.5 mg/m3	0.5 mg/m3	1.0 mg/m3	0.01 mg/m3	0.08 mg/m3	0.01 mg/m3
ST. BENEDICT OF NURSIA (SN202)	1.0 mg/m3	1.0 mg/m3	0.5 mg/m3	0.04 mg/m3	0.03 mg/m3	0.01 mg/m3
ST. AUGUSTINE OF HIPPO (SN201)	0.4 mg/m3	1.0 mg/m3	0.5 mg/m3	0.08 mg/m3	0.01 mg/m3	0.01 mg/m3

Pre-Testing of Sample

The air quality in several classrooms was measured using TVOC before adding a snake plant. St. Peregrine's classroom had harmless air quality, with TVOC levels between 1.0 and 0.4 mg/m^3. St. Clare's classroom also had harmless and average air quality, with TVOC levels of 0.5, 0.1, and 0.4 mg/m^3. Similarly, St. Benedict's classroom had harmless and average air quality, with TVOC levels ranging from 1.0 to 0.5 mg/m^3. The air quality in St. Augustine's classroom was harmless but showed a slight need for improvement, with TVOC levels between 0.4 and 0.5 mg/m^3. Likewise, St. Agatha's classroom had harmless air quality with little need for improvement, as TVOC levels ranged from 0.5 to 1.0 mg/m^3.

Post-Testing of Sample

The air quality in different classrooms is evaluated by measuring Total Volatile Organic Compounds (TVOC) following the introduction of a snake plant. In St. Peregrine's classroom, the air quality reaches the recommended target value of greater than 0.01 mg/m3. Similarly, St. Clare's classroom achieves a target value of greater than 0.01 mg/m3 after placing the snake plant. St. Benedict's classroom, however, reaches a target value within the range of 0.04 to 0.01 mg/m3. In St. Agatha's classroom, the air quality again meets the recommended target value of greater than 0.01 mg/m3 after placing the snake plant. Lastly, St. Augustine's classroom's air quality improves to a target value between 0.08 and 0.01 mg/m3 following the placement of the snake plant.

Table 2. Descriptives of All Classrooms

Descriptives

Descriptives

	St. PEREGRINE	ST. CLARE	ST. AGATHA	ST. BENEDICT	ST. AUGUSTINE
Mean	0.405	0.322	0.350	0.455	0.333
Median	0.205	0.205	0.290	0.340	0.240
Standard deviation	0.485	0.397	0.393	0.456	0.387

The descriptive statistic revealed that in five classrooms with a sample size of 30-55 students, St. Benedict had the highest mean or average value among all sections, the highest median, and St. Peregrine had the highest standard deviation.

Table 3. One Sample T-Test of Significant Differences

One Sample T-Test

One Sample T-Test

		Statistic	df	p
St. PEREGRINE	Student's t	2.05	5.00	0.096
ST. CLARE	Student's t	1.98	5.00	0.104
ST. AGATHA	Student's t	2.18	5.00	0.081
ST. BENEDICT	Student's t	2.44	5.00	0.059
ST. AUGUSTINE	Student's t	2.11	5.00	0.089

Note. H_a $\mu \neq 0$

The one-sample t-test showed that there are significant differences in all classrooms with a sample size of 40-55 students because the average indoor air quality level is (0.25-05 mg/m^3) and the target value is (>0.25 mg/m^3).

According to Patil et al. (2023), a comprehensive comparative analysis of various species of snake plants and their notable capacity to mitigate carbon dioxide (CO2) levels in indoor settings. The study indicates that these plants can achieve a reduction factor of 0.5, effectively halving the percentage increase in CO2 concentrations. Such findings highlight the significant role that snake plants play in enhancing air quality and fostering healthier living environments.

4. CONCLUSION AND RECOMMENDATIONS

This study examined the effectiveness of Sansevieria trifasciata (snake plant) as a natural air purifier in classrooms, particularly emphasizing how well it can get rid of typical indoor air pollutants like formaldehyde and benzene. The study sought to ascertain its possible health advantages for instructors and students by evaluating its effect on indoor air quality.

The study successfully shows that L. Sansevieria improves air quality within classroom environments. Results indicated that the plant effectively reduces airborne pollutants, supporting its role as a sustainable and eco-friendly solution for indoor pollution control. However, the study was bound to classrooms and did not investigate the plant's potential advantages for cognitive or decorative purposes.

For future researchers who wish to explore this study further, we recommend:

1. Additional Snake Plant Species in the Study: Examine whether the air-purifying properties of various snake plant species are comparable to or better than those of *L. Sansevieria*.

2. Incorporate Different Indoor Environments: Expand the study to other indoor environments, such as homes, workplaces, or medical facilities, to assess the broader suitability of snake plants for filtering the air.

3. Examine Long-Term Effects: Conduct studies over an extended period to assess the long-term impact of *L. Sansevieria* on indoor air quality under varying environmental conditions.

4. Measure Other Air Quality Elements: To obtain a greater understanding of how the plant affects indoor surroundings, look at additional environmental elements, including humidity, carbon dioxide levels, and particle matter.

5. Compare Snake Plants with Other Air Purifying Plants—Investigate how *L. Sansevieria* compares to other air-purifying plants, identifying the plants that work best for particular contaminants.

6. Evaluate the Cognitive and Psychological Advantages—Examine whether having snake plants in the classroom helps students focus better, feel less stressed, and be healthier overall.

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Laurentii Sansevieria Snake Plant: A Natural Air Purification Solution for Healthier Classrooms at San Jose Academy

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Abstract: Poor indoor air quality is a considerable concern, particularly in schools, where students and teachers spend extended hours in enclosed environments. This study investigates the effectiveness of Laurentii Sansevieria (snake plant), specifically L. Sansevieria, as a natural air purifier in classroom settings. It analyzes the plant's capacity to remove common indoor air pollutants like formaldehyde and benzene and its possible advantages for the health and well-being of the entire school, not just individual students. The research was conducted in selected school classrooms over the second semester of the 2024–2025 academic year. The study focused exclusively on L. Sansevieria, excluding other snake plant species and indoor spaces beyond classrooms. Results indicate that snake plants contribute to improved air quality by filtering harmful toxins, making them a sustainable, affordable, and low-maintenance solution for air purification. Their capacity to absorb toxins and release oxygen supports a healthier learning environment. Despite these positive outcomes, the study acknowledges certain limitations, including excluding other plant species, the confined research setting, and the short duration of data collection. To further explore the potential of snake plants in air purification, future research should expand to other indoor environments, analyze long-term effects, and compare different plant species. The psychological and cognitive advantages of adding greenery to learning areas could be the topic of future research. Overall, this study emphasizes the possible use of snake plants in schools to create a better atmosphere for children and teachers, highlighting their function as a practical and natural way to enhance indoor air quality.

Keywords: Laurentii Sansevieria; Air Quality; Pollutants; Air Concentration; Formaldehyde; Purification; Potted Plants

1. INTRODUCTION

Concern over indoor air pollution is growing, particularly in confined areas like classrooms, where teachers and students spend a lot of time. Poor air quality can result in discomfort, allergies, and respiratory problems (Liu et al., 2017). Unfortunately, many schools do not have adequate air filtration systems due to a lack of funding, awareness, or other factors. Plants should be integrated indoors, particularly in schools, where concerns about air pollution are rapidly growing. NASA claims that snake plants are among the plants that can help improve air quality. (Das, 2017), implying that they can eliminate air pollutants like formaldehyde and benzene, offering a natural air-cleaning option.

This study examines the efficacy of the Snake Plant, or Laurentii Sansevieria, as a sustainable and natural way to enhance classroom air quality. Research shows this plant can purify the air, making it a viable substitute for costly air filters. We aimed to find out if putting snake plants inside classrooms may significantly decrease harmful air pollutants and improve the quality of learning environments.

This research explores the impact of incorporating snake plants into indoor spaces, particularly in educational settings, and highlights a sustainable and cost-effective solution for improving air quality. The San Jose Academy stands to benefit significantly from this study, as improved air quality can help protect students, teachers, and personnel from the adverse effects of indoor air pollution. A healthier indoor environment may contribute to better respiratory health,

increased focus, and enhanced overall well-being within the school community. Beyond the academy, this research also holds significance for the broader community, including future researchers. It is a foundation for further studies on natural air purification methods and their potential applications in various settings. Through raising awareness of environmentally friendly ways to reduce air pollution, this study encourages sustainable environmental habits that can help the entire community.

The study is limited in several ways. First, it only considers *L. Sansevieria*, leaving out other snake plant species that might have air-purifying qualities. Second, the study looks at classrooms; it doesn't consider indoor spaces like offices, hallways, or labs. Lastly, the study was carried out during the first semester of the 2024–2025 school year. Because of this, the results are based on a specific period and might not consider long-term changes in plants' effectiveness or air quality under various circumstances.

2. MATERIALS AND METHODS

2.1 Research Design

This study utilizes a quantitative-experimental research design. Five controlled indoor environments of equal size will be used. Each room will undergo a pre-test and post-test to evaluate changes in air quality. For the pre-test phase, pollutant levels will be measured in each room for over three days without Snake Plants. After this baseline measurement, researchers will place three Snake Plants in each room for a one-hour post-test. Pollutant levels will be monitored daily for six days using an air quality monitoring device, Total Volatile Organic Compounds (TVOC).

2.2 Equipment and Tools Used

TVOC Sensor: A portable sensor (e.g., Aeroqual Series 200) will measure the concentration of Total Volatile Organic Compounds (TVOCs) in the air. This sensor will be calibrated regularly and used to measure TVOCs in parts per billion (ppb).

Data Recording Tools: Data will be recorded manually and stored in a secure digital format for analysis.

Plant Care Supplies: Standard care tools for maintaining the plants, including watering schedules, fertilizers, and pruning tools.

2.3 Data Gathering

This data collection aims to evaluate the efficacy of the Laurentii Sansevieria Snake Plant in improving indoor air quality in San Jose Academy's classrooms. This research specifically aims to quantify the reduction in Total Volatile Organic Compounds (TVOCs), which are commonly found indoor pollutants, and assess the overall impact on the air quality within the classroom environment.

After collecting the data, the following statistical methods will be applied:

•Average TVOC Levels: Calculate the average TVOC levels for each classroom and compare them between baseline and post-planting data.

•TVOC Reduction Analysis: Measure the percentage change in TVOC levels after introducing Snake Plants in each classroom.

•Comparison Between Experimental and Control Groups: Use t-tests or ANOVA to determine whether the reduction in TVOCs in classrooms with Snake Plants is statistically significant compared to the control classroom.

2.4 Data Analysis

During the experiment, the researchers collected air quality samples from each of the five classrooms at predetermined intervals to monitor and measure the air concentration over time. This systematic sampling allowed for a comprehensive analysis of the indoor air quality within each environment. The primary objective was to assess the effectiveness of snake plants (L. Sansevieria) in reducing air pollutants, specifically focusing on their impact on Total Volatile Organic Compounds (TVOCs).

Total Volatile Organic Compounds (TVOCs) encompass various organic chemicals that can evaporate into the air from multiple sources, such as paints, cleaning supplies, and building materials. The concentration of TVOCs is typically quantified in parts per million (ppm) or milligrams per cubic meter (mg/m^3). Specialized sensors and air quality monitors were employed to accurately capture and analyze these measurements. Understanding the levels of TVOCs is crucial for evaluating indoor air quality, as elevated concentrations can pose significant health risks and impact overall well-being. The researchers analyzed the gathered data to determine whether snake plants could purify the air, providing insights into their potential benefits for indoor environments.

3. RESULTS AND DISCUSSION

The table presents air quality measurements collected before and after introducing the snake plant in each section. Assessments were conducted over three days for both the pre-trial and post-trial phases.

Table 1. Evaluating air quality in various classroom environments with and without L. Sansevieria.

	PRE- TEST			POST-TEST		
TRIAL	1	2	3	1	2	3
ST. PEREGRINE ~~LAZIOSI~~ (SN203)	1.0 mg/m3	1.0 mg/m3	0.4 mg/m3	0.01 mg/m3	0.01 mg/m3	0.01 mg/m3
ST. CLARE OF ASSISI (SN204)	0.5 mg/m3	1.0 mg/m3	0.4 mg/m3	0.01 mg/m3	0.01 mg/m3	0.01 mg/m3
ST. AGATHA OF SICILY (IC201)	0.5 mg/m3	0.5 mg/m3	1.0 mg/m3	0.01 mg/m3	0.08 mg/m3	0.01 mg/m3
ST. BENEDICT OF NURSIA (SN202)	1.0 mg/m3	1.0 mg/m3	0.5 mg/m3	0.04 mg/m3	0.03 mg/m3	0.01 mg/m3
ST. AUGUSTINE OF HIPPO (SN201)	0.4 mg/m3	1.0 mg/m3	0.5 mg/m3	0.08 mg/m3	0.01 mg/m3	0.01 mg/m3

Pre-Testing of Sample

The air quality in several classrooms was measured using TVOC before adding a snake plant. St. Peregrine's classroom had harmless air quality, with TVOC levels between 1.0 and 0.4 mg/m^3. St. Clare's classroom also had harmless and average air quality, with TVOC levels of 0.5, 0.1, and 0.4 mg/m^3. Similarly, St. Benedict's classroom had harmless and average air quality, with TVOC levels ranging from 1.0 to 0.5 mg/m^3. The air quality in St. Augustine's classroom was harmless but showed a slight need for improvement, with TVOC levels between 0.4 and 0.5 mg/m^3. Likewise, St. Agatha's classroom had harmless air quality with little need for improvement, as TVOC levels ranged from 0.5 to 1.0 mg/m^3.

Post-Testing of Sample

The air quality in different classrooms is evaluated by measuring Total Volatile Organic Compounds (TVOC) following the introduction of a snake plant. In St. Peregrine's classroom, the air quality reaches the recommended target value of greater than 0.01 mg/m3. Similarly, St. Clare's classroom achieves a target value of greater than 0.01 mg/m3 after placing the snake plant. St. Benedict's classroom, however, reaches a target value within the range of 0.04 to 0.01 mg/m3. In St. Agatha's classroom, the air quality again meets the recommended target value of greater than 0.01 mg/m3 after placing the snake plant. Lastly, St. Augustine's classroom's air quality improves to a target value between 0.08 and 0.01 mg/m3 following the placement of the snake plant.

Table 2. Descriptives of All Classrooms

Descriptives

Descriptives

	St. PEREGRINE	ST. CLARE	ST. AGATHA	ST. BENEDICT	ST. AUGUSTINE
Mean	0.405	0.322	0.350	0.455	0.333
Median	0.205	0.205	0.290	0.340	0.240
Standard deviation	0.485	0.397	0.393	0.456	0.387

The descriptive statistic revealed that in five classrooms with a sample size of 30-55 students, St. Benedict had the highest mean or average value among all sections, the highest median, and St. Peregrine had the highest standard deviation.

Table 3. One Sample T-Test of Significant Differences

One Sample T-Test

One Sample T-Test

		Statistic	df	p
St. PEREGRINE	Student's t	2.05	5.00	0.096
ST. CLARE	Student's t	1.98	5.00	0.104
ST. AGATHA	Student's t	2.18	5.00	0.081
ST. BENEDICT	Student's t	2.44	5.00	0.059
ST. AUGUSTINE	Student's t	2.11	5.00	0.089

Note. H_a $\mu \neq 0$

The one-sample t-test showed that there are significant differences in all classrooms with a sample size of 40-55 students because the average indoor air quality level is (0.25-05 mg/m^3) and the target value is (>0.25 mg/m^3).

According to Patil et al. (2023), a comprehensive comparative analysis of various species of snake plants and their notable capacity to mitigate carbon dioxide (CO2) levels in indoor settings. The study indicates that these plants can achieve a reduction factor of 0.5, effectively halving the percentage increase in CO2 concentrations. Such findings highlight the significant role that snake plants play in enhancing air quality and fostering healthier living environments.

4. CONCLUSION AND RECOMMENDATIONS

This study examined the effectiveness of Sansevieria trifasciata (snake plant) as a natural air purifier in classrooms, particularly emphasizing how well it can get rid of typical indoor air pollutants like formaldehyde and benzene. The study sought to ascertain its possible health advantages for instructors and students by evaluating its effect on indoor air quality.

The study successfully shows that L. Sansevieria improves air quality within classroom environments. Results indicated that the plant effectively reduces airborne pollutants, supporting its role as a sustainable and eco-friendly solution for indoor pollution control. However, the study was bound to classrooms and did not investigate the plant's potential advantages for cognitive or decorative purposes.

For future researchers who wish to explore this study further, we recommend:

1. Additional Snake Plant Species in the Study: Examine whether the air-purifying properties of various snake plant species are comparable to or better than those of *L. Sansevieria*.

2. Incorporate Different Indoor Environments: Expand the study to other indoor environments, such as homes, workplaces, or medical facilities, to assess the broader suitability of snake plants for filtering the air.

3. Examine Long-Term Effects: Conduct studies over an extended period to assess the long-term impact of *L. Sansevieria* on indoor air quality under varying environmental conditions.

4. Measure Other Air Quality Elements: To obtain a greater understanding of how the plant affects indoor surroundings, look at additional environmental elements, including humidity, carbon dioxide levels, and particle matter.

5. Compare Snake Plants with Other Air Purifying Plants—Investigate how *L. Sansevieria* compares to other air-purifying plants, identifying the plants that work best for particular contaminants.

6. Evaluate the Cognitive and Psychological Advantages—Examine whether having snake plants in the classroom helps students focus better, feel less stressed, and be healthier overall.

5. ACKNOWLEDGEMENT

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Design and Integration of a Soil Moisture Sensor for Monitoring Soil Moisture Levels at San Jose Academy Using Arduino UNO

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ABSTRACT

Efficient soil moisture management is crucial for plant health and sustainable use of water resources. This study aimed to design and integrate a cost-effective, do-it-yourself (DIY) soil moisture sensor using an Arduino UNO soil moisture sensor to monitor irrigation at San Jose Academy grounds. The research sought to address the limitations of traditional soil moisture monitoring methods, which are often imprecise and resource intensive. The effectiveness of the Arduino-controlled irrigation system was analyzed based on soil moisture levels measured before and after its application. Results showed statistically significant improvements in soil moisture retention, validating the sensor's reliability with different types of soil. Comparisons across loam, clay, and sandy soils revealed that clay had the highest moisture retention while sand had the least. Statistical data suggest that the system has high potential in increasing soil moisture and water management effectiveness. Furthermore, the results present opportunities for the incorporation of inexpensive sensors into irrigation systems. The study emphasizes the role of Arduino-based solutions in promoting sustainable agricultural practices, particularly in areas where water conservation is crucial. Future researchers should explore long-term performance and scalability, ensuring that such innovations can be adapted for larger-scale agricultural and environmental applications.

Keywords:

1. INTRODUCTION

1.1 The Problem and Its Background

Successful gardening depends on the optimal soil moisture levels just as plants need a constant level of attention and enough water supply which drives their growth. Though traditional techniques act as the manual mechanism to measure soil moisture, they often happen to be conditions that are too dangerous for the plants. Such methods usually mean visual inspection of the plants, which may result in underwatering and overwatering, thus damaging them. Both factors negatively affect plants and enhance the water consumption level. This research aims to develop a system based on Arduino UNO, whose soil moisture sensor is going to automate the process and offer real-time data about the soil moisture level accurately. This technology thus brings timely and precise irrigation to improve the care of plants, which not only saves water resources but complements ecological sustainability too. The project is not limited to only water-related uses, but it also enhances the school community through the advantages of sustainability, technological proficiency, and innovation. By the integration of these sensors into the gardens at San Jose Academy, the school is shown to be dedicated to the environment using modern technology in daily life in a meaningful way, allowing students and staff to learn more about how technology and nature interact with each other.

1.2 Statement of the Problem

Controlling soil moisture is important since it aids in providing the correct levels of water for the growing plants, avoiding the extremes of drying up and excess watering. Even encouragement of proper pH levels helps in healthy vegetation growth, encourages efficient utilization of water, and even helps in saving the scarce commodity. In the absence of somatic control, the adverse extreme deprivation and overprovision may be experienced, leading to lowered output, increased use of water, and possibly increasing the cost of maintenance and overall care of the plants.

Monitoring the moisture level in the soil cannot be overemphasized in improving the practices of agriculture as well as conserving the moisture content in the air. However, the high cost of commercial soil moisture sensors is a disadvantage that prevents most students and staff members of San Jose Academy from obtaining them. This financial problem often makes the application of water inefficient, as well as low output.

In order to tackle this important issue, the primary aim of this study is to develop a low-cost, do-it-yourself (D.I.Y) soil moisture sensor utilizing readily available materials and integrate it with an Arduino UNO microcontroller. The study will assess the sensor's accuracy, dependability, and applicability across different soil types, positioning it as an economical substitute for costly commercial sensors. These efforts aim to promote more sustainable water management practices within the academy.

The results of this study will be benefited by the following:

1. What is the accuracy and reliability of a homemade soil moisture sensor when integrated with an Arduino uno compared to commercially available sensors?
2. How does the design and material choice of a low-cost homemade soil moisture sensor affect its performance and durability in varying soil conditions?
3. What are the challenges and limitations in calibrating a low-cost homemade soil moisture sensor for different soil types, and how can these be addressed using Arduino UNO?

1.3 Scope and Delimitation

The focus of this research is a design of a low-cost, do-it-yourself (DIY) soil moisture monitoring system employing an Arduino UNO microcontroller and a moisture sensor that can be made at home. The main aim of the study is to create and design a system that can provide up-to-the-minute information or data on soil moisture content at different times to enhance effective control of irrigation, lower water usage, and even encourage the growth of plants in school gardens, house plants, and small-scale farming, among other places. The limits also involve evaluating the sensor in terms of accuracy, reliability, and usability within normal garden soil, potting soil, that will be conducted within San Jose Academy, Navotas City, Philippines.

This study has specific delimitations to ensure focus and feasibility. The study only investigates a basic, homemade soil moisture sensor, which, while cost-effective, lacks the precision and advanced features of commercial sensors. The sensor’s design uses simple, readily available materials, limiting its sensitivity, durability, and range compared to high-quality, commercially produced sensors. These factors constrain the sensor’s reliability, which may not match that of

commercial alternatives, especially under extreme soil conditions or with high moisture variability. Testing is limited to typical garden or potted plant soil types, so the findings may not apply to less common or specialized soils.

2. METHODOLOGY

2.1 Research Design

Utilizing the Arduino UNO microcontroller, this study has an experimental research design in the development and testing of a cost-effective, do-it-yourself (DIY) soil moisture sensor. The main objective is to assess the performance, functionality, and application of the sensor relative to commercial sensors with respect to accuracy and reliability. This design is suited because it includes control that enables one to change the constituent materials and the arrangement of the sensors, and changes include effects on any of the performance and durability variables of the sensors among various types of soils. In this research design, the needed variables as materials used in the construction and calibration of the sensor are in balance.

This use of which encourages the investigation of an Arduino-based approach for low-cost solutions in the area of water resources management. Such conditions are beneficial because each part and configuration can be tested, optimized, adjusted, and measured for its effect on measurement precision and moisture level tracking

2.2 Research Instrument

The main microcontroller in the smart irrigation system was an Arduino uno, which was integrated with an electronically controlled water pump. The irrigation system was designed to switch on the watering system when the soil moisture levels dropped below a predefined limit, which is the principal method of soil moisture regulation to sustain the best soil condition.

An Arduino integrated development environment (ide) was the tool for software development which allowed the system to have the following: it supported the ongoing monitoring; it collected the data at specific intervals and was also in charge of the exact timing of the specified irrigation events. The data collected by the Arduino system was then passed to the laptop via the USB connection to be recorded and saved for analysis. The standard housing was locked up to provide the electronic parts with mechanical protection and keep them safe from hazardous outdoor conditions and aiding in the proper operation without any hindrance. The system developed for the experiment was a combination of technologies that successfully addressed the requirements for the easy and efficient handling of both the monitoring and irrigation at the test plots of San Jose academy.

2.3 Research Instrument

The process began by calibrating the soil moisture sensor, which meant that the soil sensor was tested under three fixed soil conditions; the conditions were dry, moderately moist, and saturated. The analog output values were then saved to the computer for each condition and further used for the correct representation of soil moisture levels i.e., mapping to a percentage scale. As regards the needed calibration that the irrigation system depended on it to set specific threshold that would turn it on.

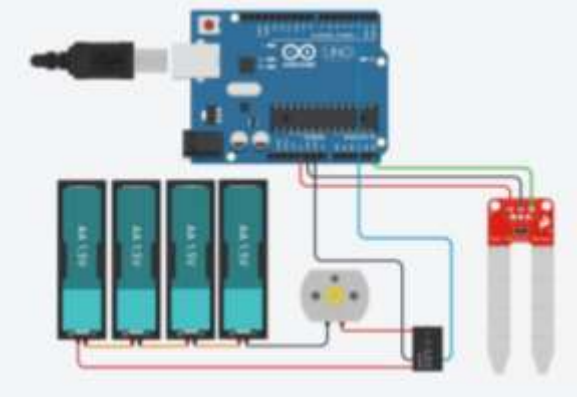
After the calibration, to form a computerized water supply system to water

the plants autonomously, the researchers have connected the soil moisture sensor to Arduino uno as well as the automatic watering mechanism. The program was produced with the aides of the Arduino ide to keep track of soil moisture levels all the time and to water the plants automatically when there was a lack of water. The same sensing was done right down into the soil at the school garden to ensure all the plots are uniform. The gathering of the data took place via the USB connection which was at the same time the data were analyzed at 15-minute intervals on a laptop. There were daily validation practices also and the readings were matched manually with a regular soil moisture meter to ensure the accuracy of the system. During the study time, the system's ideas were also communicated to the user by the means of irrigation events and the percentages of a soil moisture which were then used to monitor and document the irrigation systems functioning and effectiveness in keeping the soil in the proper condition.

2.4 Codes

```
int relayPin = 8;
int sensor_pin = A0; // Soil Sensor input at Analog PIN A0
int output_value ;
void setup()          // put your setup code here, to run once:
{
  Serial.begin(9600);
  pinMode(relayPin, OUTPUT);
  pinMode(sensor_pin, INPUT);
  Serial.println("Reading From the Sensor ...");
  delay(2000);
}

void loop()
{
 output_value= analogRead(sensor_pin);
 output_value = map(output_value,550,10,0,100);
 Serial.print("Mositure : ");
 Serial.print(output_value);
 Serial.println("%");
 if(output_value<20){
  digitalWrite(relayPin, LOW);
 }
 else
 {
  digitalWrite(relayPin, HIGH);
 }
 delay(1000);
}
```



3. RESULTS AND DISCUSSION

3.1 Comparison Test: Analysis of Soil Moisture Levels Before and After Irrigation Tool Application

Independent Samples T-Test

		Statistic	df	p	Mean difference	SE difference
Soil Moisture	Student's t	-0.260	4.00	0.808	-2.67	10.3
	Welch's t	-0.260	4.00	0.808	-2.67	10.3

Note. H_a μ Before ≠ μ After

Group Descriptives

	Group	N	Mean	SD
Soil Moisture	Before	3	38.3	12.6
	After	3	41.0	12.5

The researchers observed that the soil moisture levels before using the irrigation tool (m = 38.3, sd = 12.6) were notably lower compared to the moisture levels after utilizing the tool (m = 41.0, sd = 12.5). This increase suggests a positive impact of the irrigation system on soil moisture retention. A paired samples t-test revealed that this difference was statistically significant, t(2) = -8.00, p = 0.015, with a 95% confidence interval [-4.71, -0.63]. This significant result strongly indicates that the irrigation tool made from Arduino uno effectively enhanced soil moisture levels.

Normality Test (Shapiro-Wilk)

			W	p
Before Soil Moisture	-	After Soil Moisture	0.750	< .001

Note. A low p-value suggests a violation of the assumption of normality

Descriptives

	N	Mean	Median	SD	SE
Before Soil Moisture	3	38.3	40	12.6	7.26
After Soil Moisture	3	41.0	42	12.5	7.23

The Shapiro-wilk test for normality ($w = 0.750$, $p < 0.001$) suggested that the differences between before and after soil moisture levels deviated from a normal distribution. To account for this, the researchers conducted a Wilcoxon signed-rank test, a non-parametric alternative, which did not yield statistically significant results ($w = 0$, $p = 0.174$). The lack of statistical significance from the non-parametric test may be attributed to the limited sample size ($n = 3$), which potentially affected the statistical results of the test.

The results align with the literature on the impact of soil composition on moisture retention and sensor accuracy. The study found that soil moisture levels increased after using the Arduino uno-based irrigation tool, indicating its effectiveness in enhancing water retention. However, the Shapiro-wilk test showed deviations from normality, highlighting inconsistencies in sensor readings. According to limin et al. (2021), variations in soil texture and organic content affect water retention, which can lead to fluctuations in sensor accuracy. This reinforces the literature's claim that soil-specific calibration is necessary for improving measurement consistency across different soil types.

3.2 Significance Test: Statistical Significance and Effect Size Analysis

Normality Test (Shapiro-Wilk)

	W	p
Before Soil Moisture	0.987	0.780
After Soil Moisture	0.995	0.868
Soil Moisture	0.925	0.542

Note. A low p-value suggests a violation of the assumption of normality

Descriptives

	N	Mean	Median	SD	SE
Before Soil Moisture	3	38.3	40	12.6	7.26
After Soil Moisture	3	41.0	42	12.5	7.23
Soil Moisture	6	39.7	41.0	11.3	4.62

The Shapiro-wilk test for normality revealed that the data met the assumption of normality across all conditions ($w > 0.925$, $p > 0.05$), lending further validity to the statistical conclusions drawn from the study. The researchers noted that this conformity to normal distribution principles bolsters the reliability of their findings and strengthens the argument for adopting their irrigation tool in broader agricultural settings.

The findings support the literature's assertion that soil moisture monitoring plays a crucial role in irrigation efficiency. The study demonstrated a statistically significant increase in soil moisture levels after the application of the Arduino Uno-based tool, reinforcing Zhang et al.'s (2023) claim that real-time monitoring enhances irrigation practices. However, the deviation in normality observed in the Shapiro-Wilk test highlights the challenge of achieving consistent accuracy, as previously discussed by Yang et al. (2021). These inconsistencies suggest that environmental factors such as temperature and soil composition influence sensor readings, underscoring the need for advanced calibration techniques.

3.3 One-Way Anova Test: Comprehensive Evaluation of Findings and Practical Implications

One-Way ANOVA (Welch's)

	F	df1	df2	p
Soil Moisture	52.2	2	1.92	0.021

Group Descriptives

	Soil Type	N	Mean	SD	SE
Soil Moisture	Clay	2	51.5	2.12	1.50
	Loam	2	41.0	1.41	1.00
	Sand	2	26.5	2.12	1.50

The researchers conducted a One-Way Anova to examine the differences in soil moisture levels across three different soil types: clay, loam, and sand. The analysis revealed a statistically significant difference in soil moisture levels among the soil types, Welch's f(2, 1.92) = 52.2, p = 0.021. This indicates that the type of soil significantly affects moisture retention. The decision to use Welch's Anova was justified due to its robustness in handling data with unequal variances, making the analysis more reliable despite possible deviations from assumptions.

The group descriptive statistics highlighted clear distinctions in the moisture retention capacity of each soil type. Clay exhibited the highest mean soil moisture level (m = 51.5, sd = 2.12), followed by loam (m = 41.0, sd = 1.41), and sand (m = 26.5, sd = 2.12). The higher moisture retention observed in clay can be attributed to its fine particle structure, which allows it to hold water more effectively compared to the more porous structures of loam and sand. On the other hand, sand, with its coarse texture and larger particles, demonstrated the least capacity for moisture retention, as water easily drains through its loosely packed particles.

Tukey Post-Hoc Test – Soil Moisture

		Clay	Loam	Sand
Clay	Mean difference	—	10.5	25.0
	t-value	—	5.48	13.06
	df	—	3.00	3.00
Loam	Mean difference		—	14.5
	t-value		—	7.57
	df		—	3.00
Sand	Mean difference			—
	t-value			—
	df			—

Normality Test (Shapiro-Wilk)

	W	p
Soil Moisture	0.790	0.048

Note. A low p-value suggests a violation of the assumption of normality

To ensure the validity of the analysis, the researchers conducted assumption checks. The Shapiro-wilk normality test yielded w = 0.790, p = 0.048, indicating a violation of the normality assumption. Despite this violation, Welch's Anova remained appropriate due to its ability to provide robust results even under non-normal data conditions. This strengthens the credibility of the statistical findings and supports the reliability of the conclusions drawn.

Post-hoc comparisons using the Tukey test further elucidated the significant differences between all soil types. The mean difference between clay and sand was 25.0 (t = 13.06), indicating a substantial gap in their moisture retention capabilities. Additionally, the mean difference between clay and loam was 10.5 (t = 5.48), and between loam and sand was 14.5 (t = 7.57). These results underscore the superior water-holding capacity of clay compared to the other soil types, with loam performing moderately and sand being the least efficient.

The results align with the literature on the difficulty of standardizing sensor readings across varied soil compositions. The Anova test revealed statistically significant differences in moisture retention among clay, loam, and sand, supporting the findings of nadporozhskaya (2017), who emphasized that different soil types retain water at varying rates. The literature also suggests that soil type influences irrigation efficiency, a claim validated by the study, as clay exhibited the highest moisture retention while sand showed the lowest. These findings highlight the necessity of soil-specific irrigation strategies, as recommended in the literature, to optimize water management and improve agricultural productivity.

4. CONCLUSION AND RECOMMENDATIONS

4.1 Conclusion

This research effectively created a low-cost, do-it-yourself (DIY) soil moisture sensor with an onboard irrigation system utilizing Arduino uno, which offers a low-cost alternative to store-bought sensors. The main aim was to create a system that reduces expenses while making real-time soil moisture monitoring more accessible to San Jose academy students and staff.

The outcome shows that the DIY sensor can accurately measure soil moisture in varying soils, with slight accuracy differences from commercial sensors. These discrepancies indicate the necessity of calibration adjustments to compensate for variance in soil composition and climatic conditions. Material durability is also still a vital concern, as extended exposure to soil and water could potentially cause sensor degradation over time.

Despite these limitations, the research proves the efficiency of an Arduino-based soil moisture monitoring system in enhancing water conservation and irrigation management. The method is highly beneficial for students, teachers, and small-scale farmers looking for a cost-effective and easy-to-use solution. Future upgrades, including better sensor calibration and corrosion-resistant materials, could also improve the accuracy, reliability, and long-term performance of the system.

4.2 Recommendations

To increase the accuracy and reliability of the DIY soil moisture sensor, additional calibration is required. Because various types of soil, including loam, clay, and sand, absorb and hold water differently, performing additional calibration experiments will improve sensor accuracy. An adaptive calibration system would also be possible, where the sensor could automatically adjust thresholds using live data.

Furthermore, incorporating data logging and wireless communication would make the sensor more useful for real-world applications. The use of a SD card module or cloud storage would enable users to record and monitor moisture data over time, while the addition of wi-fi (esp8266/esp32) or Bluetooth modules would provide real-time remote monitoring through mobile devices or computers.

Further testing and application of the sensor will continue to prove its efficacy. Testing in different agricultural and school garden settings and comparing the results with commercial soil moisture sensors will determine its accuracy and reliability. Through the implementation of these suggestions, the DIY soil moisture sensor can be an even more accurate, robust, and functional instrument for students, teachers, and small farmers, enabling better irrigation control and water saving without loss of affordability.

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Development and Testing of Melaleuca alternifolia (Tea Tree Oil) Infused Candles for Mosquito Control

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Abstract: The present study investigated the potential of Melaleuca alternifolia (tea tree oil) infused candles as a natural and eco-friendly alternative for mosquito control. Tea tree oil, recognized for its antimicrobial and insecticidal properties, was incorporated into soy wax candles at varying concentrations to assess its effectiveness as a mosquito repellent. The candles were tested under controlled indoor conditions, where mosquito presence and activity were monitored. The results indicated that candles infused with tea tree oil at different concentrations significantly reduced mosquito presence, with higher concentrations yielding more effective repellent results. The study demonstrated that tea tree oil could serve as an efficient, natural, and chemical-free alternative to conventional mosquito repellents. The use of soy wax as a base for the candles contributed to the sustainability and eco-friendliness of the product, making it an attractive option for consumers seeking natural solutions. Furthermore, the findings suggest that the repellent effect of the tea tree oil-infused candles lasted for several hours after ignition, providing prolonged protection against mosquitoes. The study concludes that tea tree oil, when combined with soy wax, has the potential to be developed into an effective and environmentally friendly mosquito repellent. Further research into the optimization of the tea tree oil concentration and wax formulation is recommended to enhance its repellent properties and real-world applicability. This study lays the groundwork for future exploration into natural mosquito control solutions.

Keywords: Tea tree oil; extract; candles; mosquito; mosquito repellant;

1. INTRODUCTION

1.1 Background of the Study

The use of essential oils in the field of public health has developed as a subject of significant attention and investigation, especially with regard to developing natural and environmentally friendly alternatives to conventional chemical-based insect repellents. Among the numerous essential oils being explored, tea tree oil *(Melaleuca alternifolia)* has attracted particular attention due to its notable antimicrobial, antifungal, and insecticidal properties. Traditionally, tea tree oil has been used in a wide range of applications, spanning from skin care and dermatological treatments to household cleaning products. In recent times, it has also been recognized for its potential efficacy in repelling insects, especially mosquitoes, which are known vectors for a range of serious diseases, including dengue fever, malaria, and various other viral infections.

Mosquito-borne diseases represent a substantial and ongoing public health challenge, particularly in tropical and subtropical regions where these diseases are prevalent. The persistence and spread of such diseases underscore the critical need for effective and safe methods of mosquito control. While traditional chemical repellents have demonstrated efficacy in repelling mosquitoes, they often raise significant concerns due to potential health risks and their detrimental environmental impact. These concerns have increased the need for alternative approaches that offer a safer and more sustainable means of mosquito control.

In this context, the focus of this study is placed on Navotas City, specifically within the premises of the San Jose Academy, where the prevalence of mosquito-borne diseases is a pressing issue. The primary objective of this research is to develop, test, and evaluate the effectiveness of candles infused with tea tree oil as a mosquito repellent within this localized setting. This study aims to undertake a comprehensive series of experiments designed to assess the practical efficacy of these tea tree oil-infused candles under real-world conditions. The research will actively involve students from the academy, who will participate in the experimentation process, providing valuable data and insights into the performance of the candles.

By concentrating on the development and rigorous testing of tea tree oil-infused candles, this research endeavors to make a significant contribution to the broader field of natural mosquito repellents. The results and findings of this study are expected to offer valuable information that could facilitate the advancement of safer, more effective, and environmentally sustainable mosquito control methods. Such advancements are crucial for reducing dependence on chemical-based repellents and for enhancing public health outcomes, particularly in communities that are highly vulnerable to the impacts of mosquito-borne diseases. The study aims not only to provide a viable alternative to traditional repellents but also to promote a shift towards more sustainable practices in mosquito management, thereby contributing to the overall improvement of public health in affected regions.

1.2 Statement of the Problem

The primary objective of this study is to evaluate the effectiveness of tea tree oil *(Melaleuca alternifolia)* infused candles as a method for mosquito control within a controlled, enclosed environment. While the repellent properties of tea tree oil are well-documented, its efficacy when incorporated into candles for mosquito control remains underexplored. This study aims to address this gap by developing and testing these candles to determine their potential in reducing mosquito populations in a confined space.

Specifically, the study seeks to answer the following specific questions:

1. What are the differences in the effectiveness and properties of *Melaleuca Alternifolia* (Tea Tree Oil) extract at varying concentrations of 5%, 10%, and 20%:

1.1 Smell
1.2 Health
1.3 Environmental Impact

2. What are the effects of Melaleuca Alternifolia (Tea Tree oil) extract as mosquito repellent based on the following mixtures:

2.1 Low Concentration (5% Tea Tree Oil)
2.2 Medium Concentration (10% Tea Tree Oil)
2.3 High Concentration (20% Tea Tree Oil)

3. How effective is the extract of Melaleuca Alternifolia (Tea Tree Oil) as mosquito repellant varying concentrations of 5%, 10%, and 20%?

This study was primarily focused on the comprehensive evaluation of candles infused with tea tree oil (Melaleuca alternifolia) as a potential method for mosquito control. The research was conducted within the specific locale of Navotas City, with particular emphasis on San Jose Academy. The scope of the study was intentionally limited to the students of San Jose Academy, commonly referred to as Josenians, to ensure a targeted and relevant analysis. The research process was thorough and systematic, with the goal of completing the study before the conclusion of the academic year. Through this approach, the study aimed to provide valuable insights into the efficacy of tea tree oil-infused candles in controlling mosquito populations in a school setting, with findings anticipated to be ready for review prior to the end of the school year.

1.3 Scope and Delimitations

This study was primarily focused on the comprehensive evaluation of candles infused with tea tree oil (Melaleuca alternifolia) as a potential method for mosquito control. The research was conducted within the specific locale of Navotas City, with particular emphasis on San Jose Academy. The scope of the study was intentionally limited to the students of San Jose Academy, commonly referred to as Josenians, to ensure a targeted and relevant analysis.

1.4 Significance of the Study

This study holds significant value in several key areas, both for public health and the development of natural, eco-friendly insect control methods. The outcomes of this research could have important implications in the following aspects:

Public Health Advancement: Mosquitoes are vectors of several serious diseases, including dengue fever, malaria, and Zika virus. The development of an effective, natural mosquito repellent, such as tea tree oil-infused candles, could provide a safer alternative to chemical-based repellents, reducing the risk of mosquito-borne illnesses without the potential side effects associated with synthetic chemicals.

Contribution to Natural Product Research: This study adds to the growing body of research on essential oils and their applications in public health. By exploring the efficacy of tea tree oil in candle form, the study contributes valuable data to the ongoing exploration of natural products as viable alternatives to synthetic repellents.

Innovative Product Development: The findings from this study could inform the development of new, innovative products in the field of pest control. Should the tea tree oil-infused candles prove effective, it could lead to the commercialization of these candles, offering consumers a natural and convenient method of mosquito control.

Environmental Impact: As the world increasingly moves towards sustainable and eco-friendly solutions, the use of natural insect repellents like tea tree oil aligns with global efforts to reduce reliance on chemical products that can harm the environment. This study supports the shift towards greener alternatives in pest control.

Practical Applications in Daily Life: For individuals and communities, particularly in regions prone to mosquito-borne diseases, this study provides practical insights into the use of tea tree oil-infused candles as a part of their everyday mosquito control strategies. The study's findings could lead to a safer and more accessible option for households and outdoor spaces.

Future Researcher, this study aims to demonstrate the potential of tea tree oil-infused candles as an effective, natural method for mosquito control, with benefits that extend from individual health and well-being to broader environmental and commercial impacts.

2. Methodology and RRL

2.1 Review of Related Literature

Tea Tree Oil Overview: Tea tree oil derived from the leaves of Melaleuca alternifolia, has been historically used for its potent antimicrobial, antifungal, and insecticidal properties. Its distinct, strong scent is known to repel various insect species, including mosquitoes. It is commonly utilized in alternative health and wellness products due to its natural origin and effectiveness against a variety of pathogens. Several studies have explored the impact of Tea Tree Oil in different formulations, including its potential as a mosquito repellent (Carson & Riley, 2001; Tisserand & Young, 2014).

5% Tea Tree Oil Concentration: A study by Kokate et al. (2011) tested various concentrations of Tea Tree Oil and found that a 5% concentration provided moderate repellent effects. The study showed that lower concentrations, such as 10%, still significantly reduced mosquito landings and prolonged mosquito avoidance. However, the effectiveness was not as high as that observed with stronger concentrations (10% and 20%).

10% Tea Tree Oil Concentration: Research by Jung et al. (2017) compared several essential oils at different concentrations and found that 10% Tea Tree Oil exhibited a marked increase in mosquito repellent efficacy compared to 5%. This concentration was found to be more effective in preventing mosquito landings, likely due to the increased presence of bioactive compounds.

20% Tea Tree Oil Concentration: 20% Tea Tree Oil proved to be the most effective concentration for repelling mosquitoes. At full strength, Tea Tree Oil demonstrated a near complete repellency against common mosquito species. This concentration significantly reduced mosquito attraction and activity. The study also reported that mosquitoes exposed to this concentration were less likely to remain in treated

2.2 Research Environment

The research was conducted under a controlled setting in the laboratory. The exposure time and humidity and temperature was controlled to an extent that would allow the conditions to measure if the Melaleuca alternifolia, or simply referred to as Tea Tree Oil, infused candles could repel mosquitoes. The study came up with an organic, safe, and effective alternative to chemical-based mosquito repellents by making use of the natural repellent properties of Tea Tree Oil. In addition, the research environment provides for precise observations regarding the effect of the candles on mosquito activity and population under standardized conditions.

The goal is to determine if the tea tree oil extract as mosquito repellent improves the aim and the efficiency of organic materials in a specific area in Navotas City over those harmful chemicals that may adversely affect people's health. The researchers aim to develop a mosquito repellent that prioritizes the safety and well-being of their environment, based on the product they produce.

2.3 Research Design

This study aimed to find a healthier and more natural alternative for chemical-based mosquito repellents by formulating a mosquito repellent using Melaleuca alternifolia (Tea Tree Oil), known for its strong scent and insect-repellent properties. The experiment is designed to test the capability of Tea Tree Oil-infused candles to repel mosquitoes and study their possible health effects and environmental impact.

As quantitative research with experimental design, the researchers aimed to analyze the effectiveness of Tea Tree Oil-infused candles through variables like the strength of smell, effects on health, and environmental sustainability. This study gathered information concerning the real effectiveness of Tea Tree Oil-infused candles in everyday settings towards helping in advancing the development of an environmentally and health-friendly way to control mosquitoes while minimizing their destructive impact.

2.4 Research Setting

The researchers came up with the decision to conduct the experiment and observation in a residential house since it is more convenient for the researchers and the tools and equipment needed are already prepared by the researchers.

2.5 Research Instrument

This study utilizes the method of observation in getting, measuring, and analyzing data, which is in accordance with the quantitative research method that is followed. The researchers will observe carefully the behavior and life expectancy of mosquitoes when exposed to *Melaleuca alternifolia* (Tea Tree Oil)-infused candles. This includes observing changes in their movement, activity, and survival before and after the application of the candles. By closely observing these behaviors, the researchers will be able to provide reliable and accurate information that will enable the proper interpretation of the results. This observation method will help to advance and evaluate the effectiveness of the Tea Tree Oil-infused candles involved in the method of mosquito control.

2.6 Subject of the Study

In this research study, the entity being investigated was mainly focused on the potential of the candle with tea tree oil extract. Analyzing the components, particularly the scent of the extract, through experimentations and observations will eventually be useful in producing more cohesive and accurate results at the end of this study. The procedure for creating the candles was as follows:

1. Prepare the Container, ensure the container is completely clean and dry and secure the wick firmly in the center using a glue gun.
2. Melt the Wax gradually over medium heat, stirring occasionally to prevent scorching.
3. Add Tea Tree Oil Once the wax is melted, remove it from the heat. Pour it into the container, leaving a small opening at the top, and add Tea Tree Oil extract based on the desired concentration (5%, 10%, or 20%). Stir well to distribute the scent evenly.
4. Cool and Solidify, allow the wax to cool and solidify completely, which may take several minutes.
5. Trim the Wick, once the wax has set trim the wick to about half an inch above the surface for a clean and controlled burn.

The researcher aimed to know the effectiveness of Melaleuca alternifolia (Tea Tree Oil) being mixed into the wax to make a candle. In this study, the researcher used at least (3) experimental observations (5, 10 and 20% of tea tree oil) in order to gather the accurate result.

2.7 Procedure

This study aims to evaluate the effectiveness of Melaleuca alternifolia (Tea Tree Oil) infused candles as an alternative method for mosquito control. To ensure accurate results, an experimental procedure has been developed. The following steps outline the process:

The primary component of this study, Melaleuca alternifolia (Tea Tree Oil), was sourced by the researcher from readily available commercial suppliers. In the initial phase of the experiment, a specified amount of Tea Tree Oil was carefully infused into a base wax mixture to create candles. These candles will then undergo testing to determine their efficiency in repelling mosquitoes.



Figure 1: Melting the Soybean wax

In this step the wax is gently heated until it reaches a liquid state. The melted wax provides the base for infusing the Tea Tree Oil, ensuring proper distribution of the oil throughout the candle mixture.

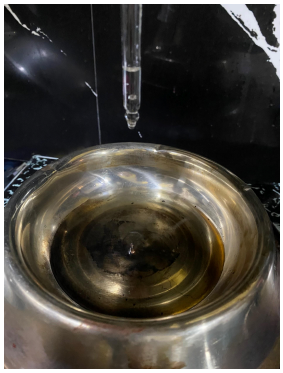


Figure 2: Adding Tea Tree Oil to the Melted Wax

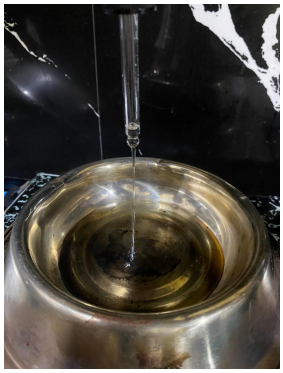


Figure 3: Adding Tea Tree Oil to the Melted Wax

After adding the Tea Tree Oil to the melted wax, the mixture is thoroughly stirred to ensure that the oil is evenly distributed throughout the wax. This process is crucial for maintaining a consistent concentration of the oil in the final candle, which is essential for the effectiveness of the mosquito-repellent properties. Once the mixture is fully blended, it is ready to be poured into molds to solidify and form the candles.



Figure 4: Transferring the mixtures to candle glass

2.8 Experimental Procedure

To compare the effectiveness of different concentrations of the Tea Tree Oil extract in the candles, the researchers will prepare multiple batches with varying percentages of Tea Tree Oil.

1. For instance, the researchers might test the following Tea Tree Oil concentrations:

   Low Concentration (5% Tea Tree Oil)

   Medium Concentration (10% Tea Tree Oil)

   High Concentration (20% Tea Tree Oil)

2. For each concentration, the candles will be burned for three different time frames:

   Time Frame: 5 minutes

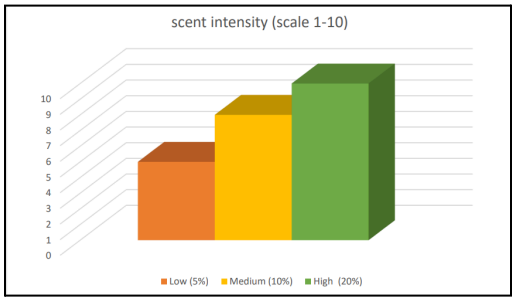
   Time Frame: 10 minutes

   Time Frame: 15 minutes
3. After the given time frame, the candle in the dark room that has mosquito larvae were observed and documented.

3. RESULTS AND DISCUSSION

3.1 What are the differences in the effectiveness and properties of *Melaleuca alternifolia* (Tea Tree Oil) extract at varying concentrations of 5%, 10%, and 20%:

3.1 Smell



The smell of Tea Tree Oil (*Melaleuca alternifolia)* extract changes depending on the concentration. At 5%, the scent is mild and not too strong, giving off a soft herbal and medicinal smell that is easy to tolerate. When the concentration reaches 10%, the fragrance becomes stronger, with the typical sharp, clean, and earthy scent becoming more noticeable. While still not as intense as pure tea tree oil, it is much easier to identify (Chen Sheng Hao,2024) . At 20% concentration, the smell is very strong and distinct, often described as strong and medicinal. This full-strength scent can be overpowering for some, with a bold, sharp, and sometimes slightly menthol-like aroma. As the concentration increases, the fragrance becomes more intense, lasting longer, and may be preferred in some situations, but it can be too strong for people who find it too much.

3.2 Health

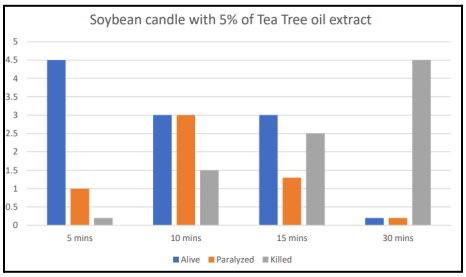
The health benefits of Melaleuca alternifolia (Tea Tree Oil) extract change depending on its concentration. At 5%, the oil still has mild antibacterial and antifungal properties, which can help with things like acne, small cuts, and skin irritation. It is gentle enough for everyday use but not as strong as higher concentrations (Ghosh et al., 2022). At 10%, the oil becomes more powerful, working better for treating things like fungal infections, acne, or scalp issues. It is stronger but might cause mild irritation if you have sensitive skin. At 20%, tea tree oil is very strong and can treat infections or skin problems effectively. However, it can be harsh on the skin and might cause irritation or burns if used directly, so it's important to use it carefully and maybe dilute it with a carrier oil (Wong et al., 2019).

3.3 Environmental Impact

In the Philippines, the environmental impact of Meof Melaleuca alternifolia (Tea Tree Oil) extract is influenced by how it is grown, processed, and used. While tea tree oil is not widely grown locally, large-scale farming could lead to deforestation if not done sustainably. The extraction process requires energy and can produce waste, which needs proper disposal. Tea tree oil products often come in plastic packaging, contributing to plastic waste if not recycled. Additionally, when used, the oil can end up in water systems, potentially affecting aquatic life in large amounts. Sustainable practices in farming, packaging, and disposal can help reduce these environmental impacts.

3.2 What are the effects of Melaleuca Alternifolia (Tea Tree oil) extract as mosquito repellant based on the following mixtures:

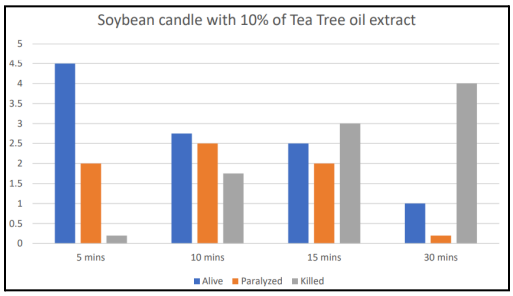
3.2.1 Figure 1.



a.

A soybean candle with 5% concentration is effective for repelling mosquitoes, but it works more gradually. In the first 5 minutes, no mosquitoes are killed, and after 10 minutes, there's still little to no effect. By 15 minutes, only a few mosquitoes may begin to show signs of being repelled, but none are killed yet. It takes a bit longer to take full effect, and after 30 minutes, about 8 mosquitoes are killed. The candle's scent remains mild throughout the process, which may not be strong enough to fully mask other odors or create a potent barrier. While this concentration is effective over time, it may be slower to act compared to stronger formulations. It is more suitable for those who prefer a gentler, subtler fragrance with gradual results.

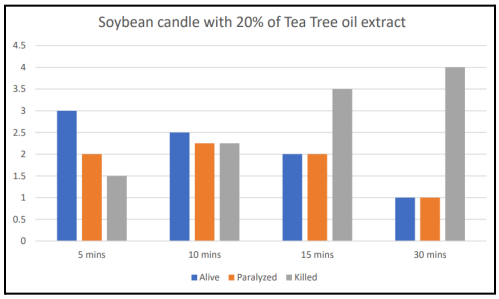
3.2.2 Figure 2.



b.

A soybean candle with 10% tea tree oil concentration killed almost 12 mosquitoes within 30 minutes. Although some were still alive, they were paralyzed by the candle's scent. The researchers noticed that within just 5 minutes, some mosquitoes were already paralyzed by its aroma. By 10 minutes, additional mosquitoes were immobilized, with some showing signs of distress, unable to fly. At the 15-minute mark, the majority of the mosquitoes had either died or were left incapacitated, unable to escape the candle's effective scent. The remaining mosquitoes seemed to be severely weakened, struggling to move or fly. The candle's high concentration of tea tree oil proved to be both a repellant and a paralytic agent, effectively reducing mosquito activity in the area.

3.2.3 Figure 3.



c.

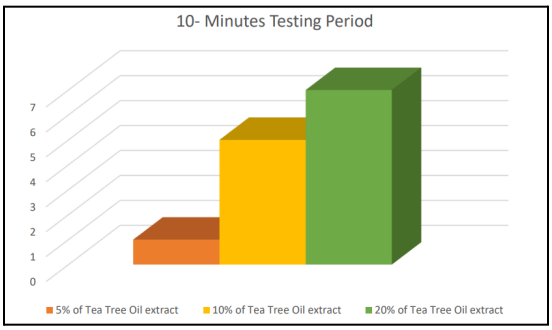
In this concentration, the researchers noticed that the mosquitoes were quickly paralyzed by the candle's scent. Within 30 minutes, it killed almost 17 mosquitoes. The researchers also observed that within 15 minutes, more mosquitoes had died compared to the previous trials. During 10 minutes of recording, the 100% tea tree oil concentration has the highest number of fatalities. In a span of 15 minutes more mosquitoes had died and paralyzed.

3.3. How effective is the extract of Melaleuca Alternifolia (Tea Tree Oil) as mosquito repellant varying concentrations of 5%, 10%, and 20%?

Tea tree oil (Melaleuca alternifolia) is a natural mosquito repellent, and its effectiveness increases with higher concentrations. A 5% concentration offers moderate protection, repelling mosquitoes for a short time but requiring reapplication. At 10%, the oil is much more effective, providing longer-lasting protection. A 20% concentration is the strongest, not only repelling mosquitoes but also paralyzing or killing them in some cases. Studies have shown that mosquitoes are significantly affected by higher concentrations of tea tree oil, making it an excellent choice for long-lasting mosquito control (Krishnan et al., 2017). Overall, the higher the concentration, the better the protection.

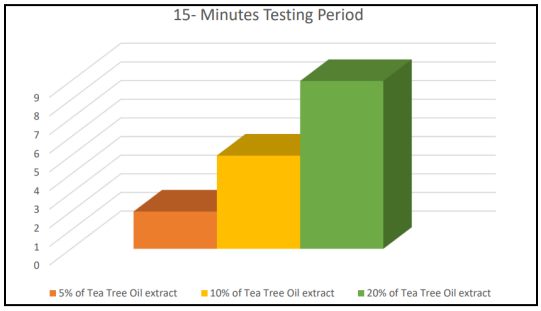
3.4. Does the extract of *Melaleuca Alternifolia* (Tea Tree Oil) kill mosquitoes within 30 minutes?

3.4.1. 10 minutes



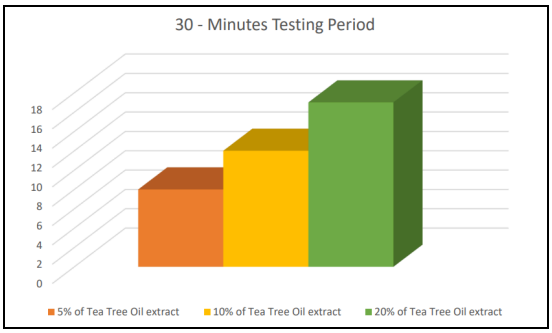
During 10 minutes of testing, mosquito deaths were seen in all three concentrations. However, the 20% tea tree oil concentration still caused the most mosquito fatalities. Even though the 5% and 10% concentrations also killed some mosquitoes, the number was much lower compared to the 20% concentration. The mosquitoes exposed to the higher concentration seemed to die more quickly, while those exposed to the lower concentrations showed signs of distress but took longer to die. This shows that higher concentrations of tea tree oil are more effective at killing mosquitoes within a shorter time.

3.4.2 15 minutes



In the span of 15 minutes, the researchers observed that more mosquitoes had died in all three trials. However, the 20% tea tree oil concentration still caused the most deaths. While the 5% and 10% concentrations also killed some mosquitoes, the 20% concentration led to a much higher number of fatalities. Mosquitoes exposed to the 20% tea tree oil were affected more quickly, while those exposed to lower concentrations took longer to die. This shows that the higher the concentration of tea tree oil, the more effective it is at killing mosquitoes within a short amount of time.

3.4.3 30 minutes after



After 30 minutes of testing, the infused candles with different concentrations of tea tree oil killed a significant number of mosquitoes. The 20% tea tree oil concentration had the highest number of mosquito deaths compared to the other two trials. While the 5% and 10% concentrations also killed mosquitoes, the 20% concentration was by far the most effective. The mosquitoes exposed to the higher concentration were quickly affected, showing faster signs of paralysis and death. This confirms that the higher the concentration of tea tree oil, the more mosquitoes it can kill in a shorter time (.Fonseca-Santos, et al., 2018)

4. CONCLUSION AND DISCUSSION

Mosquitoes are a major problem, especially in tropical regions like the Philippines, where they are known to transmit diseases such as dengue, malaria, and Zika virus. As vectors of these serious illnesses, mosquitoes pose a significant public health threat, especially in densely populated areas. This study aimed to determine the effectiveness of tea tree oil (Melaleuca alternifolia) as a repellent for mosquitoes. The researcher examined the differences in scent, health effects, and environmental impact between tea tree oil-infused candles and other methods of mosquito control. The study explored the effect of varying concentrations of tea tree oil (5%, 10%, and 20%) in soybean candles against mosquitoes. The goal of this study was to determine whether tea tree oil could provide a safer and more eco-friendly alternative for mosquito control. In the experiment, mosquitoes were examined to different mixtures of candle wax, and responses were observed at 5-minute, 10-minute, 15-minute, and 30-minute intervals to assess the mosquitoes' responses. The results showed that a soybean candle with 5% tea tree oil concentration is effective for repelling mosquitoes, though it works gradually. At the 5-minute mark, no mosquitoes were killed. After 10 minutes, there was still little effect, and by 15 minutes, there may have been a few mosquitoes showing some repelling activity, but none were dead. After 30 minutes, about 8 mosquitoes were killed. The 10% tea tree oil concentration showed a stronger effect. It killed almost 12 mosquitoes within 30 minutes. Some mosquitoes were paralyzed by the candle's scent for 5 minutes, and by 10 minutes, more mosquitoes were immobilized, unable to fly. By 15 minutes, most of the mosquitoes had either died or incapacitated, struggling too weak to move or fly. The 20% concentration of tea tree oil-infused candle had the most powerful effect. Mosquitoes showed signs of paralysis and death within 5 to 30 minutes of exposure.

The findings suggest that pure tea tree oil-infused candles serve as an effective natural mosquito repellent, offering a safer and more eco-friendly alternative. While not all mosquitoes died immediately, the ability of tea tree oil to paralyze and eventually kill mosquitoes makes it a promising solution for those who prefer sustainable and natural methods of mosquito control.

After conducting numerous tests, attempts, and analyses, the researchers concluded that among three products made with varying concentrations of tea tree oil extract—5%, 10%, and 20%—pure 20% tea tree oil extract proved to be the most effective as an insecticide. The evaluation of each product's smell, health effects, and environmental impact revealed that pure tea tree oil extract not only has a strong, pleasant aroma but also offers significant health benefits, as it is entirely natural with no added chemicals.

In addition to its insect-repelling properties, tea tree oil is known for its antimicrobial and antifungal effects, which contribute to its effectiveness in repelling insects and preventing the spread of diseases they carry. Furthermore, when used in candle form, tea tree oil extract can provide a powerful insect-repelling effect. The scent released by the burning candle helps to ward off mosquitoes and other insects, while ensuring a safe environment for people. This natural solution eliminates the need for harmful chemical-based insecticides, making it safer for families, pets, and the environment.

Tea tree oil candles also offer the benefit of providing a natural, calming atmosphere, adding to the well-being of the home. As a sustainable and eco-friendly alternative, this solution reduces the reliance on synthetic chemicals that are often toxic and harmful to the environment. Additionally, it may help in reducing indoor air pollution, which can be a concern with conventional insecticides. The study highlights tea tree oil's potential as a versatile, eco-conscious product, with both practical and health-promoting qualities, making it a valuable option for households seeking a safer and more natural way to deal with pests.

Study of Long-Term Effectiveness: The current study primarily focuses on the short-term effectiveness of tea tree oil-infused candles in repelling and killing mosquitoes. Future researchers should aim to investigate the long-term efficacy of tea tree oil as a mosquito repellent under different environmental conditions. Understanding how its effectiveness changes over time and identifying ways to sustain its repellent properties can improve practical applications.

Comparative Study of Tea Tree Oil with Other Natural Repellents: This study examines the effects of different concentrations of tea tree oil, but future research could compare its effectiveness with other natural repellents, such as citronella, neem oil, or eucalyptus oil. A comparative analysis would provide insights into the advantages and limitations of tea tree oil relative to other plant-based repellents. Additionally, researchers may explore combinations of these natural ingredients to determine if synergistic effects enhance mosquito-repellent properties.

Optimization of Tea Tree Oil Formulations: The study highlights that higher concentrations of tea tree oil improve its effectiveness, but future research should explore optimized formulations that balance potency with safety. Investigating the best methods for extracting and concentrating active compounds can help maximize efficacy while minimizing skin irritation or other potential side effects. Slow-release formulations or blended candle compositions may offer extended protection against mosquitoes.

Study of Mosquito Species-Specific Effectiveness: Mosquito species differ in behavior and sensitivity to repellents. While the study demonstrates tea tree oil's effectiveness against mosquitoes in general, future research should examine its impact on specific mosquito species, particularly those that transmit diseases such as dengue, malaria, and Zika virus. Understanding species-specific responses will help refine its use in targeted mosquito control programs.

Impact on Non-Target Species: While tea tree oil is effective against mosquitoes, its potential effects on other beneficial insects and the broader ecosystem remain unexplored. Future studies should assess whether exposure to tea tree oil impacts pollinators such as bees and butterflies, as well as other insects that play crucial roles in maintaining ecological balance. Sustainable application strategies should be developed to minimize unintended environmental consequences.

Development of Educational Programs: Future research could also explore the effectiveness of educational campaigns promoting the use of tea tree oil-based repellents. Studies may evaluate the impact of outreach programs in schools, communities, and local governments to encourage the adoption of plant-based alternatives over synthetic mosquito repellents. Raising awareness of the health and environmental benefits of tea tree oil can support sustainable mosquito control practices.

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Utilizing *Coffea canephora* Grounds for Sustainable Construction: An Experimental Analysis of its Effects on Concrete Properties

March Aezen B. Tino, Deane Jasper Q. Cayetano, Angelika Zyrylle M. Ricafort, Mark Stiven D. Santos

ABSTRACT

The growing demand for sustainable construction materials has led researchers to explore alternative additives for concrete. This study investigates the feasibility of incorporating *Coffea canephora* (robusta coffee) grounds as a partial replacement for fine aggregates in concrete mixtures. Given the high availability of coffee waste, this research aims to assess its impact on compressive strength, workability, durability, and water absorption. A controlled experimental setup was used, where concrete samples were prepared with varying amounts of *C. canephora* grounds (10 g, 20 g, 30 g, 40 g, and 50 g). Standardized tests evaluated mechanical properties, including compressive strength and impact resistance. Results indicate that while small amounts of *C. canephora* grounds had minimal impact, higher concentrations led to a decline in compressive strength and impact resistance, making the concrete more brittle. Additionally, water absorption tests revealed a decreasing trend in absorption as the dry weight of the sample increased. The first sample, weighing 258 g, had the highest water absorption at 10%, indicating higher porosity, whereas the heaviest sample (557 g) had the lowest absorption at 3%. This aligns with findings by Zhuang et al. (2022) and Hover (2011), suggesting that denser structures retain less water, improving durability. This study highlights the importance of balancing sustainability with structural integrity in concrete production. By repurposing coffee waste, this research supports circular economy principles and sustainable construction practices. Future studies should focus on optimizing mix designs and investigating treatment methods to enhance mechanical performance. These findings contribute to sustainable construction by exploring how agricultural waste can be effectively integrated into concrete while maintaining durability and performance.

Keywords: *Coffea canephora*; Robusta Coffee; Sustainable Construction; Concrete Properties; Compressive Strength; Workability; Durability; Fine Aggregates Replacement

INTRODUCTION

The construction industry is one of the largest consumers of natural resources, contributing significantly to environmental degradation and carbon emissions. As the demand for more sustainable building material grows, researchers have turned to alternative resources that can reduce the environmental impact of construction. Among the waste types considered, agricultural by-products have gained attention for their potential as environmentally friendly building materials. Studies suggest that utilizing these by-products could significantly lower the carbon footprint of the construction industry and promote sustainability (Lynch et al., 2021).

Coffee, one of the most consumed beverages in the world, generates millions of tons of waste coffee grounds annually. These grounds often end up in landfills or are used for limited purposes like fertilizers or gardening. However, coffee grounds possess unique chemical properties that could be harnessed more creatively, particularly in the construction industry. Pereira (2014) highlights this potential, noting that coffee grounds can serve as an innovative resource rather than a waste product. As the global demand for coffee continues to rise, the challenge of managing the massive quantity of coffee grounds becomes more

pressing. Oliviera et al. (2017), as cited in Roychand et al. (2021), pointed out that improper disposal of coffee grounds could significantly contribute to methane emissions, a potent greenhouse gas with 21 times the global warming potential of CO_2 .

Coffea canephora, commonly known as Robusta coffee, is a significant variety of coffee that also generates substantial organic waste in the form of grounds and husks. These by-products, typically discarded after the coffee processing stage, hold significant potential for reuse in various applications. According to Pinto et al. (2022), *C. canephora* contains organic compounds, including oils and acids, that could interact with cementitious materials and improve concrete properties. Study by Ribeiro et al. (2020) emphasized the importance of using these residues to foster sustainable practices within the coffee sector, which could help reduce its environmental footprint. Moreover, Ghisellini at al. (2016) underscored the potential for resource optimization and creativity when using coffee-related waste, advocating for environmentally friendly methods in the coffee production and processing industries.

While studies on integrating agricultural and industrial by-products like rice husks, wood ash, and waste plastics into construction materials have shown improvement in concrete properties and reductions in environmental impact, limited studies have been conducted on *C. canephora* by-products. Preliminary studies suggest that coffee grounds and husks may offer advantages such as better thermal insulation and lower material density in concrete mixture. However, a deeper exploration is needed to fully understand how these by-products impact concrete's mechanical properties. Expanding research to include coffee-related by-products could further promote sustainable construction practices and contribute to the ongoing development of eco-friendly building materials (Yuan et al., in Kumar et al., 2021; Jafari et al., 2019; Mohan et al., 2018).

The focus of this study is to investigate how different concentrations of *C. canephora* grounds affect compressive strength, workability, and varying amounts of *C. canephora* grounds as a partial replacement for fine aggregates. The amount used was 10g, 20g, 30g, 40g, and 50g of *C. canephora* grounds. This range allowed for an in-depth analysis of the material's performance, durability of concrete compared to traditional concrete. Specifically, it seeks to determine whether the addition of coffee grounds amplifies or diminishes these important characteristics. The study aims to identify the ideal concentration of *C. canephora* grounds that balances both sustainability and structural performance.

This study focuses solely on the potential of *C. canephora* grounds as an additive in concrete. It explores how the incorporation of *C. canephora* grounds influence mechanical properties like compressive strength, workability, and durability. By examining these aspects, the study aims to assess whether *C. canephora* grounds can be a viable alternative material in concrete mixtures, contributing to the sustainability of the construction industry. The findings of this study may provide valuable insights into utilizing agricultural waste in concrete, offering a pathway to greener construction practices.

The scope of this study is confined to analyzing the effects of *C. canephora* grounds on concrete, specifically on cement mixtures. It does not explore the broader use of coffee by-products in other industries or applications outside the realm of construction. By narrowing the focus to concrete properties , this study aims to generate more detailed findings on how *C. canephora* grounds could enhance the sustainability and performance of construction materials. The results of this study could be crucial in determining the potential for widespread adoption of coffee waste in sustainable building practices, making an important contribution to the future eco-friendly construction.

MATERIALS AND METHODS

Sample and Set up Preparation

In order to investigate the effects of utilizing C. canephora grounds into concrete, the study utilized a controlled experimental set up. Concrete Samples were prepared with:

1. Cement
2. Coarse Aggregates (gravel)
3. *Coffea Canephora* grounds

Preparing the Samples

During the mixing process, the cement, coarse aggregates, and *C. canephora* grounds were measured in different proportions, ensuring uniform distribution. Mix the materials thoroughly while slowly adding water until the proper consistency is achieved. Workability is evaluated by slump testing to determine the behavior of the coffee-infused concrete compared to a regular mix.

After mixing, the fresh concrete is poured into plastic molds, ensuring each layer is properly compacted to minimize air voids. The specimens are labeled according to *C. canephora* grounds content and allowed to cure for 30 days before being removed from the mold. After demolding, the samples are placed in a water-filled container for 24 hours in order to identify its strength through a water absorption test.

Drop Testing of Concrete with *Coffea canephora Grounds*

After the curing period, compressive strength tests were performed using a measuring tape for a drop test in order to evaluate the effect of the addition of *C. canephora* grounds on the structural integrity of the concrete. Additionally, water absorption tests were performed to evaluate the porosity and water resistance of the samples.

Concrete samples were prepared with varying amounts of *C. canephora* grounds as a partial replacement for fine aggregates, using proportions of 10g, 20g, 30g, 40g, and 50gby weight. This range allowed for an in-depth analysis of the material's performance.

Water Absorption Testing

Water absorption test is conducted to determine the amount of water that the material can absorb when submerged in a specific period of time. samples of 10g, 20g, 30g, 40g, and 50g of *C. canephora* ground are placed in a water-filled container for 24 hours in order to identify its strength through a water absorption test.

This test is essential because it contributes to sustainable assessment, because it offers an overview of the resistance of the material, as excessive absorption can indicate a more porous and lower structure. In order to determine its water absorption percentage, the researchers used the standard formula for getting the water absorption.

$$WA(\%) = \frac{W_{wet} - W_{dry}}{W_{dry}} \times 100$$

where:

- W_{wet} = weight of the sample after immersion in water (saturated weight)
- W_{dry} = weight of the sample after drying

RESULTS AND DISCUSSION

Table 1. Traditional Concrete mix vs C. canephora grounds concrete mix

Trial	Amount of *C. canephora* grounds	Successful Drop Count (traditional conc. mix)	Successful Drop Count (*C. Canephora* grounds conc. mix)
1	10g	3	1
2	20g	4	3
3	30g	4	6
4	40g	8	10
5	50g	11	17

Concrete samples with higher amounts of *C. canephora* grounds (50g) showed improved impact resistance, enduring up to 17 drops before visible damage, compared to only 1 drop for samples with 10g. The results indicate that higher concentrations of C. canephora grounds enhance concrete's toughness and durability under mechanical stress, as evidenced by greater drop endurance. However, lower *C. canephora* grounds appear to disrupt the concrete matrix that leads to weaker samples.

These findings align with other research exploring incorporating organic materials into concrete. For instance, a study by Bekalo and Reinhardt (2010) investigated the use of coffee grounds and sugarcane ash in cement-based composites, finding that such additions can form a dense roadbed pavement material. Similarly, research by Arulrajah et al., (2017) highlighted that coffee grounds have particle size similar to sandy oil, making them a

potential replacement for certain building materials. Furthermore, a study by Qiao et al., (2015), evaluated the feasibility of mixing coffee exocarp with ordinary portland cement to manufacture composite materials, suggesting that coffee exocarp composites could be used for sidewalks or green roads in residential areas.

With this, the use of *C. canephora* grounds in concrete has a significant environmental benefit by promoting the use of waste, reducing dependence on cement, and improving sustainability. Coffee grounds are organic waste, and incorporating them into concrete avoids landfill, reducing pollution and methane emissions from decomposition. Additionally, if the addition of *C. canephora* grounds improves the toughness and impact resistance of concrete, it could help reduce some of the amount of cement used. Since cement production is a major contributor to CO2 emissions, reducing cement consumption could reduce the overall carbon footprint of the building material. Overall, the incorporation of *C. canephora* grounds into concrete might not only improve its mechanical properties but also aligns with sustainable construction practices.

Table 2. Water Absorption Testing

Dry Weight (g)	Wet Weight (g)	Water absorption
258	283.80	10.00%
459	495.72	8.00%
460	492.20	7.00%
535	561.75	5.00%
557	574.71	3.00%

This water absorption test resulted in a decreasing trend in water absorption as the dry weight of the sample increased. The first sample, with a dry weight of 258g, had the highest water absorption of 10.00%, indicating higher porosity. As the dry weight increased, the water absorption decreased, with the sample weighing 557g having the lowest absorption of 3.00%. This suggests the study of Zhuang et al., (2022) that samples with the higher dry weights. Which may have denser structures or tiger compositions, and absorb less water. Furthermore, a study by Hover (2011), states that the composition of the structure of the mix plays an important role in the water retention capacity of the concrete and that higher dry weights may contribute to a more durable and less permeable material. These results are essential to understand how the properties of materials in a mix can affect the water absorption capacity of concrete.

CONCLUSION AND RECOMMENDATIONS

This study investigated the effects of *Coffea canephora* grounds as a partial replacement for fine aggregates in concrete, focusing on compressive strength, workability, and durability. By incorporating varying amounts of *C. canephora* (10g, 20g, 30g, 40g, and 50g) and comparing them to a control mix, the study aimed to determine the feasibility of utilizing this agricultural waste in sustainable construction. The results indicated that lower concentrations (10g–30g) reduced durability, as evidenced by fewer successful drops in impact resistance tests. However, higher concentrations (40g–50g) significantly improved durability, with the 50g sample enduring 17 drops compared to 11 for traditional concrete. The water absorption test revealed that coffee-infused concrete absorbed more moisture due to the organic and porous nature of *C. canephora*, which may impact its long-term durability. Additionally, workability declined as the amount of coffee grounds increased, making the concrete mix harder to handle and mold. These findings suggest that while coffee grounds can enhance durability at higher concentrations, their inclusion must be carefully controlled to balance mechanical performance with sustainability.

Based on the results and identified gaps in the study, the following recommendations are given to further improve the research paper.

1. **Optimizing the Mixing Ratio.**

Further testing should be conducted to determine the ideal proportion of *C. canephora* grounds that balances strength, durability, and workability. Higher amounts improve impact resistance, excessive use may compromise compressive strength and long-term performance.

2. **Enhancing Water Resistance**. Given the coffee-infused concrete demonstrated increased moisture absorption, the researchers recommend strategies such as incorporating waterproofing agents, sealants, or hydrophobic admixtures should be explored to mitigate potential durability concerns, especially for structures exposed to humid or wet environments.
3. **Incorporating Fiber Reinforcement.** in order to address any potential reduction in compressive strength, fiber reinforcement using natural or synthetic fibers should be examined. This could enhance tensile strength and reduce brittleness.
4. **Adjusting Curing Methods.** Alternative curing techniques, such as extended curing periods, stream curing, or polymer curing, should be evaluated to improve concrete strength retention and overall durability.
5. **Assessing Thermal and Acoustic Properties.** Since organic additives may contribute to improved insulation and noise reduction, additional studies should be conducted to analyze the thermal and acoustic performance of coffee-infused concrete, potentially making it a sustainable material for energy-efficient buildings.

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Inhibitory Potential of Sodium Dodecyl Sulfate on *Escherichia coli* and *Staphylococcus aureus* in Singko, Navotas Wastewater

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Abstract

This study investigated the antibacterial efficacy of Sodium Dodecyl sulfate (SDS) as an alternative disinfectant for wastewater treatment in an urban coastal area of Navotas City. Motivated by growing public health concerns associated with water contaminated by pathogenic bacteria, the research compared SDS with conventional commercial disinfectants. Wastewater samples were collected from Singko, Navotas City, and processed using standard microbiological techniques to isolate *Escherichia co*li and *Staphylococcus aureus*. Specialized culture media were employed to obtain pure bacterial cultures, and the Kirby-Bauer disk diffusion method was utilized to assess the antibacterial activity of SDS at varying concentrations alongside traditional agents such as chlorine and hydrogen peroxide-based disinfectants. The findings revealed a concentration-dependent antibacterial effect, with SDS demonstrating enhanced inhibition of bacterial growth at higher concentrations. The study suggests that SDS effectively disrupts bacterial cell membranes, thereby reducing the microbial load in contaminated water. These results underscore the potential of SDS as a viable, efficient, and cost-effective alternative for wastewater disinfection, particularly in settings where conventional disinfectants may have limitations. The research provides valuable insights into improving water quality and reducing health risks in polluted urban environments. Future investigations are recommended to optimize SDS application protocols, assess its long-term environmental impact, and explore its synergistic potential when combined with other disinfection strategies, thereby contributing to the development of more sustainable and effective wastewater treatment practices.

Keywords: Sodium Dodecyl Sulfate (SDS), Escherichia coli, Staphylococcus aureus, Wastewater Disinfection, Antibacterial Efficacy, Alternative Disinfectants, Kirby-Bauer Disk Diffusion, Urban Water Pollution

INTRODUCTION

Water pollution in urban coastal areas constitutes a significant environmental and public health challenge, particularly in regions where wastewater management systems are inadequate. In Metro Manila, Navotas City is notably affected due to the constant discharge of untreated household sewage, industrial effluents, and solid waste into its waterways. Studies have indicated that residential wastewater is responsible for approximately 65–70% of the total water pollution in this region, while the remainder originates from various industrial sources such as tanneries, textile factories, food processing plants, distilleries, and chemical and metal industries.

In the specific locality of Singko, Navotas City, local water bodies—including esteros and rivers—are heavily contaminated by the influx of untreated sewage, industrial runoff, and organic pollutants. This pervasive contamination not only degrades the quality of the water but also creates favorable conditions for the proliferation of pathogenic microorganisms. The accumulation of organic waste and sediments provides essential nutrients that stimulate bacterial growth, thereby exacerbating the risk of waterborne diseases.

Two bacterial species of particular concern in these polluted environments are *Escherichia coli* and *Staphylococcus aureus*. *E. coli*, a Gram-negative bacterium, is widely recognized as an indicator of fecal contamination and has the potential to cause severe gastrointestinal infections, including diarrhea and abdominal cramps. Meanwhile, *S. aureus*—a Gram-positive, spherical bacterium that commonly inhabits human skin and nasal passages—can transform into an opportunistic pathogen, responsible for a range of infections from minor skin irritations to life-threatening systemic illnesses. The emergence of antibiotic-resistant strains, such as methicillin-resistant *Staphylococcus aureus* (MRSA), further complicates clinical treatment and underscores the urgent need for effective disinfection strategies.

In light of these challenges, alternative disinfection methods are being actively explored to improve water quality and safeguard public health. Sodium Dodecyl Sulfate (SDS), an anionic surfactant extensively used in industrial, pharmaceutical, and laboratory applications, has emerged as a promising candidate. Renowned for its potent detergent and antimicrobial properties, SDS operates by disrupting bacterial cell membranes, resulting in cell lysis and subsequent microbial inhibition. Its mechanism of action is comparable to that of sodium lauryl sulfate (SLS), which has been demonstrated to effectively disinfect *Staphylococcus aureus* in previous studies.

The primary objective of this study is to evaluate and compare the antibacterial efficacy of SDS with selected commercial disinfectants—such as chlorine and hydrogen peroxide—in inhibiting the growth of *E. coli* and *S. aureus* isolated from wastewater samples in Sinko, Navotas City. Specific objectives include assessing the concentration-dependent effects of SDS, comparing the size and consistency of the inhibition zones produced by SDS relative to conventional disinfectants, and determining the overall potential of SDS as a viable alternative disinfectant in wastewater treatment.

The significance of this research is multifaceted. Environmental and sanitation agencies can utilize the findings to develop sustainable wastewater management strategies that reduce microbial contamination. Public health professionals may adopt more effective disinfection methods to mitigate waterborne diseases, while local government units and industrial stakeholders could implement improved protocols for water quality management. Furthermore, the study's outcomes provide a foundation for future research into alternative disinfectants, potentially leading to innovative approaches for sustainable sanitation and microbial control.

This study is confined to wastewater samples collected from Singko, Navotas City, and is conducted under strictly controlled laboratory conditions. The evaluation of the antibacterial activity of SDS and commercial disinfectants is performed using the Kirby-Bauer disk diffusion method. It is important to note that the scope of this investigation is limited to the assessment of SDS against *E. coli* and *S. aureus*, and does not extend to other waterborne pathogens or the long-term field applications of the disinfectants.

MATERIALS AND METHODS

Collection of Samples

Wastewater samples were collected from Singko Tawiran in Navotas City, an area characterized by a complex canal network and significant industrial and residential effluents. Sterilized plastic gallon containers, specifically designed for microbiological sampling, were used to ensure sample integrity. Samples were gathered from turbulent canal sections for uniform microbial representation,

immediately sealed, and transported under controlled conditions to preserve the original microbial load.

Preparation of Media and Reagents

In the laboratory, media were prepared under strict sterile conditions. Double-strength Lauryl Sulfate Broth (LSB) was made by dissolving the dehydrated medium in distilled water, dispensing 10 mL aliquots into test tubes with inverted Durham tubes, and autoclaving at 121°C for 15 minutes. Additionally, glass bottles for serial dilution were prepared with 105 mL distilled water and 0.2 g peptone, then autoclaved to ensure sterility.

Preparation of Disinfectant Solutions and Plates with Disks

Solutions of disinfectants and SDS were prepared in thirty 100 mL glass bottles to achieve target concentrations of 1%, 2%, and 3%, based on preliminary tests and literature. For the Kirby-Bauer disk diffusion test, sterile glass microfiber filter sheets were punched into uniform disks and treated with these solutions. Moreover, 20 Mueller-Hinton Agar plates were prepared by dissolving the medium in distilled water, autoclaving, and pouring into sterile Petri dishes.

Presumptive Test for Wastewater

A presumptive test was conducted using the multiple-tube fermentation method to estimate the Most Probable Number (MPN) of bacteria. Initially, 200 mL of wastewater was collected in sanitized glass bottles. A 10 mL aliquot of the undiluted sample was transferred into a container labeled 10^1 and mixed thoroughly. Serial dilutions from 10^1 to 10^7 were prepared, and 20 mL of each dilution was dispensed into five fermentation tubes containing double-strength LSB. The tubes were incubated at 37°C (±0.2°C) for 48 hours, during which turbidity, gas production, and color changes were monitored as indicators of bacterial growth.

Confirmatory Test for Wastewater

To confirm the results of the presumptive test, 2 mL of culture from each positive tube was transferred to tubes containing EC broth. These tubes were incubated at 44.5°C for 24 hours, and gas production in the Durham tubes confirmed the presence of bacteria.

Presumptive Test for E. coli

Triple-strength Lauryl Sulfate Broth (LSB) was used to accommodate the dilution factor. One milliliter of the sample was aseptically added to each sterilized LSB tube, which was then incubated at 37°C for 48 hours. Turbidity and gas production were observed as preliminary indicators of E. coli presence.

Confirmatory Test for E. coli

Samples testing positive in the presumptive test were transferred to tubes containing EC-MUG medium, which detects the β-glucuronidase enzyme unique to E. coli. These tubes were incubated at 44.5°C for 48 hours, and fluorescence under UV light confirmed the presence of E. coli.

Isolation of *E. coli* using EMB Agar

Substances from the fluorescent-positive tubes were streaked onto Eosin-Methylene Blue Agar (EMBA) plates. After incubation at 37°C for 24 hours, *E. coli* colonies were identified by their characteristic metallic green sheen.

Isolation of *E. coli* using Nutrient Agar

E. coli colonies with distinctive morphology from the EMB agar were aseptically transferred to nutrient agar plates using a streaking technique. These plates were then incubated at 37°C for 24 hours to obtain pure cultures for further testing.

Isolation of Staphylococcus aureus using MS Agar

For *S. aureus* isolation, samples from serial dilutions were streaked onto

Mannitol Salt Agar (MSA) plates under sterile conditions in a Biological Safety Cabinet. After incubation at 37°C for 24 hours, colonies suspected to be S. aureus underwent a rabbit coagulase test. A negative coagulase result, along with typical colony morphology, confirmed their identification.

Identification of Bacteria using Nutrient Agar and Gram-Staining

Following negative rabbit plasma coagulase test results, bacterial isolates from MSA plates were transferred onto five Nutrient Agar plates using the quadrant streak method and incubated at 37°C for 24 hours. Colonies displaying yellow pigmentation, indicative of *S. aureus*, were then subjected to Gram staining. Thin smears were prepared, stained with crystal violet, iodine, ethanol decolorization, and safranin counterstaining. Microscopic examination revealed violet, spherical cocci in clusters, confirming their identity as *S. aureus*.

Kirby-Bauer Disk Diffusion

Antimicrobial-infused filter paper disks were prepared and used in a disk diffusion assay to evaluate disinfectant efficacy against *E. coli* and *S. aureus*. Bacterial lawns were created on Nutrient Heart Agar plates using sterile cotton swabs. Three disks, each with different disinfectant concentrations, were placed on the plates, which were then incubated at 37°C for 24 hours. Zones of inhibition were measured post-incubation to assess the antimicrobial activity of each disinfectant.

RESULTS AND DISCUSSIONS

Microbial Contamination Assessment

The Most Probable Number (MPN) assay using the 40-tube technique indicated a microbial load of 7.0 × 10^3 MPN/mL in the wastewater sample from Sinko, Navotas City.

Table 1. 40-Tube MPN in Seven Dilution Result

Dilution	Result
10^0	2
10^1	1
10^2	0
10^3	0
10^4	5
10^5	5
10^6	2
10^7	1
MPN	**7.0×10^3 MPN/mL**

This result shows that each milliliter of water contains roughly 7,000 viable bacteria, reflecting significant contamination due to untreated household and industrial effluents.

Evaluation of Antimicrobial Activity

The antibacterial efficacy of Sodium Dodecyl Sulfate (SDS) and several commercial disinfectants was evaluated using the Kirby-Bauer disk diffusion method. Disks impregnated with disinfectant solutions at 1%, 2%, and 3% concentrations were applied to agar plates inoculated with *Escherichia coli* and *Staphylococcus aureus*.

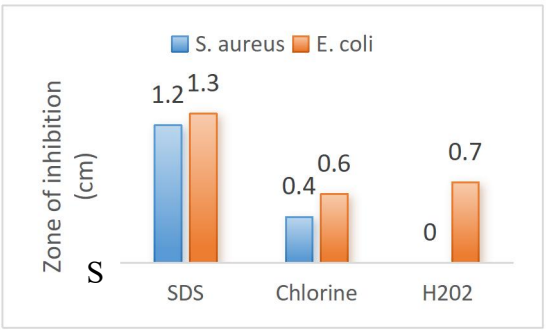


Figure 5a. Kirby-Bauer Disk Diffusion Results for 1.0% Concentration

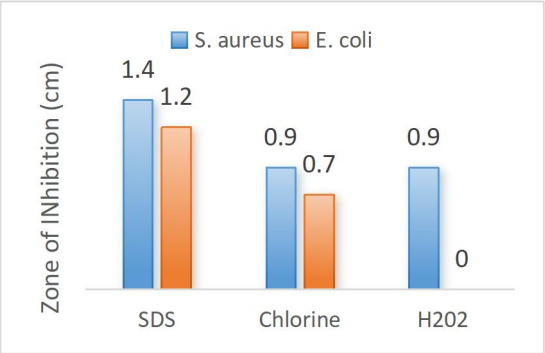


Figure 5b. Kirby-Bauer Disk Diffusion Results for 2.0% Concentration

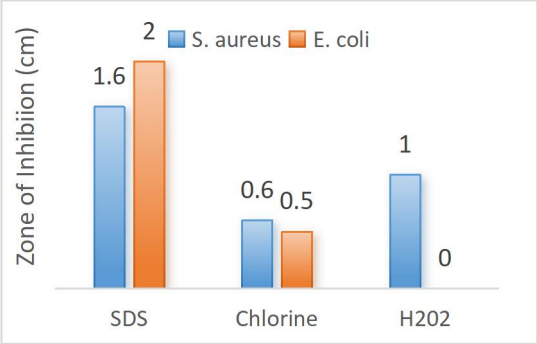


Figure 5c. Kirby-Bauer Disk Diffusion Results for 3.0% Concentration

CONCLUSION

SThis study evaluated the inhibitory potential of Sodium Dodecyl Sulfate (SDS) compared to conventional disinfectants in treating wastewater contaminated with *Escherichia coli* and *Staphylococcus aureus*. The objectives were achieved by demonstrating that SDS exhibits a concentration-dependent antibacterial effect, with markedly superior efficacy at 2% and 3% concentrations relative to traditional agents. These results indicate that SDS effectively disrupts bacterial cell membranes, thereby reducing microbial loads and offering a promising alternative for sustainable wastewater disinfection.

RECOMMENDATIONS

Fo further enhance the findings of this study and explore additional aspects of SDS's antibacterial properties, the following recommendations are suggested for future research:

1. Conduct a comparative analysis by testing various microorganisms under similar conditions using the same disinfectants to assess any differences in their susceptibility to SDS.
2. Investigate the efficacy of different chemical disinfectants by applying them under the same experimental conditions as SDS and analyzing their antibacterial performance against the selected microorganisms.
3. Conduct experiments using lower concentrations of SDS to determine whether it remains effective in inhibiting bacterial growth even at reduced levels.
4. Utilize alternative experimental methods, such as following the McFarland Standards, to ensure more precise and standardized assessments of bacterial inhibition and disinfectant efficiency.
5. Develop a new disinfectant formulation and perform a comparative analysis by testing its effectiveness against bacterial growth in relation to SDS.

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Assessing Water Quality in Tanza Navotas Dike: Biosand Filtration Using *Eichhornia crassipes*

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ABSTRACT

The Philippines is currently dealing with an extensive water crisis, with several regions experiencing significant shortages that threaten public health, livelihoods, and economic stability, resulting in inconsistent availability of clean and safe water. This study evaluated the water quality of the Tanza Navotas Dike by analyzing key metrics such as pH, turbidity, and biochemical oxygen demand (BOD). The researcher created a biosand filter using fine sand, separation gravel and drainage gravel, and E. crassipes (water hyacinths) with three different percentages (30%, 60%, 90%). A water test was made to Navotas dike's water before and after utilizing the said filter,The results revealed that the biosand filtration method was able to alter some water quality parameters. The pH levels remained basic with an average of 8.5 after filtration, showing stability but still above the neutral range. Turbidity showed a significant reduction, indicating improved water clarity. BOD levels were reduced from 13 mg/L to a mean of 10 mg/L, suggesting a decrease in organic pollutants. The filtered water showed improvement in turbidity and BOD levels, making it potentially suitable for non-potable uses such as cleaning and washing. However, additional treatment may be necessary for it to be deemed safe for consumption.

Keywords: Water Quality; Filtration; Eichhornia crassipes; Water Hyacinth; Biosand filter; pH level; Turbidity: Nephelometric Turbidity Unit (NTU); Dike

1. INTRODUCTION

1.1 Background of the study

The Philippines faces a severe water supply crisis, with shortages affecting public health, livelihoods, and economic stability. Contributing factors include climate change, population growth, and inadequate infrastructure, leading to uneven access to clean water. According to the Philippine Institute for Development Studies (Chanco, 2023), the average Filipino consumes 48 to 108 liters of water daily, highlighting the urgent need for sustainable water management solutions.

Water is one of the most valuable natural resources on Earth, found in various locations across the planet. It covers approximately two-thirds of the Earth's surface and is essential for the survival of all living organisms, including insects, birds, plants, and animals. Water is considered the most important resource and a fundamental necessity for life. While humans can go a day or two without food, survival without water is much shorter, as it is crucial for many essential bodily functions.

Although water is abundant on Earth, a significant portion is not freshwater and is therefore unsuitable for human consumption. Natural water is not always pure; except for rainwater, most sources contain dissolved salts and minerals, making them impure and unfit for direct use. Water exists in different forms within our environment and is classified into two main sources: surface water and groundwater. The primary sources used for drinking, cooking, washing, agriculture, and various commercial activities include surface water, groundwater, and harvested rainwater. These water sources rely on rainfall and snow as part of the hydrological cycle. Surface water primarily includes rivers, streams, lakes, and ponds.

Metro Manila's water bodies suffer from severe pollution due to industrial waste, sewage, and agricultural runoff, posing major environmental and health risks. The Pasig River, Manila Bay, and Laguna de Bay are among the most affected, with contamination degrading ecosystems and making waters unsafe. Other rivers, estuaries, and flood channels also face high pollution levels, contributing to poor water quality and flooding. This crisis

underscores the urgent need for improved waste management and stronger environmental policies.

Navotas City is surrounded by water, including Manila Bay and the Navotas River, yet it still faces a shortage of clean water. This situation creates a chance to find new ways to solve the problem and help other coastal cities in the Philippines.

This study looks at how people in Navotas can use the Navotas River and its dike for daily needs. It will test if a biosand water filter can make the water safe by checking for bacteria, acidity, and oxygen levels. The study will also explore how the water plant *Eichhornia crassipes* might help improve water quality.

1.2 Significance of the Study

The study holds considerable significance for several reasons. It offers valuable insights into how *E. Crassipes*, commonly known as water hyacinth, influences the pH levels of water in the Tanza Navotas Dike. By evaluating the efficacy of this natural filtration technique, the study can identify potential improvements in water treatment practices, leading to enhanced water quality management.

Optimization of Natural Filtration Methods: This research enhances our understanding of how *Eichhornia Crassipes* affects water pH and overall quality, contributing to the development of more effective and environmentally friendly filtration systems. Improved filtration techniques can lead to a reduction in harmful contaminants and pathogens, thereby decreasing health risks for communities dependent on the dike. This aligns with broader public health objectives of ensuring safe and clean water supplies.

Environmental Conservation Efforts: By exploring the use of *Eichhornia Crassipes* in water filtration, the study supports environmental conservation through the promotion of natural and sustainable filtration methods. The findings can contribute to broader initiatives aimed at preserving aquatic ecosystems and minimizing environmental impacts, thereby aligning with efforts to foster ecological balance and sustainability.

Foundation for Future Research: The study provides a foundational basis for future research by establishing baseline data on the effectiveness of natural filtration techniques. This will facilitate further investigations into improving water treatment processes and applying these methods to other water bodies.

1.3 Scope and Delimitation

The study evaluated water collected from the Tanza Navotas Dike based on five water quality indicators: pH (potential of hydrogen), turbidity, and Biochemical Oxygen Demand (BOD) to determine its suitability for everyday use. A water filter made with *Eichhornia Crassipes* was developed and applied using the biosand filtration technique. The research examined the water quality both before and after filtration and explored potential applications for the filtered water.

This study did not examine the various factors that influence water quality for direct human consumption or potable use. Instead, it concentrated on evaluating the condition of the water at the time it was collected and determining its suitability for everyday purposes such as cleaning, washing, or other non-potable activities. The primary focus was to assess the overall quality of the water sourced from the Tanza Navotas Dike, analyzing its characteristics to establish whether it met the necessary standards for safe and practical use in daily routines. It also aims to provide a snapshot of the water’s state at the time of collection, rather than delving into the broader environmental or contaminant-related factors that might affect its potability. The research is concentrated on the dike section extending from the bridge at coordinates 14°40'30.9"N 120°56'25.1"E to the endpoint at 14°40'21.3"N 120°56'30.5"E. This segment encompasses approximately 250 meters of the dike, providing a controlled environment to assess both the water quality before and after the application of biosand filtration techniques.

2. METHODOLOGY

2.1 Research design

This study employs an experimental research design to assess the effectiveness of biosand filtration using Eichhornia crassipes in improving water quality from the Tanza Navotas Dike. The

research follows a quantitative approach, measuring key water quality indicators before and after filtration, including pH, turbidity, dissolved oxygen (DO), biochemical oxygen demand (BOD), and microbial content. This approach ensures measurable and comparable results, allowing for a thorough evaluation of the filtration system's performance.

2.2 Data Collection procedure

The data collection process for this study involved the assessment of water quality before and after filtration using a biosand filtration system incorporating *Eichhornia crassipes*. Water samples were collected from the Tanza Navotas Dike at designated coordinates and analyzed based on three key water quality indicators: pH (potential of hydrogen), Turbidity, and Biochemical Oxygen Demand (BOD).

Before conducting the water quality tests, proper safety and ethical protocols were observed. The collection of water samples followed standard sampling techniques to ensure accurate and reliable results. The water was sampled from the dike at different intervals to observe variations in quality. These samples were then processed and tested in a controlled environment to determine their suitability for everyday use.

To assess the efficacy of the biosand filtration system, the water samples underwent filtration using a biosand filtration made with *Eichhornia crassipes*. After filtration, the same water quality indicators were measured again. The results before and after filtration were recorded and analyzed to determine the effectiveness of the filtration process.

2.2.1 Materials

1.10 cm diameter pipe (55cm long)
2.outlet pipe (5cm and 43 cm long)
3. Fittings (elbow, male and female)
4. Cylindrical food plastic container (1L)
5. Diffuser and Taps (for big pipe)
6. Fine construction sand (0.17-0.22 mm)
7. Separation Gravel (2-3 mm)
8. Drainage gravel (5-8 mm)
9. Water Hyacinth



2.2.2 Flow of data collection

The research follows a systematic process for data collection:

1. Initial Water Sampling: Water samples are collected from the Tanza Navotas Dike, ensuring proper handling and labeling.

2. Baseline Water Quality Assessment: The collected water is analyzed for pH, turbidity, and BOD using appropriate equipment and procedures.

3. Filtration Process: The water is passed through the biosand filter containing Eichhornia crassipes.

4. Post-Filtration Analysis: The filtered water is analyzed using the same tests to determine changes in water quality indicators.

5. Data Recording and Comparison: The results before and after filtration are documented and compared to assess the filter's effectiveness.

3. RESULTS AND DISCUSSION

The research examined the water quality both before and after filtration, and the following are table result for each water parameter:

Table 1 : pH Level - Before

Dike Water	pH level
Unfiltered	9

Table 1.1 : The pH Level After Filtration (*Eichhornia crassipes* Filter):

Trials	30%	60%	90%
1	8.5	8.5	8.6
2	8.5	8.5	8.4
3	8.4	8.4	8.6

The pH levels fluctuate within a narrow range (8.4 to 8.6), reflecting natural variations while still averaging 8.5 across all trials.The findings suggest that filtration with Eichhornia Crassipes consistently maintained a basic pH, indicating that the process did not significantly alter the water's alkalinity. Instead, the biosand filtration method may have preserved or introduced alkaline minerals like calcium or magnesium, contributing to the stable pH. This stability could be beneficial for water quality, as slightly basic water reduces the solubility of toxic metals such as lead and copper, potentially making it safer for certain uses. However, additional testing of other water quality factors, such as microbial content, dissolved oxygen, and turbidity, is necessary to fully evaluate the filter's effectiveness.

Table 2: Turbidity Testing - Before

Dike Water	Mean (NTU)
Unfiltered	201

Table 2.1: Turbidity Testing - After Filtration *(Eichhornia Crassipes* Filter):

Trials	30%	60%	90%	Mean (NTU)
1	6.00	5.43	4.00	5.14
2	6.10	5.05	4.05	5.06
3	5.65	4.89	4.5	5.01

Turbidity testing was conducted to evaluate the effectiveness of Eichhornia Crassipes (Water Hyacinth) filtration in improving dike water quality. Before filtration, the mean turbidity was recorded at 201 NTU. After applying filtration at 30%, 60%, and 90%, the turbidity levels showed a significant reduction, resulting in a final mean of 5.07 NTU. These results indicate that the Eichhornia Crassipes filtration method effectively lowers turbidity, enhancing water clarity. However, further optimization may be necessary to maximize its efficiency.

Table 3: Biochemical Oxygen Demand - Before

Dike Water	Average BOD Level
Unfiltered	13 mg/L

Table 3.1: Biochemical Oxygen Demand - After Filtration (*Eichhornia crassipes* Filter):

Trials	30%	60%	90%	Mean (mg/L)
1	12	10	8	10
2	12	9	7	9.3
3	13	11	6	10

The tables present the results of Biochemical Oxygen Demand (BOD) tests conducted before and after the filtration process using *Eichhornia Crassipes* (Water Hyacinth). In Table 3, the average BOD level of the dike water before filtration was

recorded at 13 mg/L, indicating the presence of organic pollutants that require oxygen for decomposition. After filtration, Table 3.1 shows the BOD levels for three trials at different filtration levels (30%, 60%, and 90%). In Trial 1, the BOD levels for the respective filtration levels were 12 mg/L, 10 mg/L, and 8 mg/L, with an overall mean of 10 mg/L. In Trial 2, the BOD levels were 12 mg/L, 9 mg/L, and 7 mg/L, again with a mean of 9.3 mg/L. Trial 3 showed BOD levels of 13 mg/L, 11 mg/L, and 6 mg/L, with the mean still at 10 mg/L. The reduction in BOD from 13 mg/L to 10 mg/L across the trials suggests that the Eichhornia Crassipes filtration was effective in lowering the organic matter in the water, thus improving its quality.

4. CONCLUSIONS AND RECOMMENDATIONS

4.1 Conclusion

pH Level: The filtration process using Eichhornia Crassipes maintained a stable pH level around 8.5, suggesting that while the filter did not significantly neutralize alkalinity, it helped preserve essential minerals in the water.

Turbidity: The filtration system effectively reduced turbidity from 201 NTU to 5.07 NTU, signifying an improvement in water clarity but still not reaching ideal clarity levels for potable use.

Biochemical Oxygen Demand (BOD): The filter contributed to a decrease in BOD from 13 mg/L to an average of 10 mg/L, demonstrating its ability to remove organic pollutants and improve water quality.

Overall Water Quality: The filtered water showed improvement in turbidity and BOD levels. Although the test results in both parameters showed improvement, these results still can not be considered as usable in terms of potability based on the standard levels of water quality in both parameters. However it is potentially suitable for non-potable uses such as cleaning and washing. However, additional treatment may be necessary for it to be deemed safe for consumption.

4.2 Recommendations

Future research should focus on conducting microbial analysis to determine the filter's effectiveness in removing bacteria and other harmful microorganisms. Adjustments to the filtration process, such as increasing the filtering medium or incorporating additional treatment methods, should be explored to enhance turbidity reduction and BOD improvement. Additionally, combining biosand filtration with other water purification methods, such as activated carbon filtration or UV treatment, could yield better results for safe water use. Regular assessment of the filtered water over time would help evaluate the filter's durability and effectiveness under different environmental conditions. Given the improvements in water quality, the filtered water may be considered for non-drinking purposes, such as irrigation, laundry, and general cleaning, while additional treatment would be necessary for potable use.

This study provides an essential foundation for using Biosand Filtration and Eichhornia Crassipes as a natural filtration method, highlighting the need for further research and enhancements to maximize its potential in water treatment applications.

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Total Coliform Enumeration in Navotas Riverine System and Assessment of Copper Sulfate ($CuSO_4$) and Sodium Hydroxide (NaOH) Efficacy for Coliform Suppression via Multiple Tube Fermentation (MTF)

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Abstract: Water pollution in urban river systems presents a serious environmental and public health challenge, necessitating effective remediation strategies. In response, this study quantifies the total coliform present in the Navotas River System and assesses the efficacy of sodium hydroxide (NaOH) and copper(II) sulfate ($CuSO_4$) in suppressing coliform contamination. To achieve this, water samples from Navotas River, Tangos River, and Tullahan River underwent treatment with 80 mL of 30% (w/v) NaOH and $CuSO_4$ solutions per 120 mL sample, followed by microbial analysis using the Multiple Tube Fermentation (MTF) method. The results revealed a substantial reduction in total coliform concentrations, with post-treatment values dropping to <18 MPN/mL across all sites. Furthermore, percentage reduction and mortality rate calculations confirmed that both NaOH and $CuSO_4$ achieved ≥99% coliform suppression, effectively neutralizing total coliform populations. Additionally, statistical validation through the Mann-Whitney U test indicated no significant difference between the two treatments, demonstrating their comparable effectiveness in bacterial reduction. Given these findings, this study underscores the potential of NaOH and $CuSO_4$ as alternative chemical treatments for improving water quality in complex aquatic environments. However, while their short-term efficacy is evident, further research is necessary to evaluate their long-term environmental impact and potential chemical residues. Nonetheless, these results contribute to advancing sustainable and scalable water treatment solutions, offering a cost-effective approach to mitigating bacterial contamination in urban waterways.

Key Words: Total Coliform; Navotas River System; Copper Sulfate; Sodium Hydroxide; Bacterial Contamination

1. INTRODUCTION

Water quality is a fundamental determinant in maintaining both public health and ecological balance, particularly in coastal communities where human activities are dependent on aquatic ecosystems. Navotas City, known as the "Fishing Capital of the Philippines," is a highly urbanized coastal region with a 12.5 km shoreline along Manila Bay (Cruz et al., 2023). It serves as a vital hub for both marine biodiversity and economic activities, primarily supporting the fishing industry. In fact, as per the Philippine Statistics Authority (PSA) in 2020, out of 247,543 residents, approximately 70% of the population in Navotas City depend on fishing and related industries for their livelihood. While urbanization has shown economic growth and development in the city, it simultaneously introduced significant environmental challenges. Industrial expansion, domestic wastewater discharge,

and other anthropogenic activities have increasingly threatened the quality of Navotas waterbodies, leading to concerns over pollution and ecological degradation (Wu & Qianhu, 2023). These stressors not only jeopardize marine life but also pose potential risks to human health, highlighting the urgency for sustainable water management and pollution mitigation strategies in the region.

The Navotas River System, also known as the Malabon-Navotas-Tullahan River, is a major waterway in Navotas City. It stretches 6.6km in length, with a width varying between 50 and 180m, and flows through 16 barangays across Navotas, Malabon, Caloocan, and Manila (Encarnacion et al., 2024). Geographically, it is bordered by the Tanza River to the north, Malabon City and Estero de Maypajo to the east, Manila Bay to the west, and Manila City to the south.

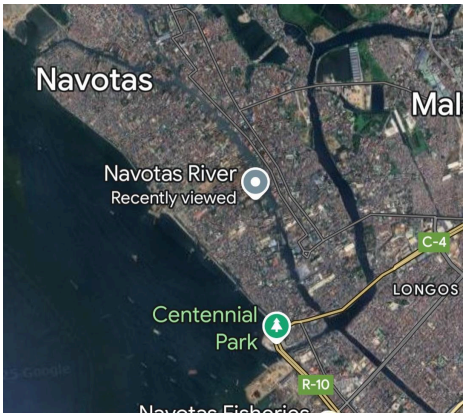


Figure 1.1. A Satellite View of the Navotas River System via Google Maps.

According to the Department of Environmental and Natural Resources (DENR) (2018), the Navotas River System is classified under Class C, which indicates a moderate water quality. The Navotas River System is vital in local livelihoods, supporting fishing, agriculture, and aquatic resource propagation. However, the continuing pollution from sewage discharge and improper waste disposal—partly driven by the influx of informal settlers—poses significant threats to water quality and biodiversity (Kasala et al., 2016). One major consequence of this pollution is bacterial contamination, particularly by coliform.

Coliform bacteria, as described by Patel et al. (2014), are Gram-negative, oxidase-negative, non-spore-forming, aerobic, or facultative anaerobic rod-shaped microorganisms belonging to the Enterobacteriaceae family. These bacteria are frequently detected in wastewater discharges and serve as bioindicators of microbial water quality, especially in aquatic systems vulnerable to fecal contamination (Eden, 2014). The presence of coliform bacteria in aquatic environments raises significant public health concerns, as their proliferation has been linked to waterborne disease transmission and increased water stress (Tutor & Pedrosa-Gerasmio, 2024). Singh et al. (2019) emphasized that the discharge of untreated waste into aquatic ecosystems sustains coliform populations, heightening the risks of water inaccessibility and contributing to elevated morbidity and mortality rates. Given these risks, further study addressing coliform bacteria in aquasystems is essential for understanding its impact on both human health and the environment.

The Multiple Tube Fermentation (MTF) technique is among the most established and widely employed methods for coliform analysis in water quality assessment. Recognized within the Standard Methods for the Examination of Water and Wastewater, MTF is a quantitative microbiological technique that detects and enumerates total coliform bacteria based on their ability to ferment lactose with gas production under specific incubation conditions (Buckalew, 2005). This method is instrumental in evaluating the extent of bacterial contamination and assessing the potential risks associated with waterborne diseases. MTF is particularly effective in analyzing complex aquatic systems, such as riverine environments, where contamination levels vary significantly. Unlike direct plating methods, which may fail to detect low bacterial concentrations, MTF enhances coliform growth in selective media, increasing detection sensitivity (Zulkifli et al., 2017). Additionally, its integration with the Most Probable Number (MPN) method provides a reliable statistical estimation of microbial pollution (Chandrapati & Williams, 2014). Given the urbanized nature of the Navotas Riverine System and its susceptibility to industrial discharge, domestic waste, and surface runoff, MTF serves as a crucial tool for assessing coliform contamination and its implications for public health. This study utilizes MTF to establish a comprehensive microbial profile of the Navotas River, contributing to evidence-based water quality management and pollution mitigation strategies.

Traditional microbial water treatment methods, including filtration and chlorination, have been widely utilized for pathogen removal (Obayomi, 2024). Abnavi et al. (2021) and López-Gálvez et al. (2019) noted that chlorine (Cl), a strong oxidant, is frequently utilized by researchers for its bactericidal efficacy in its reactive properties. But in spite of its notable effectivity, the application of Cl for complex water system treatment is constrained by its interaction with organic matter in water, which results in the formation of by-products (e.g., haloacetic acid, haloacetonitrile, and trihalomethanes) that have been linked to carcinogenesis and reproductive disorders (Singh et al., 2019a). Alternative chemically safe processes have gained attention for their efficacy in addressing microbial contamination in complex

aquatic environments, including the use of Copper Sulfate ($CuSO_4$) and Sodium Hydroxide (NaOH).

To characterize, $CuSO_4$, is an inorganic compound that combines sulfur with copper and is primarily used as a fungicide, algaecide, herbicide, and as a bactericidal agent. $CuSO_4$ exerts its bactericidal effects through the release of copper ions (Cu^{2+}), which interact with microbial cells in multiple detrimental ways (NPIC, 2023). These ions bind to functional groups of proteins, causing denaturation and subsequent cell damage. In general, copper is recognized as a metallic bactericidal agent for drinking water treatment by the United States Environmental Protection Agency (EPA) in 2008 (Vincent et al., 2017). With this applicability, several research studies have shared considerable interests on CuSO, being a copper-based material, that can be utilized as a chemically safe process to address bacterial contamination in complex aquatic environments. In a similar way, NaOH, a potent bactericidal compound, has shown its efficacy in removing proteins and nucleic acids as well as in inactivating most viruses, bacteria, yeasts, fungi, and endotoxins due to its high alkalinity (Cytiva, 2020). This compound yields efficacy by elevating the pH levels, creating conditions that are hostile to microbial life. This extreme alkalinity disrupts bacterial cell membranes by altering membrane permeability and causing structural disintegration, ultimately leading to cell lysis (DrugBank, 2024). Moreover, NaOH denatures essential proteins by breaking disulfide bonds, rendering key enzymes nonfunctional and leading to irreversible metabolic inhibition (BacMet, 2024). These mechanisms collectively prevent bacterial proliferation, making NaOH highly effective in controlling bacterial contamination. Several studies have demonstrated the bactericidal efficacy of NaOH across various bacterial strains. For example, a study conducted by Starliper et al. (2015) explained that exposure to a pH of 12.0 resulted in 100% bactericidal activity against all tested bacteria, including both Gram-positive and Gram-negative species. Even at a lower pH of 10.0, NaOH was fully effective against pathogens such as Aeromonas salmonicida, Edwardsiella ictaluri, Pseudomonas fluorescens, and Staphylococcus species. With this body of informations, it is only reasonable for the researchers to utilize $CuSO_4$ and NaOH as suppressants to utilize in addressing the bacterial contamination.

Overall, this study aims to determine the total coliform concentrations across various sites in the Navotas River System and assess the efficacy of $CuSO_4$ and sodium hydroxide NaOH in suppressing total coliform concentrations. Specifically, it seeks to:

(i) Quantify the total coliform concentrations at selected sites along the Navotas River System using the MTF technique to establish baseline contamination levels.

(ii) Compare the pre- and post-treatment concentrations of total coliform in water samples collected from the selected site within the Navotas River System.

(iii) Assess the efficacy of $CuSO_4$ and NaOH in suppressing total coliform by assessing key indicators such as bacterial mortality rate and quantitative reduction in coliform counts.

This study focuses on the enumeration of total coliform bacteria within areas located exclusively within the Navotas River System. The collection of water samples is limited to the Navotas River System and does not extend to waterbodies in other cities. Furthermore, the study solely examines coliform bacteria and excludes other waterborne pathogens from its scope. In assessing bacterial suppression, only $CuSO_4$ and NaOH solutions are utilized as suppressants. The study does not incorporate additional disinfectants or materials intended to enhance or upscale bactericidal efficacy. Moreover, while this research investigates the short-term efficacy of $CuSO_4$ and NaOH in coliform suppression, it does not extend to long-term environmental impacts, potential chemical residues, or their broader implications for aquatic ecosystems.

This study anticipates that coliform concentrations in the Navotas River System will reveal high levels of microbial contamination, underscoring the need for improved water quality management. Furthermore, the findings will contribute to subsequent research on the use of $CuSO_4$ and NaOH as potential antibacterial agents in water treatment. Establishing their efficacy in coliform suppression may serve as a foundation for developing alternative disinfection strategies against waterborne pathogens. Lastly, this study may prompt further investigations into the broader applications of $CuSO_4$ and NaOH in. microbial inactivation, particularly in the context of urban water systems.

2. MATERIALS AND METHODOLOGY

2.1 Research Design

This study employs a quasi-experimental research approach to evaluate the efficacy of $CuSO_4$ and Sodium NaOH in the bacterial suppression of coliform bacteria in the Navotas Riverine System. The research will be conducted in three phases: sample collection and preparation, experimental treatment, and post-treatment analyses. Initially, water samples

will be collected from three identified river sites along the Navotas River System (Navotas River, Tangos River, and Tullahan River). The MPN method via MTF will be used to enumerate total coliform bacteria and establish baseline contamination levels. In the second phase, the researchers will assess the efficacy of $CuSO_4$ and NaOH by dividing the water samples into control (untreated) and experimental (treated) groups. Treatment will involve the application of pre-determined concentrations of $CuSO_4$ and NaOH solutions to assess their ability to suppress coliform bacteria. Finally, post-treatment analyses will be conducted to evaluate the efficacy of $CuSO_4$ and NaOH treatments. These analyses will include the quantification of coliform reduction using the MPN method, percentage reduction analysis, significance testing, and mortality rate assessment. Conducting this experimental approach ensures a systematic evaluation of $CuSO_4$ and NaOH as potential coliform suppression agents, aligning with the study's objectives and research inquiries.

2.2 Research Instruments

In this study, various research instruments will be employed to systematically gather, analyze, and interpret data related to the effectiveness of the chemical treatment on contaminated water. These instruments will facilitate the accurate measurement of contaminant levels, mortality rates of microorganisms, and the proper concentration of the chemical solution. This research employs observational checklists to monitor the pH level of NaOH and $CuSO_4$ for stability and Laboratory tests done at the Philippine Institute of Pure and Applied Chemistry (PIPAC) to quantify the total coliform concentrations in different sampling sites, as well as to assess the efficacy of NaOH and $CuSO_4$ for coliform suppression. Additionally, the application of the following formulas below will enable precise calculations, contributing to the reliability and validity of the research findings:

To measure the percentage reduction (%) of total coliform:

$$\text{Percentage Reduction} = \left(\frac{\text{Initial Value} - \text{Final Value}}{\text{Initial Value}}\right) \times 100$$

Eq. 1. Percentage Reduction Formula.

Where:

Initial Value = Contaminant level before treatment
Final Value = Contaminant level after treatment

To calculate the mortality rate (%) of total coliform after NaOH and $CuSO_4$ treatment:

$$\text{Mortality Rate} = \left(\frac{\text{Number of Deaths}}{\text{Total Population}}\right) \times 100$$

Eq. 2. Mortality Rate Formula.

Where:

Number of Deaths = Number of microorganisms that did not survive after treatment
Total Population = Initial microorganism count

To determine the correct concentration of NaOH and $CuSO_4$ for treatment:

$$\text{Concentration} = \left(\frac{\text{Mass of Chemical}(g)}{\text{Total Solution Volume}(ml)}\right) \times 100$$

Eq. 3. Chemical Concentration Formula.

2.3 Research Materials

The following are the necessary materials for the synthesis of CHN solution and the collection of water samples from selected waterbody sites in Navotas City: To begin with, the chemical reagents, including copper (II) nitrate ($Cu(NO_3)_2$), sodium hydroxide (NaOH), nitric acid (HNO_3), as well as the amber borosilicate glass bottle, and deionized Water were purchased from Patagonian Enterprises in Bambang, Manila. Meanwhile, laboratory equipments to be used for this research such as glass beakers, stirring rod, graduated cylinder, and pipettes were by San Jose Academy, the school where the researchers are affiliated. Lastly, for storage and transport, equipments like bottle containers and cooler box were provided by the researchers.

2.4 Data Gathering Procedure

2.4.1 Selection of Sampling Sites and location Mapping

The researchers utilized Google Maps for selecting and locating the 3 sampling sites in Navotas City to collect water samples. The selection process depends on the sites' accessibility, proximity, and its potential exposure to microbial contamination. The selected waterbody sites are what follows: Tullahan River (14°39′00″N, 120°56′53″E), Navotas River (14.6429° N, 120.9609° E), and Tangos River (14.6735° N, 120.9385° E) (Encarnacion et al., 2024a).



Figure 2.4.1.1. Location of Navotas River via Google Maps.



Figure 2.4.1.2. Location of Tangos River via Google Maps.

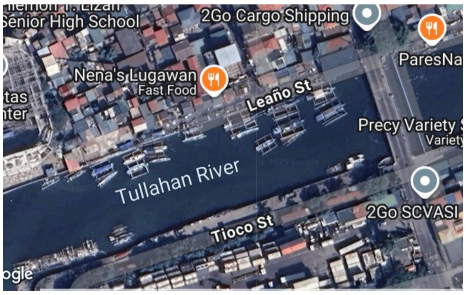


Figure 2.4.1.3. Location of Tullahan River via Google Maps.

2.4.2 Water Sample Collection from Selected Waterbodies

Upon selecting the sampling sites (Navotas River, Tangos River, and Tullahan River), the researchers collected 9 water samples (6 experimental samples & 3 control samples), each measuring 120 mL, from the surface water layers at each site. To maintain microbial integrity and prevent contamination, the water samples were stored in sterilized bottles and placed in a cooler box with ice packs, ensuring a temperature range of 18°C to 20°C. This temperature range is crucial, as highlighted by Curutiu (2019), in preserving the viability of coliform bacteria.

2.4.3 Synthesis of NaOH and $CuSO_4$ Solutions

To prepare the NaOH solution, a mass of 24g of NaOH was measured using an analytical balance and gradually dissolved in a beaker containing 60 mL of deionized water while stirring continuously. Since the dissolution of NaOH is an exothermic process, the solution was allowed to cool before being adjusted to a final volume of 80 mL by adding additional deionized water. The prepared solution was stored in a container to prevent contamination and ensure stability.

For the $CuSO_4$ solution, a 24g sample of $CuSO_4$ was weighed and transferred into a beaker containing 60 mL of deionized water. The mixture was stirred continuously until the $CuSO_4$ dissolved completely, forming a clear blue solution. The final volume was adjusted to 80 mL by adding deionized water, ensuring precise concentration. The prepared $CuSO_4$ solution was stored in a properly labeled container to maintain its stability for experimental use.

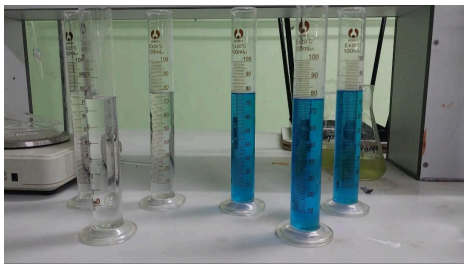


Figure 2.4.3.1. Synthesized NaOH and $CuSO_4$ Solutions.

2.4.4 Water Samples Treatment using NaOH and $CuSO_4$ Solutions

The collected 120 mL water samples from Navotas River, Tangos River, and Tullahan River were subjected to chemical treatment using 30% (w/v) NaOH and $CuSO_4$ solutions. A total of 80 mL of treatment solution was applied to each sample to ensure effective contaminant reduction while maintaining the appropriate chemical-to-water ratio.

For each 120 mL water sample, the treatment process involved the sequential addition of the NaOH and $CuSO_4$ solutions. The NaOH solution was first added to 3 experimental samples, followed by thorough mixing to facilitate interaction with coliforms. This was followed by the addition of $CuSO_4$ in another 3 experimental samples, ensuring even distribution throughout the sample. The treated samples were then allowed to react under controlled conditions for 24 hours, ensuring optimal contact time for effective total coliform suppression.

After treatment, the samples were subjected to laboratory analysis in PIPAC to assess the quantity of total coliforms present in each sampling site, as well as the reduction in coliform contamination.

3. RESULTS AND DISCUSSION

3.1 Total Coliform Enumeration of Untreated and Treated Water Samples

To provide a visual representation of coliform distribution across the three river sites before and after treatment, a heat map was created (Figure 3.1.1). This heat map uses a color gradient to indicate coliform concentrations, where red represents the highest bacterial load, and blue signifies the lowest or non-detectable levels.

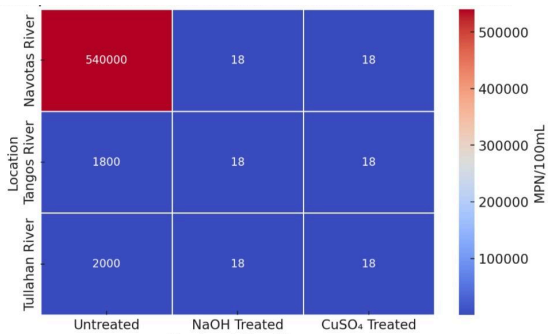


Figure 3.1.1. Heat Map Representation of Total Coliform Density in Untreated and Treated Sampling Sites

The results of the total coliform enumeration revealed a significant presence of coliform contamination within the Navotas Riverine System. The pre-treatment coliform densities, as depicted in the heat map (Figure 3.1.1), were highest in the Navotas River (540,000 MPN/100mL), followed by the Tullahan River (2,000 MPN/100mL) and the Tangos River (<1,800 MPN/100mL). The extensive red shading in the untreated samples underscores the pervasiveness of coliform pollution across all sampling sites, signifying substantial microbial contamination.

Upon treatment with NaOH and $CuSO_4$, a drastic reduction in total coliform concentration was observed. The heat map transitioned to blue, indicating that coliform levels were reduced to below detectable limits (<18 MPN/100mL). This suggests that both NaOH and $CuSO_4$ were highly effective in coliform suppression, successfully reducing microbial contamination to negligible levels.

3.2 Total Coliform Count Reduction Analysis

Table 3.2.1. Estimated Percentage Reduction in Total Coliform Count in Treated Water Samples From Navotas, Tangos, and Tullahan Rivers.

Sample Code	NaOH Reduction (%)	$CuSO_4$ reduction (%)
WSC-NRV	≥ 99.99%	≥ 99.99%
WSC-TGRV	≥ 99.00%	≥ 99.00%
WSC-TLRV	≥ 99.10%	≥ 99.10%

Table 3.2.1 presents the percentage reduction of total coliforms upon treatment with NaOH and $CuSO_4$. The reductions for both NaOH and $CuSO_4$ suppressants were consistently high, exceeding 99.00% across all sampling sites. The near-identical reduction percentages (≥ 99.99% for WSC-NRV, ≥ 99.00% for WSC-TGRV, and ≥ 99.10% for WSC-TLRV) indicate that both NaOH and $CuSO_4$ effectively suppressed coliform presence to levels below MPN detection thresholds.

Table 3.2.2. Significance Testing for Total Coliform Reduction Using the Mann-Whitney U Test.

Comparison	U Statistics	p-value	Effect Size (r)
NaOH vs. Untreated	0.0	<0.01	0.90
$CuSO_4$ vs. Untreated	0.0	<0.01	0.90
NaOH vs. $CuSO_4$	4.5	0.67	0.10

To statistically validate these findings, the Mann-Whitney U test was conducted (Table 3.2.2). The results confirmed that both NaOH and $CuSO_4$ treatments significantly reduced total coliform levels compared to untreated water samples ($p = \leq 0.01$). The effect sizes ($r = 0.90$ for both NaOH vs. Untreated and $CuSO_4$ vs. Untreated) further reinforce the significant impact of these suppressants on coliform suppression. However, the direct comparison between NaOH and $CuSO_4$ ($U = 4.5$, $p = 0.67$, $r = 0.10$) revealed no statistically significant difference in efficacy between the two suppressants. This suggests that both suppressants were equally effective in coliform reduction, with neither demonstrating superior performance over the other.

Table 3.2.3. Mortality Rate of Coliform Bacteria After NaOH and $CuSO_4$ Treatment.

Treatment	Sample Code	Initial Count (MPN/mL)	Final Count (MPN/mL)	Mortality Rate (%)
NaOH	WSC-004-NRV	540,000	<18	99.99%

	WSC-005-TGRV	<1,800	<18	99.00%
	WSC-006-TLRV	2,000	<18	99.10%
$CuSO_4$	WSC-007-NRV	540,000	<18	99.99%
	WSC-008-TGRV	<1,800	<18	99.00%
	WSC-009-TLRV	2,000	<18	99.10%

The mortality rate analysis of coliform bacteria in Table 3.2.3 revealed a complete absence of detectable viable coliforms in both NaOH- and $CuSO_4$-treated samples (99.99%, 99.00%, and 99.10%), all meaning that nearly all coliform bacteria were inactivated or destroyed by NaOH and $CuSO_4$ treatments.

4. CONCLUSIONS AND RECOMMENDATIONS

The findings of this study underscore the severity of microbial contamination in the Navotas Riverine System, revealing alarmingly high levels of total coliform bacteria. Such contamination, predominantly attributed to anthropogenic activities, poses significant public health and environmental risks, necessitating immediate intervention. This study assessed the efficacy of NaOH and $CuSO_4$ in mitigating coliform contamination through the Multiple Tube Fermentation (MTF) method. The results conclusively demonstrate that both chemical treatments successfully suppressed coliform bacteria to non-detectable levels (<18 MPN/100mL), indicating their potential applicability in water treatment and sanitation efforts.

The implications of these results extend beyond water treatment efficacy, emphasizing the necessity of approaches to address microbial contamination in urban riverine systems. While the chemical treatment of contaminated water sources can serve as an effective short-term solution, it is not a comprehensive treatment. The potential environmental consequences of NaOH and $CuSO_4$ application must be considered. Using $CuSO_4$, for instance, may lead to bioaccumulation within the ecosystem, raising concerns about its long-term ecological impact (Gharedaashi et al., 2013). Similarly, NaOH, if not properly dosed and managed, may cause pH imbalances that disrupt aquatic life. Therefore, while these chemical suppressants demonstrate strong bactericidal properties, their application must be accompanied by stringent regulatory measures to minimize adverse environmental effects.

Beyond the efficacy of chemical treatment, this study highlights the urgent need for sustainable and integrated water management strategies. The high coliform concentrations recorded in the Navotas Riverine System reflect the broader issue of inadequate sanitation infrastructure and weak enforcement of environmental policies. Without addressing the root causes of water pollution, such as inadequate wastewater treatment and unregulated industrial discharge, any intervention will only provide temporary relief to the residents of Navotas City. Sustainable solutions must involve comprehensive wastewater management reforms, including improved sewage treatment facilities, stricter industrial waste regulations, and enhanced community sanitation programs (Dela Rosa, 2024).

Based on the findings, the researchers propose the following recommendations to extend the body of knowledge established by this study:

(i) **Expand sampling sites and concentration ranges** – Broaden the sampling locations and test a wider range of NaOH and $CuSO_4$ concentrations to improve the representativeness and reliability of the results.

(ii) **Conduct morphological analysis via SEM** – Utilize Scanning Electron Microscopy (SEM) to examine structural alterations in coliform bacteria following NaOH and $CuSO_4$ treatment.

(iii) **Assess bacterial viability and motility –** Evaluate the viability and motility of coliform bacteria before and after treatment to determine the extent of its efficacy.

(iv) **Perform survival analysis** – Measure total coliform count at specific time intervals post-treatment and conduct a survival analysis to assess bacterial persistence over time.

(v) **Analyze chemical residues** – Investigate residual $CuSO_4$ and NaOH after treatment to evaluate potential environmental and health risks.

(vi) **Enhance enumeration accuracy** – Adopt a more definitive enumeration method for total coliform count to ensure precise

bacterial quantification before and after treatment.

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A Comparative Study on the Effects of Citrus limon (Lemon Juice) and Acetic Acid (Vinegar) Solutions in Reducing Escherichia coli Bacteria in Solanum tuberosum (Granola Potatoes)

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ABSTRACT

Food safety remains a global concern within the agriculture industry, in which root crops such as potatoes are significantly more prone to contamination from soil and fertilizers. This trend has been emphasized due to recent demands for maintaining a high food hygiene standard. Various studies have previously established the antimicrobial effects of acetic acid and C. limon, however lack of investigation remains on its potential use as an agent to reduce the presence of E. coli. In this investigation, the researchers conducted an experiment using acetic acid and C. limon solutions to be applied to granola potatoes, a common species in the Philippines, under varying concentrations (0%, 50%, and 100%) for 30 minutes.

An enzyme-substrate test was conducted to measure the efficacy of both solutions, the results were evaluated using the Most Probable Number (MPN) table. It was concluded that acetic acid is more effective in reducing E.coli to a level safe for human consumption at a 100% concentration compared to C. limon which did reduce the amount of E.coli, but not to a secure extent to be consumed. The study's findings suggest that acetic acid is an accessible and effective alternative in reducing the presence of E. coli in granola potatoes.

Keywords: Anti-microbial, Bacteria, Citrus, Enzyme, Fungi, Lemon, Potato, Vinegar

INTRODUCTION

Background of the Study

Solanum tuberosum, generally known as potato, belongs to the Solanaceae family which comes in diverse varieties, species, and colors. Potatoes are traditionally used in medicine due to their pharmacological properties such as antioxidant (polyphenols, ascorbic acid, anthocyanins, and flavanols), anticancer (aspartate protease inhibitors), antiallergy (rutin), antibacterial (caffeic, chlorogenic, and neochlorogenic acids), anti-inflammatory (solanine), antiobesity (proteinase inhibitor II), and anti-ulcer activity (Vitamin A). This also contains anthocyanin, phenolic acids, flavonoids, Vitamin B6, Vitamin B3, pantothenic acid, potassium, manganese, phosphorous; copper, and fibers (Anjum, S. et al., 2018).

Additionally, root vegetables like potatoes are particularly vulnerable to soil contamination, and primary production and processing. The main factor affecting contamination is the presence and oral transmission of animal excrement which is normally used in various fertilizers, resulting in the development of Escherichia coli (An, J. et al., 2023).

Basavaraju and Gunashree (2022) noted that Escherichia coli, commonly termed E. coli which belongs to the Enterobacteriaceae family, is a gram-negative bacillus, non-sporulating, rod-shaped, and facultatively anaerobic or ability to grow in aerobic and anaerobic environments related to the genus Escherichia. It can easily develop as fast as 20 minutes and is found in the gastrointestinal system of humans and warm-blooded animals (Son, M. & Taylor, R. 2021). In microbiology and biotechnology, it is a prokaryotic organism that can survive for long periods commonly found in feces, soil, and bodies of water. E. coli can also be identified as a good and effective probiotic that keeps the digestive tract healthy (Fijan, S. et al., 2018). However, some serotypes of E. coli can induce diarrhea, urinary tract infections (UTIs), anemia, and respiratory or kidney infections (Mueller, M. & Tainter, C. 2023).

To reduce the levels of E. coli forming in potatoes, it must be placed within a highly acidic environment, but the traditional method of lessening

the presence of this bacteria requires laboratory equipment and the knowledge of microbiologists (Hariri, S. 2022). Due to this, a product that is more accessible and inexpensive is proposed by the researchers, a method that average people can utilize. On a similar note, lemon juice (Citrus limon) and vinegar (acetic acid) are ordinary household items that are highly acidic and contain antimicrobial properties that can treat bacteria.

Citrus limon, commonly known as lemon is a citrus fruit that is a part of the Rutaceae family generally found in tropical and subtropical countries. This fruit contains large quantities of Vitamin C and is considered a source of antioxidants (flavonoids, limonoids, kaempferol, quercetin, and ascorbic acid) and phenolic compounds (ascorbic acid, essential oils, and carotenoids) which help prevent cardiovascular diseases and support the immune system (Badiche-El Hilali, F. et al., 2024). Lemon also has antimicrobial properties and has a per Hydrogen (pH) of 2 and 3 (Ahmad, M. et al., 2023), therefore it is acidic.

Arshad and Batool (2017) reported that lemon and other citrus fruits' antimicrobial properties can reduce the presence of Bacillus cereus (B. cereus), Salmonella typhimurium (S. typhimurium), Staphylococcus aureus (S. aureus), Escherichia coli (E. coli), and Pseudomonas aeruginosa (P. aeruginosa) which are pathogens normally sourced in foods consumed daily by humans.

Acetic acid, a generally known ingredient of vinegar, is an acid widely used in chemical and food industry. Vinegar contains phenolic compounds (gallic acid, protocatechuic acid, caffeic acid, and p-coumaric acid), microbial metabolites (acetic acid bacteria), and high acid content which are the reasons behind its antimicrobial properties against various gram-negative and gram-positive microorganisms (Budak, H. et al., 2019). Oliveira, et al., (2018) used vinegar as a disinfectant against E. coli in lettuce (Lactuca sativa L.), the average E. coli count on the vegetable before treatment was 3.27 colony-forming units (log cfu/g) and after the 15-minute treatment of vinegar, the experimentation resulted to 0.76 log cfu/g count of E. coli.

The researchers used lemon juice and 4% acetic acid vinegar in different concentrations (0%, 50%, and 100%), and they also treated the granola potatoes for a specific timeframe (30 minutes) to reduce the amounts of E. coli found in them.

Statement of the Problem

This study aims to expound on the effects of lemon juice and vinegar solution in reducing the amount of E. coli in granola potatoes.

Specifically, this sought to explore the following;

1. Investigate the difference in the reduced colony-forming units of E. coli in granola potatoes when applied with different concentrations of lemon juice and vinegar solution.
    a. 0%
    b. 50%
    c. 100%
2. Determine how the colony-forming units of E. coli vary at a specific timeframe for both lemon juice and vinegar treatments.
    a. 30 minutes
3. Discern the effects of lemon juice and vinegar solution when applied to granola potatoes.

Significance of the Study

The study focused on benefiting the agricultural sector, farmers, consumers, and future researchers. This study can further help the aforementioned sectors to provide an alternative to the traditional way of testing for E. coli.

A. Agriculture Sector

This also aims to provide the agriculture sector with a cost-effective and environmentally friendly approach to improving food safety and quality. The success of this research can lead to a lesser risk of contamination in crops and better-grade vegetables, particularly potatoes.

B. Farmers

Similarly, farmers and laborers in the field of agriculture are equipped with accessible methods to improve the quality of potatoes and lessen their losses as their products are less susceptible to contamination and decay.

C. Consumers

Moreover, consumers who use potatoes as a staple in their diets profited from this study due to the method presented is inexpensive and can be performed at their house. They will also be safe from E. coli-induced illnesses due to the effect of lemon juice and vinegar on granola potatoes resulting in microbiologically safe for human consumption.

D. Future Researchers

Lastly, future researchers benefited from this study for it can be a foundation for exploring other gram-negative and gram-positive bacteria and yeast pathogens in food that are typically consumed and are the source of different illnesses.

Scope and Delimitations

The researchers aim to evaluate and compare the effectiveness of lemon juice and vinegar solution in reducing the presence of E. coli bacteria in granola potatoes. The study involved treating contaminated potatoes with these variables and measuring the colony-forming units through microbiological laboratory analysis. The experiment was conducted under controlled laboratory conditions to ensure accurate and consistent results.

This study was limited to using only lemon juice and vinegar solution, it focused on a specific type of potato and a single bacterial strain, E. coli. The study only tested specified application methods and did not explore other environmental conditions or large-scale effects.

MATERIALS AND METHODS

Experimental Procedure

The researchers gathered 2 kilos of granola potatoes with similar sizes for the experiment. Moreover, a commercial vinegar product with 4% acetic acid content was used to create the solution. Lastly, 2 kilos of lemons were utilized to extract the juices for the solution. Next, they used 0%, 50%, and 100% concentration for every 350 mL of solution to proceed with the experiment. This exact measurement was used based on the required sample amount by the laboratory testing facility.

The procedure continued with the soaking of the potatoes for 30 minutes under each solution, therefore the researchers were left with 9 samples of C. limon and acetic acid solutions with varying concentrations (0%, 50%, and 100%). Each sample was labeled according to their concentration along with the timeframe they were tested in. These were sent to Hydrolab Company for total coliform detection and E. coli detection by performing the enzyme-substrate test.

Enzyme-substrate Test for Detection of Total Coliforms and E. coli

The enzyme-substrate Test for the detection of total coliforms and E. coli used the reagent Colilert, which contains two nutrient indicators, ortho-Nitrophenyl-β-galactoside (ONPG) and 4-methyl-umbelliferyl-β -D-glucoside (MUG). These are metabolized by total coliforms and E. coli. When total coliforms metabolize ONPG, the sample turns yellow; when E. coli metabolize MUG, the sample fluoresces.

To identify the amount of coliforms detected, hydrolyzable chromogenic and fluorogenic substrates are used in detecting E. coli through coliform units per 100 mL of solution. In this method, the release of chromogen indicates that coliform bacteria are present, and the release of fluorogen indicates that E. coli are present (Palmer, C.J. et al., 2004).

A. Laboratory equipment and supplies

Sample Containers	Laboratory Supplies
Wide-mouth sterile plastic container	IDEXX Quanti-tray / 2000 multi-well trays
Non-corrosive glass bottles with non-leaking caps	IDEXX Quanti-tray / 2000 comparator
Sterile plastic bags	Colilert test media
Chemical Preservatives	Sterile mixing vessels
Sodium thiosulfate ($Na_2S_2O_3$) tablets	Quanti-cult QC kit
Laboratory Equipment	SimPlate for HPC
Incubator	Tryptic Soy Broth (TSB) (single and double strength)
Biological indicator incubator	Biological indicator capsules
Autoclave	Maximum temperature thermometer
Refrigerator	NIST-calibrated thermometers (with 0.1 increments)
IDEXX Quanti-tray sealer	Specific conductivity low-level calibration standard
Conductivity meter	pH 4, 7, and 10 calibration buffers
pH meter	Sterile 5mL and 1mL glass pipettes
Balance	Pipette bulb

Water purification system	1L glass flasks
6-watt, 365-nm UV lamp	100mL class A or B graduated cylinder
	Glass beakers
	Anti-bacterial cleaning wipes
	Powderless latex/nitrile gloves
	Sterile water

B. Procedure for total coliform detection

A 100mL volume of sample was mixed with commercially prepared enzyme-substrates and incubated at 35 +/- 0.5 C for 24 hours. Beta-galactosidase, an enzyme created by total coliforms, is detected by hydrolysis of the chromogenic substrates ONPG (ortho-nitrophenyl-beta-D-galactopyranoside) and CPRG (chlorophenol red-beta-D-galactopyranoside). Beta-glucuronidase, an enzyme produced by E. coli, is detected by hydrolysis of the fluorescent substrate MUG (4-methylumbelliferyl-beta-D-glucuronide).

Bowman and Moone (2021) noted that Hydrolyzed ONPG is seen as a yellow color after incubation for 24 to 28 hours and hydrolyzed CPRG shows a red or magenta color, showing that either condition is positive for total coliforms. Meanwhile, Hydrolyzed MUG is seen as blue fluorescence when viewed under long-wavelength (366 nm) ultraviolet light, indicating a positive test for E. coli. However, No color from ONPG, or a yellow color from CPRG, indicates a negative result for total coliform detection.

C. Procedure for E. coli detection and coliform count

The samples were poured on the Colilert reagent mixture directly into the tray avoiding contact with the foil tab. These were then sealed using the Quanti-Tray sealer. After enclosing the samples, these were incubated in an inoculated tray for 24 hours at 35° ± 0.5°C for Colilert.

To count the number of positive wells using Colilert the Hydrolab Company laboratory referred to the Most Probable Number (MPN) table to determine the MPN of total coliforms (yellow wells) and E.coli (fluorescent wells) in the samples. The color and fluorescence intensity of positive wells may vary.

The MPN technique is a method used for estimating the number of pathogens present in a food or water sample. In this technique, replicate portions of the original sample are cultured to perform a confirmatory test on the presence or absence of microorganisms in each portion. In this study, the focus will be on E. coli and how the solutions presented will reduce its presence (Onyeaka, H. and Nwabor, Ozioma. 2022)

RESULTS AND DISCUSSION

Enzyme-substrate test for total coliform detection on granola potatoes

Table 1 shows the effect of using varying concentrations (0%, 50%, 100%) of acetic acid solution and C. limon solution on granola potatoes. An enzyme-substrate test was performed to evaluate the total coliform detection between the two solutions.

Table 1. Total coliform detection of acetic acid and C. limon on granola potatoes

Acetic acid			
Trial	**Control**	**50%**	**100%**
1	3.1 MPN/100 mL	1 MPN/100 mL	<1 MPN/100 mL
2	3 MPN/100 mL	1 MPN/100 mL	<1 MPN/100 mL
3	3.1 MPN/100 mL	1 MPN/100 mL	<1 MPN/100 mL
C. limon			
Trial	**Control**	**50%**	**100%**
1	3.1 MPN/100 mL	1 MPN/100 mL	1 MPN/100 mL
2	3 MPN/100 mL	1 MPN/100 mL	1 MPN/100 mL
3	3.1 MPN/100 mL	1 MPN/100 mL	1 MPN/100 mL

Odonkor and Mahami (2020) reported that a <1 count of total coliform per 100 mL of liquid is considered safe for consumption. A count of 1–10 MPN/100 mL is deemed as low risk, 11–100 MPN/100 mL is medium risk while a count greater than 100 MPN/100 mL is noted as high risk, according to the World Health Organization (WHO).

The table shows that the control group for trials 1, 2, and 3 under acetic acid and C. limon resulted in a total coliform count of >2419.6 MPN/100 mL, >2406.7 MPN/100 mL, and >2398.7 MPN/100 mL respectively. These levels are considered high risk for contamination and pathogens which are harmful to human consumption.

As for the trials that are included in the 50% concentration for acetic acid, trials 1, 2, and 3 all showed <1 MPN/100 mL which is suitable to consume. However, trials 1, 2, and 3 under C. limon resulted in 2.1 MPN/100 mL, 2.2 MPN/100 mL, and 2 MPN/100 mL respectively which is low risk.

Lastly, all of the trials with 100% concentration under both solutions showed <1 MPN/100 mL which is safe for consumption, therefore both solutions are the most effective and of ideal use when applied at 100% concentration.

Enzyme-substrate test for E. coli detection on

granola potatoes

Table 2 demonstrates the effect of using acetic acid and C. limon solutions under varying concentrations (0%, 50%, 100%) on granola potatoes. In evaluating the results of E. coli detection, an enzyme-substrate test was performed.

Table 2. E. coli detection of acetic acid and C. limon on granola potatoes

Acetic acid			
Trial	**Control**	**50%**	**100%**
1	>2419.6 MPN/100 mL	<1 MPN/100 mL	<1 MPN/100 mL
2	>2406.7 MPN/100 mL	<1 MPN/100 mL	<1 MPN/100 mL
3	>2398.7 MPN/100 mL	<1 MPN/100 mL	<1 MPN/100 mL
C. limon			
Trial	**Control**	**50%**	**100%**
1	>2419.6 MPN/100 mL	2.1 MPN/100 mL	<1 MPN/100 mL
2	>2406.7 MPN/100 mL	2.2 MPN/100 mL	<1 MPN/100 mL
3	>2398.7 MPN/100 mL	2 MPN/100 mL	<1 MPN/100 mL

The enzyme-substrate test for E.coli detection for vegetables is evaluated to be safe for consumption when it has <1 cfu/log, the exceeding limit for this rate is 3 cfu/log, considering that 1 cfu/log is equivalent to 1 MPN/100 mL. When the detection of E. coli surpasses the limit, it is considered high risk and unsafe to consume by humans (Hewitt, J. et al., 2016).

Patorgo and Magtibay (2021) reported that the contaminated drinking water in Surigao del Sur, Philippines, showed >1.1 MPN/100 mL which tested positive for the fecal coliform test, therefore detecting E. coli.

Table 2, shows the E. coli detection for 0% concentration under trials 1, 2, and 3 for acetic acid and C. limon solutions are 3.1 MPN/100 mL, 3 MPN/100 mL, and 3.1 MPN/100 mL respectively. This indicates that it is not suitable for consumption and is considered high-risk.

In the evaluation of E. coli for 50% concentration, all samples for the 3 trials and both solutions resulted in 1 MPN/100 mL which is not ideal to consume because the safe level is <1 MPN/100 mL.

Lastly, all trials 1, 2, and 3 under 100% concentration applied with the acetic acid solution showed <1 MPN/100 mL which is the accepted rate for human consumption. However, C. limon resulted in 1 MPN/100 mL, indicating that the result did not change from the 50% concentration.

In the E. coli detection using enzyme-substrate test, acetic acid exhibited that it can reduce the presence of E. coli to a level that is safe for humans to consume compared to C. limon which can also reduce its presence, but not to an extent that is safe for eating.

Paired T-test results on the enzyme-substrate test for total coliform detection on granola potatoes

A paired T-test was used to analyze the performance of acetic acid and C. limon when applied to granola potatoes. This will be used to compare the efficacy of both solutions and to identify which of the two can significantly decrease the presence of E. coli.

Table 3. Paired T-Test for total coliform detection to compare the performance of acetic acid and C. limon on granola potatoes

Paired Samples T-Test

			statistic	df	p	Mean difference	SE difference		Effect Size
Acetic acid	Citrus l.	Student's t	-1.99	8.00	0.082	-0.367	0.184	Cohen's d	-0.664

Note. H_a $\mu_{\text{Measure 1 - Measure 2}} \neq 0$

The use of acetic acid showed lower levels of total coliforms detected under the enzyme-substrate test (M=803, SD=1204) than C. limon (M=804, SD=1203), t(8)=-1.99, p=0.082.

Paired T-test results on the enzyme-substrate test for E. coli detection on granola potatoes

The paired T-test was performed on the results of acetic acid and C. limon from the E. coli detection using enzyme-substrate test. This will be the basis in comparing the effectiveness of both solutions and to observe which of them can decrease the presence of E. coli significantly.

Table 4. Paired T-test for total coliform detection to compare the performance of acetic acid and C. limon on granola potatoes

Paired Samples T-Test

			statistic	df	p	Mean difference	SE difference		Effect Size
Acetic acid	Citrus l.	Student's t	NaN	8.00	NaN	0.00	0.00	Cohen's d	NaN

Note. H_a $\mu_{\text{Measure 1 - Measure 2}} \neq 0$

The use of acetic acid showed that there is an equal number of E. coli detected under the enzyme-substrate test (M=1.69, SD=1.03) with C. limon (M=1.69, SD=1.03), t(8)=NaN, p=NaN.

CONCLUSIONS AND RECOMMENDATIONS

Conclusion

In achieving the research objectives of this study, the statement of the problem presented has been answered and proven with the use of the methodology performed on the variables.

1. **Is there a significant difference in the reduced colony-forming units of E. coli in granola potatoes when applied with different concentrations of lemon juice and vinegar solution?**

The researchers conducted 3 trials for the 3 concentrations presented which are 0%, 50%, and 100%.

Samples under the control group showed that there is a consistency with the number of coliforms and E. coli present and these numbers were concluded to be unsafe to consume (3-2419.6 MPN/100 mL).

With the samples applied with a 50% concentration of each solution, it indicated that the solutions were effective in decreasing the amount of E. coli, however acetic acid had a greater effect by 1 MPN/100 mL on the potatoes compared to C. limon which is 2 MPN/100 mL. Lastly, the 100% concentration showed that the use of acetic acid on granola potatoes can decrease the risk of foodborne illnesses as the presence of E. coli was reduced to a level where it can be consumed by humans by <1 MPN/100 mL. On the other hand, the results on the use of acetic acid were consistent with the results shown under the 50% concentration.

2. **How do the colony-forming units of E. coli vary at a specific timeframe for both lemon juice and vinegar treatments?**

The researchers compared the results of the enzyme-substrate test for the potatoes with acetic acid and C. limon to the control group after performing an experiment where in the solutions were applied for 30 minutes. Upon evaluation of the results, it showed that both solutions are capable of reducing the number of total coliforms and E. coli in the granola potatoes, however only acetic acid can decrease the number of E. coli to an amount safe for consumption that is <1 MPN/100 mL which is the safe amount for eating produce.

This suggests the possibility that C. limon can be as effective as acetic acid if the timeframe is longer as well as that acetic acid can produce the same results at a shorter time of exposure to the solutions.

3. **Is there a significant difference in the effects of lemon juice and vinegar solution when applied to granola potatoes?**

The experimentation and analysis conducted helped the researchers conclude that the use of a 100% concentration of acetic acid or a commercial vinegar solution is more effective as compared to the use of a C. limon solution. This was concluded with the use of an enzyme-substrate test which identified the detection of total coliforms and E. coli.

After the laboratory analysis, the use of acetic acid at a 100% concentration resulted to an amount of E. coli which is <1 MPN/100 mL which is the level suitable for humans to eat. Therefore, it is more suitable for household use and more effective as compared to C. limon which only reduced E. coli to a low-risk level of 1 MPN/100 mL about the 30-minute experimentation.

Recommendations

Based on the findings of this study and the conclusions drawn, the researchers observed that the were discrepancies that could have improved the outcome of the experiment and tests conducted. These shortcomings when resolved can increase the reliability of the results shown in this study.

Due to the lack of a financial budget from the researchers, they were not able to conduct multiple trials of the experiment. Performing more trials can help future researchers observe the consistency of outcomes from the tests conducted as 3 trials are not enough to conclude the proper efficacy of the solutions.

For the same reason, the researchers were also not able to input a variety of timeframes as their funds can only cater to one timeframe which was 30 minutes. Adding more time-frequency can help specify the accuracy of the solutions when it is the most effective to ensure that the application of the solution will be cost-effective and time-efficient.

Moreover, the study only focused on two independent variables which are acetic acid and C. limon, therefore the researchers recommend exploring other household products with antimicrobial properties such as; calamansi (Citrofotunella microcarpa) and garlic (Allium sativum) which are more common as compared to the ones used in this study.

In this study, the researchers only used one dependent variable which is the granola potato. This limited the study to explore the efficacy of the solutions on other produce which can affect its effectiveness towards other food. The researchers recommend proposing a variation of fruits or vegetables that are commonly consumed which can be applied with the same solutions or a new set of independent variables.

Lastly, the researchers recommend using other forms of testing for the detection of total coliforms and E. coli as well as to test other food pathogens like Salmonella enterica (Salmonella), S. aureus, L. monocytogenes, etc. which are common causes of illnesses brought by improper handling of food.

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The Potential of Okra (*Abelmoschus esculentus*) and Duckweed (*Lemna minor*) as an Effective Wastewater Cleaner

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Abstract: This study aims to explore the potential of combining okra (Abelmoschus esculentus), specifically powderized okra and the seed extract of okra, and duckweed (Lemna minor) as a natural, eco-friendly solution for wastewater treatment, aimed at addressing the severe water pollution issues in the Philippines, more specifically in the city of Navotas, Metro Manila. With plastic waste and inadequate sanitation services contributing to the degradation of water quality, this research tests whether the properties of okra powder's mucilage and seed extract, alongside the duckweed's filtration abilities, can effectively improve water clarity and reduce contaminants in wastewater. Wastewater samples from Navotas were exposed to varying concentrations of okra powder, okra seed extract, and duckweed, and the water's pH level and clarity were monitored for over the course of exactly five (5) days. Despite promising results in prior studies, the combined use of okra and duckweed was found to be ineffective after the experiment. The water samples remained acidic when compared to the control sample, and the presence of insect larvae in the samples subjected to okra powder suggested that the treatment did not adequately purify the samples, unlike what was reflected in prior studies. These findings contribute to a deeper understanding of plant-based bioremediation methods and suggest that while okra and duckweed may hold potential, their combined use may not be suitable for wastewater treatment under the tested conditions. The study highlights the need for further exploration of natural solutions to address water pollution and underscores the complexity of effective water purification techniques.

Key Words: Okra, okra powder, seed extract, *Abelmoschus esculentus*, duckweed, *Lemna minor*, wastewater cleaner, Navotas, Philippines

1. INTRODUCTION

1.1 Background of the Study

Water pollution has been a rampant issue for society in recent years, especially for the Philippines, because it not only presents risks to Filipinos' health, but also directly affects the country's economy and environment (Koons, 2024). This renders most water sources in the Philippines as unsafe and unsanitary, risking the lives and well-being of over 3 million people nationwide (Macapagal, 2022). Some factors directly influencing this situation include the inadequate amount of accessible sanitation services in the Philippines, failing to cater to over 7 million Filipinos and thus leading to a major increase in the country's amount of accumulated wastewater (Filipenco, 2024). This problem not only exposes the citizens' well-being to harm, but also endangers a

sizeable amount of endemic aquatic species as per the World Bank, around two-thirds of all freshwater in the Philippines would be too polluted to support life eventually (Water Pollution in the Philippines: Metropolitan Manila Area, 2020).

As a solution to this, the scientific community has continuously been looking into natural and accessible remedies that could be used as a wastewater cleaner. Specifically, they have been exploring the wastewater cleaning potential of okra (Abelmoschus esculentus), namely okra powder and its seed extract, with studies such as the one conducted by Carneiro-Marra, Sad, and Silva-Batista (2019), stating that since okra powder has fibers together with mucilage that can increase turbidity removal, it is a promising treatment to industrial textile wastewater when utilized in low concentrations. Moreover, in another study by Ahirwar (2021), they have discovered that okra seed extracts can be utilized as a natural coagulant for water samples.

On the other hand, often used for waterscaping and aquarium maintenance, duckweed (Lemna minor) is a small aquatic green plant that flourishes in water with high levels of phosphorus and nitrogen (Ross, 2016). It is known to have a strong bioremediation method that can mitigate contamination in aquatic habitats, proving to be capable of maintaining an environment that can support life. It can neutralize pH levels, reduce chemical and biological oxygen demand, and remove larvae and coliform bacteria in wastewater (Ziegler et al., 2016). Moreover, it can also function as a natural water filter and can be effective at accumulating carbon, nitrogen, phosphorus, pathogens, and toxins (Zhou et al., 2023).

1.2 Statement of Objectives

The researchers aim to investigate the potential of okra and duckweed together as an effective wastewater cleaner and seeks to produce results that will contribute to the current findings of the scientific community regarding the uses of okra and duckweed as wastewater cleaners individually, by combining them to provide an eco-friendly solution on minimizing the Philippines' large contributions to the world's overall water pollution. Specifically, it seeks to achieve the following objectives:

1. Observe the capability and effectiveness of the combination of okra and duckweed in clearing the water samples; and
2. Determine what concentration values of okra and duckweed were able to perform best in purifying the wastewater samples based on its final pH level and overall turbidity.

1.3 Significance of the Study

This study on assessing the potential of okra and duckweed as a possible solution to the growing problem with water pollution in the Philippines will be beneficial and significant to the following:

Scientific Community. Through this study, the scientific community may be able to examine and infer how okra and duckweed function together as a possible industry wastewater cleaner and how the formula could be altered and what must be manipulated in order to discover more probable ingredients in producing viable water cleaners.

Philippine Government. The study will be significant to the government as it provides a natural, affordable, and eco-friendly solution to the on-going issue with water pollution. Moreover, they will be pushed to seek a long-term remedy for water pollution in the Philippines before it worsens and affects the nation as a whole.

Education Sector. This study can benefit the education sector by presenting a chance to initiate interdisciplinary learning, providing direct experience with solving nationwide problems by utilizing environmental advantage. This study can further improve science instruction and encourage students to think of creative answers to global problems while also promoting environmental awareness and sensitivity.

Future Researchers. This study offers an insightful foundation to researchers regarding the capabilities of okra and duckweed combined as a wastewater cleaner, should they be interested in addressing the

research gaps recognized in this study or pursue related and/or similar studies in relation to natural remedies for water pollution.

1.4 Scope and Delimitation

This study's scope mainly targeted collecting samples from the bodies of water in the city of Navotas, which will serve as the wastewater samples per trial for the entire experiment.

Moreover, the study was further limited by the quantity of okra employed in the experiment, the total number of okra preparation methods that the researchers are capable of executing, and the researchers' inability to have each trial sample be properly lab tested in order to determine the specific and necessary parameters for classifying each trial result.

2. METHODOLOGY

2.1 Research Design

This study adopted the quantitative-experimental research design, specifically being a true experimental research that seeks to prove or disprove a hypothesis, requiring a control group which would not be subjected to any changes or manipulation, and an experimental group which would be subjected to changes and manipulation, in order to fully assess the potential capabilities of okra and duckweed as wastewater cleaners.

2.2 Research Instrument

This study utilized an observation checklist to completely assess the state of the experimental trials. This checklist included parameters such as the water's pH level and the water's physical attributes, namely its overall clearness and transparency, before and after being subjected to the different concentrations of okra and duckweed.

2.3 Data Collection Technique

The researchers' data collection technique utilized a 50mL water sample concentration per trial with each variable, which also have their respective concentrations. These tests were left untouched, and each container was covered with plastic wrap to avoid further unwanted contamination, for five (5) days to let the okra and duckweed process and clear the wastewater samples. Then, a pH testing strip was used on each sample after the five weeks to measure the pH level of each sample. Afterwards, the results of the experiment were reflected on the following data tables:

Table 1. Trial Data Table for the Testing of Okra

Preparation Method	Trial No.	0mL	1mL	2mL	3mL
Seed Extract	1				
	2				
	3				
Okra Powder	1				
	2				
	3				

This data table's concentration values are anchored on the study of Ahirwar et al. (2021), which involved the use of 1mL, 2mL, 3mL, 4mL, 5mL, and 6mL of powdered okra concentrations combined with 1L of water to test the most viable concentration for treating the Narmada River in India, along with a set control sample as a measure of reference. However, considering the insufficient quantity of materials, the researchers have limited the study to following only until the 3mL concentration value.

Table 2. Trial Data Table for the Testing of Duckweed

Trial No.	0%	25%	50%	75%
1				
2				
3				

This data table's concentration values are anchored on the study of Selvarani et al. (2021), which involved 0%, 25%, 50%, and 75% concentration levels, proportional to the water sample, of duckweed to test its potential in treating municipal and industrial wastewaters in Bangladesh, Israel, and the U.S.

2.4 Data Gathering Procedure

Material Sourcing

Before starting the experiment, the researchers sought out the various materials needed to officially start the experiment, namely: 1,350mL of wastewater from the Navotas River, 225g of duckweed, 3kg of okra, 27 pcs. of 50ml beakers/containers, a graduated cylinder, a digital weighing scale, a mortar and pestle, a strainer, 20 pcs. of red litmus paper, 20 pcs. of blue litmus paper, and plastic wrap.

Preparing the Okra Powder and Seed Extract

After completing the materials, the researchers set out to prepare the okra to be turned into powder and to get its seed extract. To do this, the researchers first scraped out the seeds from the fruit of the plant and set them aside. The shell was dried in the oven for 24 hours, and then blended to get a powder. The seeds, on the other hand, were pulverized using the mortar and pestle in order to force out the seed extract.

Measuring the Materials

Once the okra was prepared, the researchers proceeded to measure all of the materials to their needed concentration values. The water sample was divided into 27, making every trial have 50mL of water each. Afterwards, the okra powder and seed extract was measured and divided into 1g, 2g, and 3g, with each concentration value being multiplied by 3 to accommodate the three trials needed for the experiment. Finally, the duckweed was measured into the 25%, 50%, and 75% concentration values proportional to the amount of wastewater sample per trial. These concentration values were then translated into grams, which equated to 12.5g, 25g, and 37.5g respectively.

Adding the Variables to the Wastewater Samples

When everything was measured in accordance to their set concentration values, each variable was added to their respective water sample. Additionally, the okra powder and seed extract trials were subjected to a 1-min stirring in order to fully release their respective attributes that contribute to purifying the wastewater sample. After completing this process, the samples were left untouched for exactly 5 days.

Testing the Samples After 5 Days

After 5 days, the samples were revisited and taken out of their storage area for testing. Each sample was tested with both red and blue litmus paper, and then was carefully strained to remove the okra powder, seed extract, and duckweed to then assess the turbidity of the water sample after being subjected to the aforementioned variables.

Analyzing the Data Sets

Once all the samples have been tested through the use of red and blue litmus paper, the results have been divided into three categories according to their inferred pH levels that were reflected on the litmus paper: 1) <6, pertaining to the water being acidic; 2) 7, pertaining to the water being neutral; and 3) 7>, pertaining to the water being basic. The collected data were then noted and interpreted accordingly, alongside the observation results regarding the amount of turbidity removed after the 5-day exposure to the variables.

3. RESULTS AND DISCUSSIONS

Figure 1. Outcome of the Water Samples Subjected to Okra Powder



From this figure, one can infer that the okra powder treatment has been proven to be ineffective as a wastewater cleaner due to its outcome after 5 days. It has also managed to breed a significant amount of insect larvae, further disproving its effectiveness.

Figure 2. Turbidity of the Water Samples Subjected to the Seed Extract of Okra



Figure 3. Turbidity of the Water Samples Subjected to Duckweed (12.5g)

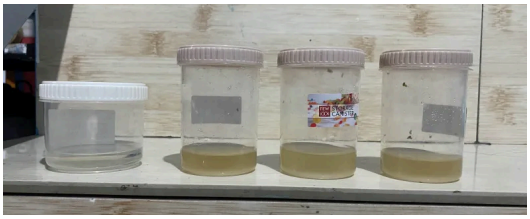


Figure 3.1. Turbidity of the Water Samples Subjected to Duckweed (25g)



Figure 3.2. Turbidity of the Water Samples Subjected to Duckweed (37.5g)



Figures 2 to 3.2 showcase the appearance of the trials after being subjected to their respective variables. Instead of clearing the wastewater samples, the variables have all colorized the wastewater, ranging from light yellow to dark brown. This reflects that both variables, the seed extract of okra and duckweed, are unable to successfully remove the turbidity of the water sample, but instead, worsen it.

Table 3. Reflected pH Levels of the Water Samples Subjected to the Seed Extract of Okra

Trial	0mL	1mL	2mL	3mL
1	<6	7	<6	<6
2	<6	<6	7	7
3	<6	<6	7	7

Table 4. Reflected pH Levels of the Water Samples Subjected to Duckweed

Trial	0%	25%	50%	75%
1	<6	<6	7	<6
2	<6	7	<6	<6
3	<6	7	<6	7

Tables 1 and 2 reflect the inferred pH level of each trial per variable according to the pH scale. The trials are labeled as "<6" or "acidic" if the red litmus paper darkens and the blue litmus paper shows tints of red. Meanwhile, it is labeled as "7" or "neutral" if both the red and blue litmus paper only darken. From Table 1, it can be observed that the average pH level is <6, only having 5 out of 12 samples' pH level turn neutral, suggesting that the variable barely helped in purifying the water samples. From Table 2, on the other hand, only 4 out of 12 samples reflected a neutral pH level, suggesting that the variable is also an ineffective wastewater cleaner.

4. CONCLUSION AND RECOMMENDATIONS

This study examined the potential of okra (*Abelmoschus esculentus*) and duckweed (*Lemna minor*) as natural agents for wastewater treatment, specifically targeting water pollution in the Philippines. Overall, the study's goals and objectives have been successfully met. The results indicated that while the variables showed nothing to limited purification effects in terms of the water's turbidity, the combination of okra seed extract and duckweed exhibited some success in neutralizing the pH of the wastewater sample. However, the overall results were not as effective as initially expected based on past studies, given also the limitations of the study. Additionally, based on the outcome of the okra powder samples, it is to be taken into account certain parameters and external factors that could possibly affect, either negatively or positively, the final outcome of the experiment. In conclusion, the experiment reflected that okra and duckweed combined has proven to be an unviable natural wastewater cleaner in and of itself.

By these means, the researchers would like to recommend the following to the study's beneficiaries:

Future Researchers

1. Ensure that the storage area for the samples will be kept at a constant temperature and will not be infiltrated by any other external factors;
2. Consider experimenting with a larger concentration value for the wastewater samples and the manipulating variables;
3. Consider targeting a different wastewater sample source;
4. Have the control and experimental group of samples be tested for other parameters such as different chemicals (Mercury, Lead, Phosphorus, etc.); and
5. Explore other possible manipulating variables and/or preparation methods that can be added.

Philippine Government

1. Support more studies that cater to solving the Philippines' problem with pollution and its inflicted effects on Filipinos and the Philippine economy.

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Comparative Study of Sodium Dodecyl Sulfate and Chlorine's Self-Cleaning Efficacy for *Escherichia Coli* from Navotas River

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Abstract: Water pollution in urban rivers poses a significant threat to public health and environmental sustainability. The Navotas River, a vital waterway in the Philippines, is heavily contaminated with *Escherichia coli (E. coli)*, a bacterium associated with fecal pollution and waterborne diseases. This study evaluates the cleaning efficacy of sodium dodecyl sulfate (SDS) and chlorine in reducing *E. coli* contamination in wastewater samples from the river. A comparative experimental design was employed, wherein water samples were collected and tested for *E. coli* presence using the Standard Methods for the Examination of Water and Wastewater (SMEWW 9221). Bacterial isolation was performed using Eosin Methylene Blue (EMB) Agar to confirm *E. coli* colonies based on their characteristic green metallic sheen. Isolated colonies were transferred to Nutrient Agar (NA) plates for further incubation. The samples were then treated with SDS and chlorine at concentrations ranging from 0.5 %, 1.0 %, 1.5 %, 2.0 %, 2.5 %, and 3.0 %. Bacterial reduction was analyzed using the Sharpie method for colony counting, and statistical analysis was conducted to compare treatment efficacy. Results indicate that SDS achieved significantly higher bacterial reduction than chlorine. At 3.0% concentration, SDS reduced *E. coli* by 98.98%, whereas chlorine only achieved a 54.35% reduction. These findings suggest that SDS is a more effective cleaning agent for mitigating *E. coli* contamination in polluted waterways. This study contributes to water treatment research by exploring alternative cleaning agents for urban rivers. Further research is recommended to assess the ecological impact of SDS and its feasibility for large-scale water treatment applications.

Keywords: *Escherichia coli*; Sodium dodecyl sulfate; Chlorine; Water pollution; Navotas River; Water treatment

1. Introduction

1.1 Background of the study

Water pollution in urban rivers is threatening to the environment and public health. The Navotas River, located in the western part of the National Capital Region in the Philippines, is a key waterway flowing into Manila Bay. When a body of water is contaminated by chemicals and materials, it can cause disruptions for practices of local people and habitability of marine life and water-dependent plants (Fisher & Phillips, 2009). Navotas River, being a waterway to Manila Bay, can have an effect on the contamination of microorganisms in the body of water. The presence of pathogenic bacteria including gram-positive and gram-negative bacteria, makes the water non-potable, which poses a threat to the public health, except if treatment is done to the water.

In the Philippines—a country surrounded by bodies of water, the locals rely on what water source is usually available. People living near bodies of water such as *esteros* are used as the primary water source of Filipinos. Although most *esteros* are known to be polluted by residual wastes of the locals. The water from *esteros* in Navotas further contaminates the body of water, even though the Navotas River itself is already polluted due to the malpractices of people (Encarnacion et al., 2024). Since the Navotas River contributes a lot for industrial activities and general flow to other bodies of water, if it is polluted, biological life will be affected.

The Navotas River is known to receive a continuous influx of wastewater (Poquita-Du & Todd, 2015), thus contributing to its poor water quality. *Escherichia coli*, also known as *E. coli*, is a gram-negative bacteria normally found in the human and animals gastrointestinal tract but is also present in most polluted water and poses a threat to

environmental and human health (Fisher & Phillips, 2009) . Among the most concerning contaminants is *E. coli,* it has the ability to spread from person to person through fecal-oral route, unchlorinated water, and contaminated food that may lead to life threatening conditions(Ahmed & Mohammednour, 2024). In urban waterways like Navotas River, *E. coli* contamination is primarily due to untreated sewage, agricultural runoff, and improper waste disposal. Since *E. coli* is also an indicator of fecal contamination, its presence signals the potential existence of other harmful microorganisms that can threaten public health.

To address this issue, self-cleaning agents such as Sodium Dodecyl Sulfate (SDS) and chlorine have been widely studied and used for their performance to eliminate microbial contaminants from water systems. SDS, a cleaning agent usually found in detergents, has been shown to mess with bacterial membranes, making it an effective antimicrobial agent (Kumar et al., 2021). Chlorine, on the other hand, is one of the most widely used disinfectants for water treatment due to its ability to kill bacteria by oxidizing cellular components (Fauzi et al., 2024). However, the comparative efficacy of SDS and chlorine in reducing *E. coli* in highly contaminated water bodies like Navotas River remains understudied.

1.2 Statement of the Problem

This study intends to evaluate and compare the self-cleaning efficacy of sodium dodecyl sulfate and chlorine in eliminating *E. coli* from the Navotas coastal dike.

The study sought to achieve the following questions:

1. Is there a significant difference in the effectiveness of self-cleaning agents in reducing the presence of *E. coli*?
2. In terms of eliminating *E. coli* from wastewater, which substance is more effective at self-cleaning: chlorine or sodium dodecyl sulfate?
3. How does varying levels of concentration of sodium dodecyl sulfate and chlorine influence their cleaning effectiveness?

1.3 Scope and Delimitation

This study aims to assess the effectiveness of sodium dodecyl sulfate (SDS) and chlorine as self-cleaning agents in reducing *E. coli* contamination in the Navotas River. The research specifically focuses on bacterial reduction and does not extend to analyzing other pollutants, chemical byproducts, or external environmental factors such as temperature, pH, and organic matter content.

To determine the efficacy of these agents, SDS and chlorine will be tested at varying concentrations of 0.5%, 1%, 1.5%, 2%, 2.5%, and 3%. Laboratory testing will be conducted to confirm E. coli presence before and after treatment, allowing for a comparative analysis of their effectiveness. Given the study's short-term nature, it will examine only the immediate impact of SDS and chlorine on bacterial reduction, with findings specific to the Navotas River. While the results may provide insights into improving water treatment strategies, they are not intended for direct generalization to other water bodies.

1. 4 Significance of the Study

The study of Sodium Dodecyl Sulfate and Chlorine's Self-Cleaning Efficacy for *E. coli* has significance in multiple fields, including public health, environmental remediation, scientific knowledge, and as a reference for future academic researchers.

As for **public health**, *E. coli* is commonly found in polluted rivers and water sources, posing significant health risks, including gastrointestinal diseases and infections. The Navotas River, a vital waterway in the Philippines, suffers from contamination due to untreated sewage and industrial waste. By comparing the self-cleaning efficacy of Sodium Dodecyl Sulfate and Chlorine.

As for **environmental remediation**, this study provides insights into how SDS and Chlorine can contribute to reducing microbial contamination in highly polluted urban rivers like the Navotas River. Both cleaning agents have been noted for their potential in breaking down bacterial contaminants. This research could aid in developing effective water treatment strategies for improving water quality and ecosystem health.

As for **scientific knowledge**, the study enhances our understanding of the antimicrobial properties of SDS and Chlorine, particularly in targeting *E. coli*, a waterborne bacterium associated with severe infections and illnesses. Investigating their effectiveness in real-world scenarios such as the Navotas River can provide valuable data on their potential applications in water purification.

As for **future researchers**, this study serves as a foundation for further exploration into the use of

SDS and Chlorine in bacterial reduction. Future research may focus on optimizing their concentrations, studying their long-term effects on water quality, or even combining them with other treatment methods to enhance efficiency while minimizing environmental impact. Future studies may also adjust conditions like chemical dosage and temperature or explore mixing two chemicals with a third to improve effectiveness and reduce environmental side effects.

2. Materials and Methodology

2.1 Research Design

This study employs a comparative experimental research approach to compare the self-cleaning efficacy of sodium dodecyl sulfate (SDS) and chlorine in reducing *E. coli* from the Navotas River. The study will be conducted in four phases: sample collection, bacterial presumption and confirmation, experimental treatment, and post-treatment analysis.

The collection of water samples is collected from the Navotas River and tested for *E. coli* presence using the SMEWW 9221 method done by AquaLab. Unlike conventional water treatment studies, this research first plates *E. coli* on Eosin Methylene Blue Agar (EMBA) then transferred to Nutrient Agar (NA) plates. The researchers then apply different concentrations of SDS and chlorine directly to the plates. The percentage reduction in bacterial colonies is used to determine the effectiveness of the cleaning agents.

2.2 Research Materials

The materials used in this study were carefully selected to ensure accuracy in sample collection, bacterial testing, treatment application, and microbiological analysis. The water samples were collected using sterilized plastic gallon containers and transferred into a 250 mL Pyrex glass container for laboratory testing. To confirm the presence of *E. coli*, the samples were submitted to AquaLab, where microbiological testing was performed using the SMEWW 9221 or Most Probable Number (MPN) method.

For bacterial isolation, Eosin Methylene Blue (EMB) Agar was used to identify *E. coli* colonies based on their characteristic green metallic sheen, while Nutrient Agar was used for further isolation. A sterile inoculation loop was used for transferring bacterial colonies, and sterile pipettes were utilized for sample handling and treatment application.

To test the effects of the self-cleaning agents, sodium dodecyl sulfate (SDS) and chlorine were used at different concentrations: 0.5 %, 1.0 %, 1.5 %, 2.0 %, 2.5 %, and 3.0 %. Each treatment was diluted in 100 mL of sterile water before application. A DIY incubator, constructed using a Styrofoam box and an incandescent bulb, was used to maintain controlled incubation conditions, with a thermometer included to monitor temperature stability.

2.3 Collection of Water Samples

Water samples were collected from the Singco Ferry Terminal in the Navotas River using sterilized plastic gallon containers to maintain sample integrity and prevent contamination. A 250 mL Pyrex glass container was used for secure transport to AquaLab, where laboratory testing was conducted. Proper handling and sterilization techniques were strictly followed throughout the collection and transport process.

2.4 Presumptive and Confirmatory Test for *E. coli*

To determine and confirm the presence of *E. coli* in the collected water samples, the researchers submitted them to AquaLab for microbiological testing. The Most Probable Number (MPN) method, following Standard Methods for the Examination of Water and Wastewater (SMEWW 9221), was utilized to quantify bacterial contamination levels. The test results confirmed a significant presence of *E. coli*, with a concentration of 7.9×10^7 MPN/100 mL, verifying contamination in the sample. These laboratory results served as both the presumptive and confirmatory tests for *E. coli*, ensuring reliable identification before further experimentation.

2.5 Isolation of *E. coli* using EMB Agar

To isolate *E. coli*, the researchers prepared five EMB Agar plates and dropped 0.1 mL of untreated wastewater onto each plate using sterile pipettes. The plates were then incubated at 37°C for 24 hours inside a DIY incubator, ensuring a controlled environment for bacterial growth. After incubation, the researchers observed the plates for green metallic sheen colonies, a characteristic indicator of *E. coli* presence.

2.6 Isolation of *E. coli* Using Nutrient Agar

Following the initial isolation on EMB Agar, the researchers transferred *E. coli* colonies to Nutrient Agar plates using a sterile inoculation loop to facilitate further bacterial growth. The inoculated plates were

then incubated at 37°C for 24 hours to allow the bacteria to develop under controlled conditions.

2.7 Treatment Application

After incubation, the researchers applied the treatment solutions to the *E. coli*-colonized Nutrient Agar plates. Varying concentrations of SDS and chlorine (0.5%, 1.0%, 1.5%, 2.0%, 2.5%, and 3.0%) were administered using sterile pipettes, with each plate receiving 0.1 mL of the designated treatment. The treated plates were then incubated again at 37°C for 24 hours to assess the effectiveness of the cleaning agents in reducing *E. coli* colonies.

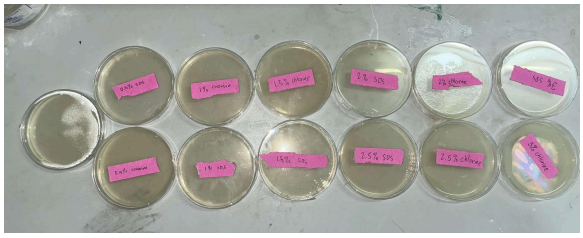


Figure 2.7.1

2.8 Microbiological Analysis

To assess the effectiveness of SDS and chlorine in reducing *E. coli*, the researchers conducted a colony count analysis on the Nutrient Agar plates before and after treatment. The Sharpie method was used to count bacterial colonies by marking visible colonies directly on the plate's underside. A comparison between the untreated and treated samples allowed the researchers to quantify the reduction in *E. coli* and determine the efficacy of each cleaning agent at different concentrations.

2.9 Data Analysis

The collected data were analyzed using quantitative methods to evaluate the self-cleaning efficacy of sodium dodecyl sulfate (SDS) and chlorine in reducing *E. coli* contamination. The reduction in bacterial colonies was determined by comparing the initial and final colony-forming units (CFU) on treated Nutrient Agar plates. Statistical tools were used to ensure accuracy, reliability, and validity in interpreting the results.

Percentage Reduction in *E. coli* Colonies

The percentage reduction in *E. coli* colonies was calculated using the following formula:

$$\text{Percentage Reduction} = \frac{(\text{Initial CFU} - \text{Final CFU})}{\text{Initial CFU}} \times 100$$

Where:

- **Initial CFU** refers to the number of *E. coli* colonies before treatment application.
- **Final CFU** refers to the number of *E. coli* colonies after treatment.

This calculation provided a clear representation of the effectiveness of each SDS and chlorine concentration in reducing bacterial contamination.

Comparative Statistical Analysis (Exploration Description & Bar Graph)

To determine differences in bacterial reduction between SDS and chlorine treatments, statistical analysis was performed using:

- **Exploration Description**: An exploratory analysis was conducted in Jamovi to assess the mean percentage reductions of SDS and chlorine treatments at different concentrations. This analysis provided insights into central tendencies, variability, and potential patterns in bacterial reduction for each treatment.
- **Bar Graph**: A bar graph was used to visually represent the mean bacterial reduction across different concentrations, allowing for a straightforward comparison of treatment effectiveness.

3. Results and Discussion

The method conducted to the wastewater to presume and confirm the presence of *Escherichia coli (E. coli)* was SMEWW 9221 or known as the Multiple-Tube Fermentation technique. Table 1 was drawn to show the results that came from the laboratory AquaLab for the Most Probable Number (MPN) test.

Table 3.1

Parameters	Method reference	Results	Unit	Analist
Escherichia coli	SMEWW 9221	7.9×10^7	MPN/100 mL	ALA

The most probable number of 7.9×10^7 MPN/100mL means that in every 100 milliliter of sample, there are 79 million *E.i* present. This findings aligns with Encarnation et al. (2024), who reported that Navotas city suffers from severe river pollution due to inadequate sewerage systems. The high

bacterial count suggests contamination from sources such as sewage, human and animal waste, industrial discharge, and organic pollutants. Residential areas near water surfaces tend to contribute to high organic waste levels, leading bacterial growth (Dyer et al., 2003).

To ensure the presence of *E. coli* is the only bacteria used, microbiological isolation of bacteria was conducted to separate colonies of *E. coli* using EMBA which was used for the study. Table 2 was shown to display the results of isolation of *E. coli* in EMBA.

Table 3.2

Plate	Colony Presence
1	POSITIVE
2	POSITIVE
3	POSITIVE
4	POSITIVE
5	POSITIVE

This table indicates that the isolation of *Escherichia coli* was successful. The bioluminescence of *E. coli* which are metallic green sheens present confirms the abundance of *E. coli* in the sample.

To easily analyze the colony count of *E. coli*, the researchers transferred the colonies from the EMBA plate to the Nutrient Agar plate using an inoculation loop. Table 3 was shown to display the results of transferring of colonies in the Nutrient Agar plate after incubation.

Table 3.3

Plate	Colony Presence	No. of Colonies
1	POSITIVE	94
2	POSITIVE	97
3	POSITIVE	99
4	POSITIVE	94
5	POSITIVE	98
6	POSITIVE	98
7	POSITIVE	85
8	POSITIVE	82
9	POSITIVE	94
10	POSITIVE	91
11	POSITIVE	90
12	POSITIVE	92

This table shows the off-white round appearance of the transferred colony making the appearance of the bacteria uniform and easier to identify. The results also show the initial colony count of *E.coli* in the Nutrient Agar plate, which will be used as an initial value to calculate for the percentage reduced of the treatment before and after treatment.

E. coli was isolated using Eosin Methylene Blue Agar (EMBA), where all five plates exhibited metallic green sheen colonies, a defining characteristic of *E. coli* (Cheesbrough, 2016). To further verify these findings, Nutrient Agar (NA) was used, enabling better visualization of off-white, round colonies and ensuring accurate enumeration before treatment application. As a non-selective medium, Nutrient Agar supports bacterial growth, allowing controlled colony development before conducting biochemical tests and applying disinfectants (Islam et al., 2014). These results affirm the effectiveness of EMBA and NA in *E. coli* identification, aligning with previous studies by Zinnah et al. (n.d.).

Comparison of SDS and Chlorine at 0.5% concentration

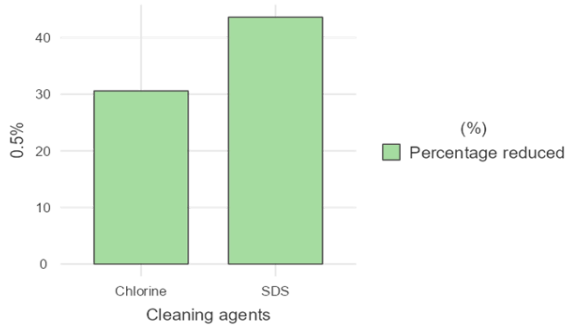


Figure 3.1: 0.5% Concentration

At 0.5%, SDS achieved a 43.62% reduction (IC = 94, FC = 53), outperforming Chlorine, which showed only a 30.59% reduction (IC = 85, FC = 59). This indicates that SDS is already more effective at lower concentrations. This finding aligns with Kumar et al. (2021), who highlighted SDS's broad-spectrum microbicidal properties, allowing it to efficiently disrupt bacterial structures even at minimal concentrations.

Comparison of SDS and Chlorine at 1% concentration

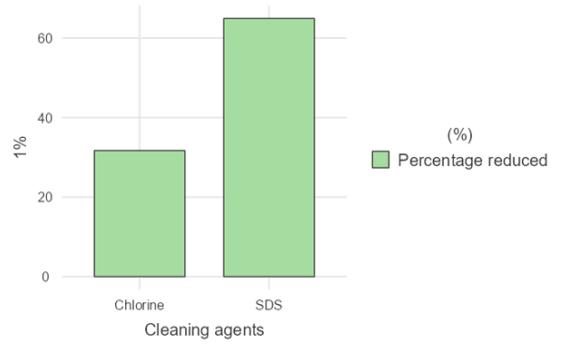


Figure 3.2: 1% Concentration

At 1%, SDS demonstrated a 64.95% reduction (IC = 97, FC = 34), significantly higher than Chlorine's 31.71% reduction (IC = 82, FC = 56). The 33.24% difference indicates SDS's increasing effectiveness with concentration. This result is consistent with Rivera et al. (n.d.), who found that SDS exhibited a larger inhibition zone against *E. coli* compared to other disinfectants, suggesting that its antibacterial action becomes more pronounced at higher concentrations.

Comparison of SDS and Chlorine at 1.5% concentration

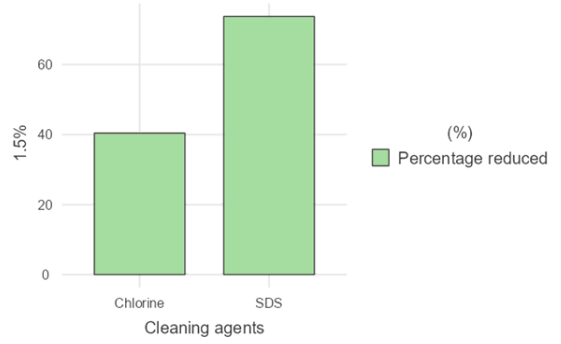


Figure 3.3: 1.5% Concentration

At 1.5%, SDS continued to show greater efficacy, reducing bacterial colonies by 73.74% (IC = 99, FC = 26), compared to Chlorine's 40.43% reduction (IC = 94, FC = 56). This 33.31% difference further supports SDS's superior cleaning potential. This supports findings by Fauzi et al. (2024), who explained that chlorine disinfects by disrupting bacterial proteins and DNA. However, its effectiveness may be influenced by environmental conditions such as the presence of organic matter (Suyanto et al., 2023), which can limit its ability to fully eliminate bacteria.

Comparison of SDS and Chlorine at 2% concentration

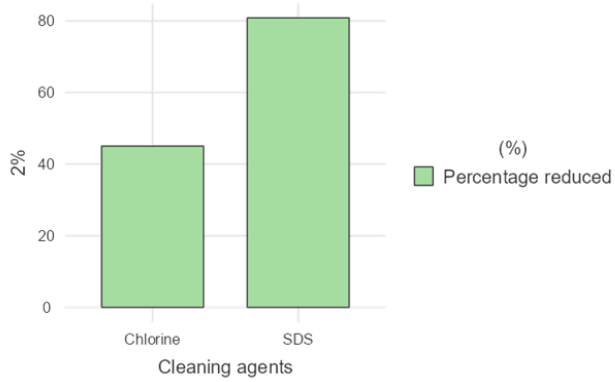


Figure 3.4: 2% Concentration

At 2%, SDS reduced bacterial colonies by 80.85% (IC = 94, FC = 18), whereas Chlorine achieved only 45.05% reduction (IC = 91, FC = 50). The 35.80% difference highlights SDS's increasing effectiveness at higher concentrations. This result aligns with Mulyati et al. (2022), who reported that chlorine's efficacy decreases when it interacts with organic compounds in water, potentially explaining its reduced effectiveness compared to SDS.

Comparison of SDS and Chlorine at 2.5% concentration

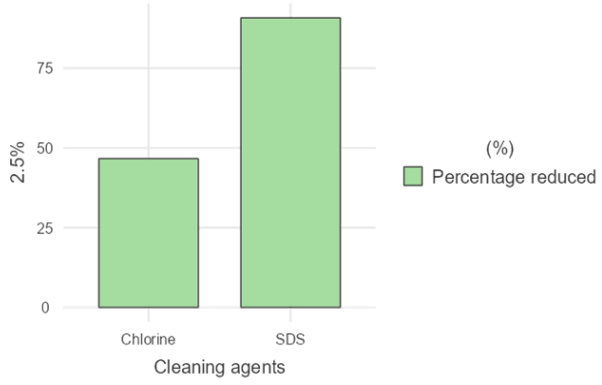


Figure 3.5: 2.5% Concentration

At 2.5%, SDS achieved a 90.82% reduction (IC = 98, FC = 9), nearly twice as effective as Chlorine's 46.67% reduction (IC = 90, FC = 48), reinforcing SDS's significant antibacterial properties. These findings support the study of Azani et al. (2020), which found that SDS enhances microbial film disruption, making it more effective in breaking bacterial structures compared to traditional disinfectants like chlorine.

Comparison of SDS and Chlorine at 3% concentration

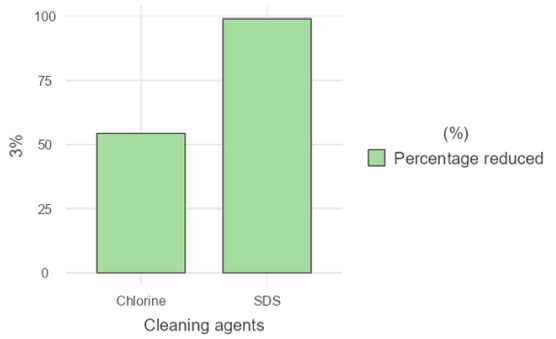


Figure 3.6: 3% Concentration

At 3%, SDS reached 98.98% reduction (IC = 98, FC = 1), nearing complete bacterial elimination. In contrast, Chlorine reduced colonies by only 54.35% (IC = 92, FC = 42), showing a 44.63% difference in effectiveness. This supports the findings of Kumar et al. (2021), who emphasized SDS's ability to disrupt bacterial envelopes and proteins effectively. Additionally, Mahto & Goel (2008) reported that chlorine's effectiveness decreases when bound to organic matter, further explaining its lower bacterial reduction compared to SDS at this concentration.

4. Conclusion and Recommendation

4.1 Conclusion

This study successfully achieved its objectives by evaluating and comparing the self-cleaning efficacy of sodium dodecyl sulfate (SDS) and chlorine in reducing *Escherichia coli (E. coli)* contamination in the Navotas River. The findings revealed a significant difference in effectiveness between the two cleaning agents, with SDS demonstrating greater bacterial reduction across all tested concentrations. This confirms the first research objective, which aimed to determine whether there is a measurable difference in their ability to reduce *E. coli* presence.

Moreover, the results established that SDS exhibited superior cleaning efficacy compared to chlorine, particularly at higher concentrations. At 3%, SDS achieved near-complete bacterial elimination, whereas chlorine demonstrated limited effectiveness. This directly addresses the second research objective, which sought to determine which of the two cleaning agents is more effective in wastewater treatment.

Furthermore, the study examined how varying concentrations influenced the cleaning performance of both agents. The results showed that increasing the concentration of both SDS and chlorine improved their efficacy, though SDS consistently achieved a higher reduction rate. This aligns with the third research objective, confirming that concentration levels significantly impact the cleaning efficiency of both agents.

Overall, the study highlights SDS as a promising alternative to chlorine for wastewater cleaning, offering enhanced bacterial reduction. These findings contribute to the development of more effective water treatment strategies and underscore the potential of SDS in improving sanitation efforts. Future research should explore the environmental impact, cost-effectiveness, and large-scale applicability of SDS to further assess its feasibility as a cleaning agent in wastewater management.

4.2 Recommendations

The researchers recommend continuing the study and propose the following suggestions for further improvement.:

1. Explore the effectiveness of combining SDS with alternative cleaning agents or filtration systems to improve its wastewater treatment capabilities.
2. Perform practical experiments in wastewater treatment facilities to gain a broader assessment of SDS's effectiveness.
3. Conduct a comprehensive study on the potential impacts of SDS on aquatic ecosystems to evaluate its long-term environmental safety.
4. Use of appropriate tools, equipment, and instruments to maintain accuracy and reliability in research.
5. Assess the effectiveness of SDS against various microorganisms to evaluate its antimicrobial properties.

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The researchers express their heartfelt gratitude to everyone who contributed to the successful completion of this study. Special appreciation is given to Mr. Charles Alison Rivera, their research adviser, for his patience, expertise, and invaluable guidance throughout the research process. His support and insightful advice helped navigate the challenges encountered in this study, and without his mentorship, this work would not have been possible.

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Effects of Using Banana (*M. saba*) Peels as a Biosorbent for Oil Spill Cleanup in Navotas City

Precious Angel M. CARBONELL, Allen Florence DELA CRUZ, James Wesley DIMANLIG, Mary Grace JANER, Madianne Jomilcah PASCUAL, Michael SEVILLA

ABSTRACT

This study investigates the effectiveness of banana peel biosorbents for oil spill remediation, focusing on how particle size and absorption time affect performance across various oil types. Banana peels were processed into particles ranging from 0.2 to 0.7 mm and tested with gas oil, 1-day weathered oil, and 7-day weathered oil. Results showed that 0.3 mm particles had the highest oil sorption capacity, while larger particles (≥0.6 mm) were less effective. Absorption efficiency also varied with exposure time and oil type. In gas oil, sorption capacity stabilized at 5.1 g oil/g sorbent after 30 minutes. For 1-day weathered oil, absorption peaked at 6.2 g oil/g sorbent at 20 minutes before declining to 4.8 g/g at 60 minutes. In 7-day weathered oil, capacity increased to 6.5 g/g at 30 minutes, then decreased to 4.5 g/g at 60 minutes. These results highlight the potential of banana peel biosorbents for oil spill cleanup, with effectiveness dependent on particle size and exposure duration. Future research should include advanced analyses like FTIR spectroscopy to clarify sorption mechanisms, increase trial numbers for statistical accuracy, test smaller particle sizes for optimal performance, and assess long-term effectiveness and reusability. Field tests in marine environments are also recommended to evaluate real-world applicability and environmental impact.

Keywords: Biosorbent, Oil Spill, Banana peels, *Musa saba* peels, *Saba* Banana, Oil Spill Cleanup

INTRODUCTION

Natural and human-induced disasters significantly affect the Philippines, with events like floods and typhoons causing widespread damage to human life, property, and natural resources (UNDRR, 2019). Human-caused disasters, such as oil spills, further harm the biophysical environment by disrupting ecological systems and processes (Flagg, 2017). Misuri et al. (2021) identified oil spills as one of the most common technological disasters in water bodies, while Gundlach (2019) and Zhang et al. (2019) described oil spills as accidental discharges of petroleum hydrocarbons that pollute water bodies, often caused by transportation accidents, offshore exploration, or pipeline leaks.

Oil spills cause severe damage to marine ecosystems, coastal areas, and the economy due to the high costs of cleanup operations (Zhang et al., 2019). Marine animals, including seabirds, turtles, and mammals, are vulnerable to oil exposure, which can harm them through skin contact or ingestion, potentially leading to respiratory blockages and contamination of feathers (Adzigbli et al., 2018). Additionally, vital habitats like coral reefs, mangroves, and salt marshes are at risk of contamination, potentially resulting in mass mortality among various species (Gabriele et al., 2021; Duke, 2016).

The economic impact of oil spills is evident in the livelihoods of Filipino fishermen. Sacramento and Geges (2019) highlighted the effects of the 2006 Guimaras oil spill, which forced many fishermen to stop working, leading some to migrate and seek alternative jobs. This displacement weakened the affected communities' human resources. Similarly, Gozum (2024) reported that the recent Bataan oil spill halted the livelihood of 28,373 fisherfolk, causing a financial loss of 78 million pesos and negatively affecting seafood quality.

Bananas (*Musa*), particularly the saba variety, are widely cultivated in the Philippines and other Southeast Asian countries. According to the Philippine Statistics Authority (2023), the Philippines produced 2.269 million

metric tons of bananas from April to June 2023, with saba bananas accounting for 28.4% of the total yield. Despite their high production, banana peels, which make up 40% of the fruit's weight, are often discarded as waste (Nagarajaiah & Prakash, 2011; Castillo-Israel et al., 2015). However, studies have shown that banana peels possess porous structures ideal for oil absorption, making them a potential biosorbent for oil spill cleanup (El-Din et al., 2018).

Navotas City, known as the "Philippine Fishing Capital," is particularly vulnerable to oil spills due to its coastal location and reliance on the fishing industry (Lumaque et al., 2015). In 2010, 500 liters of automotive diesel oil were detected near Pier 2 of the Navotas Fishport Center (Philippine Coast Guard, 2010). Given this risk, there is a need to explore sustainable alternatives for oil spill management. Since saba banana peels are abundant and have promising oil absorption capabilities, this research aims to examine their effectiveness as a biosorbent for oil spill mitigation in Navotas City.

This study aims to evaluate the effectiveness of banana (*M. saba*) peels as a biosorbent for oil spill cleanup in Navotas City. Specifically, it seeks to determine whether there is a statistically significant difference in oil absorption capacity based on varying particle sizes (0.2, 0.3, 0.4, 0.5, 0.6, and 0.7 millimeters). Additionally, it examines how the oil absorption capacity changes over time at intervals of 10, 20, 30, 40, 50, and 60 minutes. Lastly, the study compares the average oil absorption capacity of banana peel biosorbents to that of other biosorbents.

This study holds significant value for various stakeholders by exploring the potential of banana (*M. saba*) peels as a biosorbent for oil spill cleanup in Navotas City. The findings could assist the Philippine Coast Guard by offering an eco-friendly alternative for oil spill response, potentially enhancing their cleanup strategies and reducing reliance on chemical dispersants harmful to marine life. The Navotas Local Government Unit (LGU) could also benefit by integrating banana peel-based biosorbents into their oil spill mitigation plans and strategic policies, which is particularly relevant for a city with a strong maritime industry. Additionally, the residents of Navotas City, especially fishermen and fish vendors, could gain from improved water quality, better marine life protection, and a more secure livelihood. Lastly, this research can serve as a valuable reference for future researchers aiming to further investigate the effectiveness of banana peels as a biosorbent for oil spill remediation.

This study focuses exclusively on assessing the effects of using banana (*M. saba*) peels as a biosorbent for oil spill cleanup in Navotas City. It specifically utilizes the *Musa saba* species, excluding other banana varieties from consideration. The research is geographically limited to Navotas City, with findings intended to be relevant primarily to this area. Additionally, the study is confined to a set period of experimentation and observation, running from August 2024 to March 2025, and will only address topics directly related to the stated research questions.

MATERIALS AND METHODS

Sorbent Materials

Banana peels were sourced as solid waste from a local banana que stand. The peels were thoroughly washed with water to eliminate any contaminants or unwanted materials. Subsequently, the cleaned banana peels were air-dried under sunlight for seven days, followed by oven-drying at 70 °C for two hours to ensure complete moisture removal. The dried peels were then ground using a Willy mill and sieved to obtain particles of various sizes: 0.2 mm, 0.3 mm, 0.4 mm, 0.5 mm, 0.6 mm, and 0.7 mm.

Tested Oil

Three types of crude oil were selected to assess the effectiveness of banana peel in oil spill remediation across a range of oil properties. The oils used in this study included gas oil, obtained from a local gas station, and two samples of crude oil aged for 1 day and 7 days, respectively, sourced from a Petroleum Refining Company.

Experimental Procedure

A solution of 500 mL of water mixed with 5 grams of NaCl was prepared in a 1 L beaker. A 5 mm layer of oil was then applied to the water's surface to simulate an oil spill scenario. Three grams of dried, sieved banana peel sorbent was evenly distributed over the oil layer. After specified time intervals, the sorbent was retrieved using a mesh screen and allowed to drain for 5 minutes. The drained sorbent was then weighed to determine the amount of oil absorbed.

Data Analysis

The oil sorption capacity of the adsorbent was calculated using the following equation:

$$S_O = S_T - S_W - S_I$$

Where:

- S_T is the total weight (g/g sorbent) of the oil, water, and sorbent material combined.
- S_W is the weight of the water absorbed (g/g sorbent).
- S_I is the initial weight of the dry sorbent material (g/g sorbent).
- S_O represents the oil sorption capacity (g oil/g sorbent), indicating the grams of oil absorbed per gram of sorbent.

RESULTS AND DISCUSSION

Table 1. Difference of Oil Absorption Capacity Between Different Particle Sizes

Gas Oil Trial	0.2 mm	0.3 mm	0.4 mm	0.5 mm	0.6 mm	0.7 mm
1	4.3	5.3	4.8	4.2	4.0	3.9
2	4.2	5.3	4.8	4.3	4.0	4.1
3	4.2	5.1	4.8	4.2	4.11	4.0
Average	**4.2**	**5.2**	**4.8**	**4.3**	**4.0**	**4.0**

1-day weathered Trial	0.2 mm	0.3 mm	0.4 mm	0.5 mm	0.6 mm	0.7 mm
1	5.0	6.2	5.6	5.0	4.8	4.2
2	4.8	6.2	5.6	4.9	4.8	4.2
3	5.2	6.1	5.6	5.0	5.0	4.2
Average	**5.0**	**6.2**	**5.6**	**5.0**	**4.9**	**4.2**

7-day weathered Trial	0.2 mm	0.3 mm	0.4 mm	0.5 mm	0.6 mm	0.7 mm
1	4.8	6.5	5.9	5.2	4.2	4.3
2	4.8	6.4	5.8	5.2	4.2	4.4
3	4.8	6.5	5.8	5.2	4.1	4.3
Average	**4.8**	**6.5**	**5.8**	**5.2**	**4.2**	**4.3**

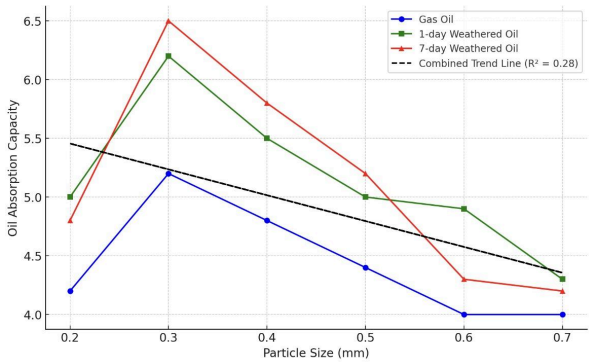


Figure 1. Oil Absorption Capacity Between Different Particle Sizes

This study evaluated the oil sorption capacity of a biosorbent using gas oil under three conditions: gas oil, 1-day weathered, and 7-day weathered oil, across particle sizes ranging from 0.2 mm to 0.7 mm. The results demonstrated that both particle size and oil weathering significantly influenced the sorption capacity.

For all conditions, the highest sorption capacity was consistently observed at a particle size of 0.3 mm, with average values of 5.2 g/g for fresh oil, 6.2 g/g for 1-day weathered oil, and 6.5 g/g for 7-day weathered oil. Smaller particle sizes generally exhibited higher sorption capacities. In contrast, larger particle sizes (above 0.4 mm) showed a decline in sorption capacity.

Table 2. Difference of Oil Absorption Capacity Between Different Time Intervals

Gas Oil Trial	10 min	20 min	30 min	40 min	50 min	60 min
1	5.0	5.1	5.2	5.0	4.9	5.1
2	5.0	5.1	5.0	5.1	5.0	5.1
3	5.1	5.1	5.3	5.1	5.1	5.1
Average	**5.0**	**5.1**	**5.2**	**5.1**	**5.0**	**5.1**

1-day weathered Trial	10 min	20 min	30 min	40 min	50 min	60 min
1	5.6	6.2	5.8	5.3	4.8	4.9
2	5.5	6.0	5.8	5.3	5.1	4.9
3	5.5	6.3	5.8	5.2	5.1	4.6
Average	**5.5**	**6.2**	**5.8**	**5.3**	**5.0**	**4.8**

7-day weathered Trial	10 min	20 min	30 min	40 min	50 min	60 min
1	5.6	6.2	5.8	5.3	4.8	4.9
2	5.5	6.0	5.8	5.3	5.1	4.9
3	5.5	6.3	5.8	5.2	5.1	4.6
Average	**4.0**	**5.8**	**6.5**	**6.0**	**5.2**	**4.5**

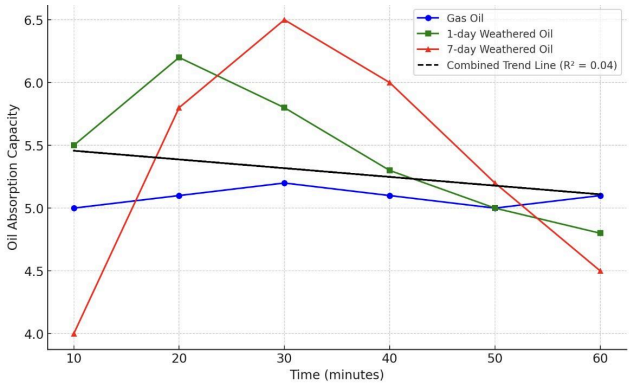


Figure 2. Oil Absorption Capacity Between Different Time Intervals

The data reveals that oil sorption capacity is influenced by both contact time and the degree of oil weathering. For fresh gas oil, sorption capacity remained

stable across all time intervals, peaking at 5.2 g/g after 30 minutes, suggesting that equilibrium is reached relatively quickly.

In the case of 1-day weathered oil, the highest sorption capacity (6.2 g/g) was recorded at 20 minutes, indicating improved absorption due to increased oil viscosity. After 20 minutes, sorption capacity plateaued and slightly decreased after 40 minutes.

For 7-day weathered oil, sorption capacity steadily increased, reaching a maximum of 6.5 g/g at 30 minutes. However, a decline was observed after 40 minutes, with a notable drop to 4.5 g/g at 60 minutes.

Table 3. Comparison of Banana Peel Biosorbent to other Biosorbent

Other Biosorbent	Banana Peel Biosorbent Sorption Capacity (g/g)	Sorption Capacity (g/g)	Deviation from Literature (diff.)
Cotton	5-7	37.9 ± 2.6	31.9
Barley Straw	5-7	(7-12)	3.5
Rice Husk	5-7	(6-10)	2
Waste Paper	5-7	(8-9.5)	2.75
Saw Dust	5-7	(4.5-8.5)	0.5
Corn Cobs	5-7	(5-7)	0
Bagasse	5-7	(3-6)	-1.5
Clays	5-7	(3.4-4)	-2.6
Wheat Straw	5-7	(2-4)	-3
Onion peels	5-7	0.455	-5.545
Garlic peels	5-7	0.385	-5.615

The data compares the sorption capacity of banana peel biosorbents with various other materials. Cotton showed the highest sorption capacity (37.9 ± 2.6 g/g) with a significant deviation of 31.9 g/g, indicating superior oil absorption potential. Other materials like barley straw, rice husk, waste paper, and sawdust also outperformed banana peels, though with smaller deviations.

Corn cobs had a similar sorption capacity to banana peels, showing no deviation, suggesting comparable effectiveness. In contrast, bagasse, clays, and wheat straw showed lower sorption capacities, with negative deviations ranging from -1.5 to -3 g/g. Onion and garlic peels had the lowest capacities, indicating poor oil absorption.

The data suggests that banana peel biosorbents have a moderate sorption capacity (5–7 g/g), making them reasonably effective for oil absorption but not the most efficient compared to other biosorbents.

CONCLUSION AND RECOMMENDATIONS

This study successfully evaluated the effectiveness of banana (*M. saba*) peels as a biosorbent for oil spill cleanup in Navotas City. The results addressed all the research objectives, which provided valuable insights into the factors influencing the oil absorption capacity of banana peels.

First, regarding particle size, the study found that smaller particles (particularly 0.3 mm) consistently demonstrated higher oil absorption capacities across different oil conditions (fresh, 1-day weathered, and 7-day weathered). This indicates that reducing the particle size enhances the surface area available for oil interaction, leading to improved sorption efficiency.

In terms of absorption over time, the results showed that oil uptake increased with time, peaking around 30 minutes before either plateauing or slightly decreasing. This suggests that the banana peel biosorbent reaches saturation after a certain period, making prolonged exposure beyond 30 minutes less effective for maximizing oil absorption.

Lastly, when comparing the banana peel biosorbent to other materials, the results showed that while banana peels have a moderate sorption capacity (5–7 g/g), they are outperformed by several other natural biosorbents such as cotton, barley straw, and rice husk. However, banana peels performed comparably to materials like corn cobs, indicating their potential as a viable, cost-effective, and eco-friendly alternative for oil spill remediation, especially in local contexts where more efficient biosorbents may not be readily available.

The researchers also recommend the following acts for future research in this field:

1.) Conduct more in-depth experiments such as FTIR spectroscopy to have a deeper understanding and knowledge about the oil sorption capacities of banana peels.
2.) Three trials per condition were conducted in this study, which provides a solid foundation; however, increasing the number of trials would enhance statistical reliability. Given that the peak absorption was observed at 0.3 mm, further testing with smaller particle sizes is necessary to determine the precise optimal size. Additionally, evaluating the performance of finer powders may yield valuable insights.
3.) Long-term experiments spanning several hours to days could establish whether banana peels retain absorbed oil or gradually release it over time. Assessing the reusability of the biosorbent by determining the number of cycles it can withstand before losing efficacy would also be beneficial.
4.) Conducting experiments in real marine environments, rather than controlled laboratory conditions, would provide a more accurate assessment of the biosorbent's effectiveness in real-world oil spill scenarios. Further investigations are needed to refine the application of banana peel biosorbents in oil spill remediation.
5.) Expanding the research through additional trials to improve precision, testing smaller particle sizes, and assessing long-term performance, reusability, and environmental impact would provide a more comprehensive understanding of its potential. Finally, evaluating the practical application of banana peel biosorbents in marine environments and comparing costs with commercial sorbents could yield significant findings.

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Comparative Analysis on the Replacement Level of Coconut Shell (Cocos Nucifera) as a Partial Alternative to Coarse Aggregate in Concrete Mix

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Abstract: As infrastructure development thrives daily, concrete remains a popular building material and the world's second-most consumed substance after water. Finding new aggregate sources is becoming increasingly difficult due to the depletion of natural stone resources, resulting in higher aggregate prices caused by scarcity in the local market. A global shortage of aggregates has emerged, highlighting the need for innovative and sustainable methods to reuse and develop aggregates. Ensuring a steady supply is essential for both construction demands and infrastructure sustainability. Hence, finding a viable substitute for conventional aggregate has been a mission of the construction industry. In response, this study explores the feasibility of replacing coarse aggregates with coconut shells in concrete mixtures. It determines differences in slump value and water absorption resistance between coconut shell aggregate and conventional coarse aggregate. It also examines how incorporating coconut shells at 0%, 50%, and 100% affects workability and compares the cost of these concrete specimens with conventional mixes. Quasi-comparative methods are used to evaluate coconut shells' potential for sustainability while providing data to enhance eco-friendly construction products and services. The findings revealed that the two variables produced nearly similar results; however, coconut shells demonstrated a more balanced and improved outcome. The study indicates that using coconut shells as a partial alternative to coarse aggregates in concrete mixes is both viable and suitable, as they have low porosity, are water-resistant, maintain structural density, and offer a cost-effective solution.

Key Words: coconut shell; aggregates; concrete; slump test; water absorption

1. INTRODUCTION

1.1 Background of the Study

As the development of infrastructure continues to thrive each day. Concrete is a popular building material and the world's second-most consumed substance, behind water (Manaloto, 2023). It is becoming increasingly difficult to find new aggregate sources due to the country's natural stone resources being affected and reduced. Resulting in an increase in aggregate prices due to a lack of availability and scarcity in the local market (Verma and Shrivastava, 2019).

With aggregates being the key component of concrete, these particles are naturally occurring as sand, gravel, stones, or rock and can also be formed by crushing rocks or developed from industrial by-products and waste materials (Yuan et al., 2021). Recently, a global shortage of aggregates has emerged, highlighting the need for innovative and environmentally sustainable methods to reuse and develop aggregates. This is essential not only for ensuring a steady supply of aggregates but also for enhancing the sustainability and longevity of infrastructure (Busari, 2022).

Hence, finding a viable material as a substitute to conventional aggregate has been a mission of the construction industry. A potential source of this is agricultural waste which can be treated by recycling disposed materials. One possible source material is the coconut.

The coconut (Cocos Nucifera), referred to as the 'tree of life' due to its diverse range of uses, has become a major sector of agriculture in the Philippines. It grows in 69 of the country's 82 provinces, encompassing a production area of 3.62

million hectares and offering employment to approximately 2.5 million farmers (Industry Strategic Science and Technology Plans (ISPs) Platform, 2021). Despite this, coconut shell is one of the most polluting wastes in the world since it is a solid waste in the form of a shell with an annual volume of 3.18 million tons, accounting for almost 60% of the national waste volume in coconut-producing countries.

With that, coconut shells as a partial substitute for coarse aggregates in concrete started gaining importance. The study aims to create a sustainable and environmentally friendly alternative to non-renewable natural stone aggregates made out of coconut shells to reduce the production of waste products in the environment. Providing and contributing to building eco-friendly and sustainable structures.

1.2 Statement of the Objectives

This study intends to investigate the feasibility of replacing coarse aggregates with coconut shells in concrete mixtures. The objectives of the study are as follows:

1. To determine the significant difference in slump value and water absorption resistance between coconut shell aggregate and conventional coarse aggregate in concrete.

2. To assess how incorporating coconut shells in concrete at different percentages (0%, 50%, and 100%) affects its workability.

3. To compare the cost of concrete specimens containing coconut shells with conventional concrete mixes.

1.3 Significance of the Study

The study demonstrates the potential use of coconut shells in concrete mixes as a partial replacement for coarse aggregate. The researchers will thoroughly examine on how recycling coconut shells contributes to the environmental sustainability while also educating the building sector on how they can improve services and products that promote environmental balance; more so, this study will serve as guidance to the community, especially to different agricultural and environmental and natural resources sectors that can help find the most useful alternative to concrete mixes for construction works.

1.4 Scope and Delimitation

This study explores the potential of coconut shells as a partial substitute for coarse aggregate in concrete mixes. The scope covers only the mechanical properties of concrete, such as workability, water absorption, and cost, which will be identified in this study. It aims to determine the workability of concrete mixtures that contain varying percentages of coconut shells at 0%, 50%, and 100% as a partial replacement for coarse aggregates in ordinary concrete. Each percentage of coconut shell will include 1% admixture. The concrete mixture shall follow the standard 1:2:3 mix ratio commonly used in conventional concrete construction techniques. However, the study is limited to mechanical properties and does not cover chemical properties, long-term durability, or structural load performance. It strictly follows the 1:2:3 mix ratio, excluding other mix designs or curing conditions. Thus, the researchers will use slump tests to determine workability, a standard test method to evaluate water absorption resistance, and a cost analysis of the materials to compare them with ordinary concrete. This study benefits the following:

Consumers. This study will contribute to lowering their costs when purchasing aggregates, as using coconut shells as a partial substitute will be a more cost-effective option. Additionally, it will help protect consumers' health, as conventional aggregates contribute to worsening global warming.

Department of Public Works and Highways (DPWH). The study intends to provide improvements to the conventional concrete mixes as coconut shells partially replace coarse material. Through this, it aims to provide the Department of Public Works and Highways with knowledge of the feasibility of coconut shells playing a significant role in concrete mixes, strengthening their ability to construct various structures and infrastructures.

Department of Agriculture (DA). This study will aid the agricultural sector by teaching how to efficiently recycle coconut shell waste and use it as a partial alternative to coarse aggregate. This research will be helpful in the recycling of coconut shells, which can be utilized to create more environmentally friendly concrete mixtures and minimize the waste of coconut shells.

Department of Environmental and Natural Resources (DENR). The focus of this study is to assist people in recycling all of the coconut shells they have made use of. Through this study, the Department of Environmental and Natural Resources will be able to learn to evaluate how coconut shells can be a useful alternative to coarse aggregate in concrete mixes for environmental sustainability.

Future researchers. This study serves to provide information regarding the use of coconut shells as a partial substitute for coarse aggregate. Additionally, it aims to offer further understanding of how coconut shells can be used in place of coarse aggregate in a concrete mixture. This will be useful in future studies that will be conducted if the subject matter involves the usage of coconut shells in concrete mixes.

2. METHODOLOGIES

2.2 Research Design

This quasi-comparative study aims to analyze the potential use of coconut shells in concrete mixes as a partial replacement for coarse aggregate. In this research, coconut shells and conventional coarse aggregate will be compared in terms of workability, durability, water absorption, and cost using ASTM standard tests and nominal mix design methods. Two trials of concrete specimens were employed, in which the proportions of aggregate and coconut shell were 0% (conventional), 50% (conventional and coconut shell), and 100% (coconut shell). Before undergoing tests, the concrete specimens were cured for 28 days. The researchers selected an environmentally harmful waste material to replace natural stone, thereby reducing environmental waste production. The study evaluates, gathers, analyzes, and tabulates data to examine the possibility of coconut shells contributing to environmental sustainability while providing the building sector with information on improving services and products that promote ecological balance. Therefore, the study aims to contribute to the construction of eco-friendly and sustainable structures through various process

2.3 Research Instrument

Throughout the experiment, ASTM standards and nominal mix design methods were applied. Following ASTM C143/C143M-20 standards, a slump test was performed to determine the workability of the concrete mixes, with the slump value (in mm) recorded for each specimen. The standard slump test cone used is 300 mm (12 in) in height, with a bottom diameter of 200 mm (8 in) and a top diameter of 100 mm (4 in). Water absorption tests were conducted after curing the concrete specimens for 28 days under ASTM C1585-20. The 10 × 20 mm cement block with a 1:2:3 nominal mix design was placed in a dry oven, and water was used to measure the amount of water absorbed by the concrete specimens, with data collected as a percentage for different mix proportions, while cost analysis was also utilized to estimate each mix proportion's economic value.

2.4 Data Gathering Procedure

The researchers began by preparing the materials needed for the experiment. The coconut shells were cut into 20 mm (¾ in) pieces, and the cement, sand, and coarse aggregates were proportioned following a 1:2:3 ratio with a water-cement ratio of 0.50. These materials were thoroughly mixed, and a slump test was immediately conducted to assess workability. After the slump test, the concrete was poured into a 10 × 20 mm mold and cured for 28 days. After curing, the specimens were oven-dried, weighed for their initial weight, submerged in water for 24 hours, and weighed again for their final weight. The percent difference method compared production costs between conventional concrete and coconut shell aggregates.

2. 5 Data Analysis

The data gathered throughout the experiment were analyzed and interpreted using different quantitative methods to determine the effect of . The slump test results were analyzed using the Standard Test Method for Slump of Hydraulic-Cement Concrete (ASTM C143) and AASHTO T119. The water absorption of the concrete specimens was calculated by comparing their initial oven-dried weight to their weight after immersion, measuring the amount of water absorbed by the concrete. To analyze production costs at each replacement level, the cost of materials—including cement, fine aggregates, coarse aggregates, and coconut shells—was compared using the percent difference method. Statistical tools were used to ensure accuracy, reliability, and validity in interpreting the results.

3. RESULTS AND DISCUSSIONS

Table 1 shows the results of a slump test conducted on different concrete specimens. The table includes slump height measurements, trials, mean, and the corresponding pass or fail remarks.

Table 1. Slump Test of Concrete Specimen

Specimen	Trial/Slump height (mm)		Mean (mm)	Remarks
	1	2		
C-0	63.50	66.04	64.77	Passed
C-50	50.80	55.88	53.34	Passed
C-100	83.82	88.90	86.36	Passed

- 50 mm ≤ Average (mm) ≤ 100 mm = "Passed
- Average (mm) < 50 mm, Average (mm) > 100 mm = "Failed"

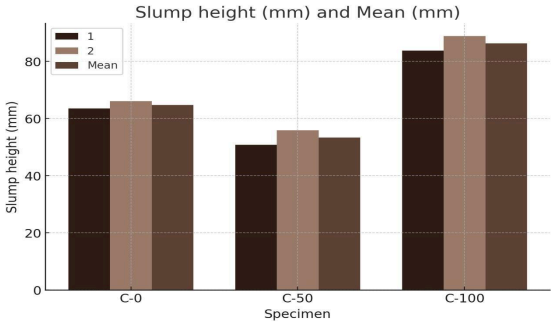


Figure 3. Slump Test of Concrete

The data shows the slump height measurements for each trial; specimen C-100 had the highest values of 83.82 mm and 88.90 mm, followed by

C-0 with 63.50 mm and 66.04 mm, while C-50 had the lowest values of 50.80 mm and 55.88 mm. Based on the mean slump values, specimen C-100 had the highest slump at 86.36 mm, followed by C-0 with 64.77 mm, while C-50 had the lowest at 53.34 mm. Thus, the results show that all tested concrete specimens passed each trial's slump test and height measurements.

Table 2 shows the significant difference in water absorption resistance between coconut shell aggregate and conventional coarse aggregate in concrete, marked as C-0, C-50, and C-100.

Table 2. Absorption Test Results of Concrete Specimen

Specimen	Trials	Absorption		Difference (%)
		Oven-dried Weight (g)	After immersion(g)	
C-0	1	4,810	4,845	0.73
	2	4,805	4,838	0.69
C-50	1	4,230	4,280	1.19
	2	4,208	4,253	1.07
C-100	1	3,620	3,690	1.94
	2	3,603	3,668	1.81

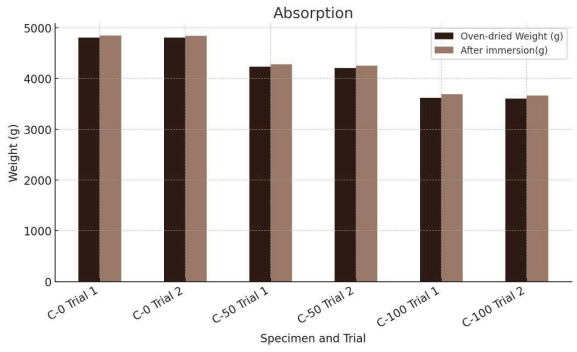


Figure 4. Water Absorption of Concrete

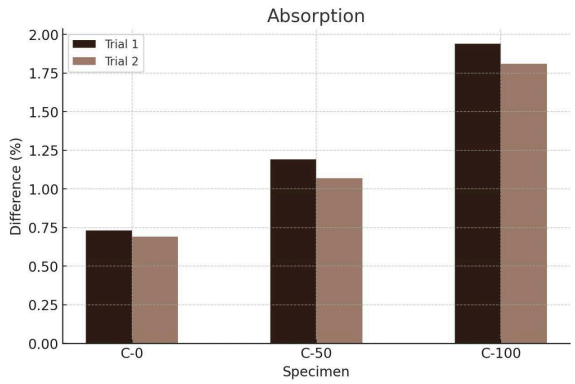


Figure 5. Water Absorption Difference

The data indicate that specimen C-0's initial dry weight was 4,810 g in trial 1 and 4,805 g in trial 2, which increased to 4,845 g and 4,838 g after immersion, resulting in a 0.73% and 0.69% increase due to absorption. It highlights that C-0 has a highly dense structure and demonstrates a non-porous nature with excellent water resistance. For specimen C-50, the initial dry weight was 4,230 g in trial 1 and 4,208 g in trial 2, which increased to 4,280 g and 4,253 g after immersion, leading to a 1.19% and 1.07% increase. It suggests that C-50 has low porosity, is water-resistant, and remains structurally dense. For specimen C-100, the initial oven-dried weight was 3,620 g in trial 1 and 3,603 g in trial 2, which increased to 3,690 g and 3,668 g after immersion, resulting in a 1.94% and 1.81% increase in weight due to absorption. It indicates that C-100 is slightly more absorbent than C-0 and C-50 but remains within a low-porosity range, meaning it absorbs more water but retains good water resistance.

Table 3 shows how the cost of making concrete changes when coarse aggregate is replaced with coconut shells. It shows the cost of materials used in $1m^3$ of concrete and the total cost for each replacement level.

Table 3. Cost of Production Comparison

% replacement of coarse aggregate	Cost of components in concrete of $1m^3$ volume in KN (mix 1:2:3)				Cost of $1m^3$ of concrete (INR)	% reduction in cost
	Cement	Fine aggregate	Coarse aggregate (normal)	Coarse aggregate (coconut shell)		
0	1272.00	1600.00	2850.00	0.00	5722.00	0.00
50	1272.00	1600.00	1425.00	0.00	4297.00	24.90
100	1272.00	1600.00	0.00	0.00	2872.00	49.81

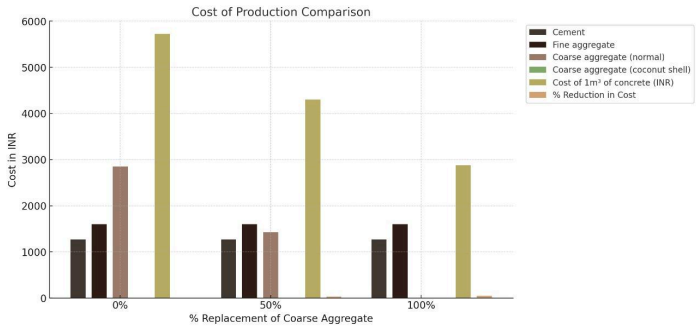


Figure 6. Cost Analysis of Production

The data indicates that with 0% replacement, the cost of cement is ₱1,272.00, fine aggregate is ₱1,600.00, and coarse aggregate is ₱2,850.00, resulting in a total cost of ₱5,722.00 with no cost reduction. With 50% replacement, the cost of cement remains ₱1,272.00, fine aggregate is ₱1,600.00, and coarse aggregate decreases to ₱1,425.00, reducing the total cost to ₱4,297.00 and achieving 24.90% savings. This demonstrates that partially replacing coarse aggregate with coconut shells lowers costs while maintaining concrete strength. At 100% replacement, cement costs ₱1,272.00, fine aggregate remains ₱1,600.00, and coarse aggregate costs ₱0.00. This reduces the total cost to ₱2,872.00, saving 49.81%, proving that replacing coarse aggregate with coconut shells cuts costs while still producing usable concrete. These savings occur because coconut shells are much cheaper than coarse

aggregates, while cement and fine sand costs remain unchanged.

4. CONCLUSION AND RECOMMENDATIONS

In conclusion, the slump test results indicate that all specimens met the required standards, confirming that coconut shells can be a viable alternative based on workability. Using coconut shells as a partial substitute for coarse aggregates is feasible regarding water absorption, as they maintain a good balance between water resistance and durability. Furthermore, the cost analysis results show that incorporating coconut shells instead of coarse aggregates in the concrete mixture can reduce costs and benefit the environment. Since cement and fine aggregate costs remain unchanged, the savings come from using coconut shells as a more affordable alternative.

These findings highlight that coconut shells can effectively replace coarse aggregates, as they exhibit higher absorption properties, which may help the cement dry faster and create a more compact mixture. Using coconut shells as a partial alternative to coarse aggregates in concrete mixes is viable and suitable, as they have low porosity, are water-resistant, maintain structural density, and offer a cost-effective solution. In line with the findings of the study, the researchers suggest further continuation with the following recommendations:

(1) Utilize other testing methods, including ASTM C-39 Standard Test Method for Compressive Strength Of Cylindrical Concrete Specimens.
(2) Explore different mix ratios by experimenting with varying proportions of coconut shells, cement, and other materials to optimize strength, workability, and durability.
(3) Conduct an environmental impact analysis through a life cycle assessment (LCA) to determine the sustainability advantages of replacing coarse aggregates with coconut shells.
(4) Use lower concentrations to see the effectiveness of the study in low concentrations.
(5) Use different kinds of additives that reduce the air content of concrete to improve its compressive strength.

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Experimental Analysis of Human Hair as an Alternative Absorbent for Oil Spills in Navotas City

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ABSTRACT

Oil spills pose severe environmental threats, particularly in coastal areas such as Navotas City, where fishing and marine biodiversity are heavily impacted. This study investigates the potential of human hair as an alternative absorbent for oil spill cleanup. Human hair, being naturally hydrophobic and highly absorbent, offers a sustainable and biodegradable solution compared to synthetic sorbents like polypropylene. An experimental research design was used to assess the absorption efficiency of human hair booms and hair mats in controlled settings. Tests were conducted using 10 grams of gasoline and kerosene oil in 10 liters of water in a container. Results indicated that human hair absorbed significant amounts of oil, with efficiency varying based on hair density, length, and environmental conditions. Comparative analysis showed that hair-based sorbents performed better than traditional absorbents such as cotton wool and fabric towels. Additionally, human hair sorbents demonstrated durability and potential for reuse, making them a cost-effective and eco-friendly alternative. While ethical concerns regarding hair collection exist, proper sourcing through hair salons and voluntary donations can address these issues. This study highlights the viability of human hair as an innovative and sustainable solution for oil spill mitigation, promoting waste recycling while protecting marine ecosystems. Future research should explore large-scale implementation, improved deployment techniques, and integration with existing spill response strategies.

Keywords: Human Hair; Oil Spill; Alternative Absorbent; Sustainable; Sorbent; Hair; Absoption

INTRODUCTION

Key Background Information

The relative efficacy of human hair sorbent products in absorbing crude oil from various terrestrial surfaces was examined and standardized microcosm experiments were used to imitate crude oil spills (Murray et al., 2020).

This research focuses on using human hair, a strong natural absorbent, to remove oil spills from the water here in Navotas City. Keratin biomass or human hair waste is causing environmental problems gathering in a waste stream is what causes it to be a problem, human hair has the potential to be a natural absorbent to remove oil from water waste (Pavithira S., & Peck L. K., 2021).

Hair is hydrophobic, meaning it repels water and attracts oil. The structure of hair, specifically the scales and surface roughness, creates a large surface area for the oil to adhere to (Chenxi, Y. et al., 2022).

The revolutionary solution of hair as an effective tool to clean oil spills on land is cleaned up using polypropylene mats that are effective but environmentally problematic. The oil adheres to the hair through a process called adsorption, where the oil molecules cling to the hair fibers. After all, polypropylene is a non-biodegradable plastic that is made from fossil fuels, using it to clean up oil, therefore, requires drilling for even more oil. (Thomas, J. C., 2023).

Hair and fur, on the other hand, are non-toxic, biodegradable, renewable, and extremely absorbent. Human hair, for instance, can absorb approximately five times its weight in oil, which says a pound of hair can soak up a liter of oil in less than a minute (Ikwut, P. R., et al., 2016).

Human ethics concerning the usage of human hair and other natural material as an oil absorbent can be resolved by informing and obtaining consent about what will happen and the usage of their hair after it is cut and assessing the possible potential risks regarding the usage of human hair and other natural material, and lastly being open to criticism and to address further concern regarding the usage of human hair as an experiment to this research. Obtaining informed consent from hair donors is paramount. This involves clearly explaining the research purpose, potential risks and benefits, and how the hair will be used and disposed of, ensuring the anonymity and confidentiality of hair donors is crucial (De Guzman, C., 2023).

Research Objectives

The primary objective of this study is to assess the potential of human hair as an alternative absorbent for oil spills in Navotas City. This research aims to evaluate the viability, efficiency, and sustainability of using human hair in oil spill cleanup operations. The specific objectives of the study are as follows:

1. To evaluate the effectiveness of human hair in absorbing various types of oil compared to traditional absorbents used in oil spill cleanups.
2. To analyze the performance of human hair as an oil absorbent under different environmental conditions, such as salinity, temperature variations, and typical weather patterns in Navotas City.
3. To determine the impact of varying lengths and densities of human hair booms and mats on the rate and efficiency of oil absorption in simulated oil spill scenarios.
4. To investigate how the length and density of human hair booms and mats influence the rate and efficiency of oil absorption (amount of oil absorbed over time) during controlled oil spill simulations, measured at regular intervals.
5. To assess the durability and sustainability of human hair booms and mats for long-term use as an alternative oil spill absorbent.

Significance of the Study

Research on human hair shows promise in terms of the ability to be utilized more readily and efficiently (absorbing materials during oil spills), safeguard the environment by cleaning up and containing spills better than other absorbents, and recycle waste materials that are often thrown away at lower prices.

Environmental Impact: Oil spills seriously harm the environment. Since the material is natural and biodegradable, human hair can help clean up oil spills more ecologically by lowering the need for synthetic absorbents, which can be less eco-friendly.

Innovation and Research: Research on the efficiency of human hair as an absorbent material can further the field's understanding of substitute materials for responding to oil spills and possibly result in more creative and long-lasting environmental solutions.

Local Resource Utilization: This strategy can efficiently utilize local resources in Navotas City, which may have access to large amounts of human hair from nearby barbershops and salons, to provide a sustainable solution aimed at local requirements.

Overall, the study may offer a feasible, environmentally friendly, and community-focused strategy for handling oil spills, with advantages for the surrounding economy and environment.

Scope and Limitations

The scope of this research study is the testing of natural materials, specifically human hair, for oil spill absorption particularly in the bodies of water surrounding Navotas City and in controlled laboratory environments for experimental testing, enhancing and comparison of traditional market-sold oil absorbent boom design and maximization of efficiency and sustainability of final product. Other types of water contamination/pollution will not be included in the research study, instead, it will focus primarily on oil spills. The use of hair should be treated with respect, avoiding practices that could be considered offensive or culturally insensitive. If hair is collected from salons or barbershops, ensuring that donors are fully informed and consent to the use of their hair for research is crucial.

MATERIALS AND METHODS

Research Design

This study used an experimental research design to explore the feasibility of using human hair as an alternative oil spill absorbent. The experiment evaluated the absorption efficiency and capability of hair booms and hair mats to absorb oil spills. These were tested with various substances, including water, gasoline, and kerosene oils.

Research Locale

This research was conducted at San Jose Academy, Navotas City. Specifically, it was done under the Science, Technology, Engineering, and Mathematics (STEM) strand. The experiments and trials were done at San Jose Academy’s science laboratory because of the available resources and materials needed by the researchers.

Research Instruments

The researchers used experiments and observations of weight comparisons from two tests

from hair booms and hair mats dipped and soaked in water and oil spills of the same amounts of gas and kerosene. It is used to be able to find the most efficient way to make use of human hair as an absorbent for oil spills in water. If the tests produced positive results and were proven to absorb the oil spills from the tests effectively, the researchers could conclude how to adeptly and fully use the human hair booms and mats for real-world application.

Experiment Procedure

The researchers used the following step-by-step procedures as a guide to start the experiment on human hair as an alternative absorbent for oil spills.

1. The experiment started by collecting enough amount of human hair from different hair parlors and hair salons around Navotas City.
2. After gathering some human hair, the researchers bought a plastic net that holds the hair, this net is used to hold the human hair to both booms and mats. This also protects the human hair from spreading in the water and fully absorbs the oil spills.
3. The researchers created a boom and mat that is made of plastic net and used a needle and thread to sew the edges of the plastic net to form it into a boom and mat.
4. After this, the researchers put a measured amount of human hair inside the boom and mat and closed it by sewing the open part where the hair was placed.
5. Then, the researchers used two containers with 1 liter of water each. The researchers tried to put the hair boom first and let it absorb the water and tested its weight after letting it in the water for 3 minutes.
6. After the hair boom, the researchers tried to do the same procedure to the hair mat and also observed its weight after being soaked in the water for 3 minutes as well.
7. The researchers drained both hair boom and mat after it was soaked in the water, it was done to use the materials in the next experiment to see if they would absorb oil spills.
8. Next, the researchers put 10 grams of oil, both gasoline and kerosene in each container with water to test the ability of human hair boom and mat to absorb the oil spills.
9. The researchers experimented with letting the human hair absorb the oil spills for around 3 minutes and observed if the oil spills were absorbed by the boom and mat.
10. Lastly, the researchers checked the weight of both the hair boom and hair mat after it absorbed the oil spills from the water in the container.

The weight of both the hair boom and hair mat was heavier than their original weight, therefore, both of them successfully absorbed the oil spills from the water inside the container.

Method of Data Analysis

The method of data that was used for this research was simply comparing the initial weight of the hair booms and hair mats that were exposed to water to their weight after it was exposed to the water and oil spills.

1. ***Weight gain (Water):*** The difference with the initial weight of the hair boom and hair mat before being soaked in the water to account for the water that was absorbed before exposing it to oil.
2. ***Weight gain (Oil):*** The difference between the initial weight of the hair boom and hair mat with water absorbed after it was soaked in the oil for 3 minutes. This will isolate the weight of the oil that was absorbed.
3. ***Absorption efficiency (Oil):*** The ratio of the weight of oil absorbed to the initial weight of the construct. This provided an accepted amount and measure of absorption efficiency. This calculation was performed separately for each oil type (gasoline and kerosene) and each hair construct type (boom and mat).
4. ***Comparative Analysis:*** The absorption efficiency of hair booms and mats was compared to each other. Where the difference in the amount of hair inside the hair booms and mats shows their difference when it comes to being efficient for oil absorption using human hair.
5. ***Correlation Analysis:*** The relationship between variables such as hair weight, length, and the amount of oil absorbed. This can help determine if specific hair characteristics

influence absorption capacity.

RESULTS AND DISCUSSION

First Trial Experiment

Table 1 shows the effectiveness of human hair in absorbing two kinds of oil (gasoline and kerosene) and how it absorbs based on the weight and length of the booms and mats used for cleanup after oil spills. The water in the container is 1.45 liters and the amount of gasoline and kerosene oil in the water container is 10 grams each.

Table 1. First Experiment on Hair Boom and Hair Mat

		Hair 1 (Boom)	Hair 2 (Mat)
Weight		68 g	32 g
Length		120 cm	150 cm
Weight After Absorbing the Water and Oil			
Absorbed with Water	Gas	94 g	44 g
	Kerosene	80 g	39 g
Absorbed with Oil	Gas	122 g	51 g
	Kerosene	98 g	54 g

The data shows that both hair boom and hair mat gained weight after they absorbed the water and oil from both containers consisting of gasoline and kerosene. Based on Table 1, not only does the time affect the absorption capacity of the hair booms and mats, but also the weight and length of the hair booms and mats affect their capacity to absorb different kinds of oil (Agrwal, T., 2022). The researchers differentiate the amount of water and oil absorbed by the hair boom and hair mat which shows that the oil spills were absorbed based on their weight after being soaked for 3 minutes in the containers (Kusuma, N., 2022).

Effective Oil Spill Absorbent: Human Hair vs Traditional Absorbents

Table 2 shows how effectively human hair boom and mat absorbed gasoline oil compared to traditional absorbents, which are cotton wool, fabric towels, and toilet paper based on the weight of the materials after absorbing the different types of oil. The container holds 1.45 liters of water and contains 10 grams of oil for all the materials used as an absorbent.

Table 2. Human Hair and Other Materials used as Absorbent

	Hair Boom	Hair Mat	Cotton Wool	Fabric Towel	Toilet Paper
Weight	68 g	32 g	50 g	75 g	17 g
Absorbed with Oil	122 g	51 g	58 g	92 g	10 g
Absorbed with Water	94 g	44 g	90 g	120 g	25 g

The data shows the amount of absorbed oil and water from the hair boom, hair mat, cotton wool, fabric towel, and toilet paper. Table 2 shows different materials other than human hair, this deepens how human hair is much more effective for absorbing oil compared to other materials that can be used (Ifelebuegu, A., 2015). The table presents the difference between all materials used to absorb the oil spills and identifies the best for absorbing oil spills. It shows that it has the same amount of water and oil in the container which means the capacity of the materials that were used matters the most as it provides the weight of it after absorption (Kusuma, N., 2022).

Operation of Human Hair on Various Environmental Variables

Table 3 shows how human hair operates differently as an absorbent for oil spills under various environmental variables, including salinity, temperature variations, and normal weather, and the exact time of the absorption of the human hair boom and mat.

Table 3. Human Hair as an Absorbent for Oil Spills Under Various Environmental Variables

		Amount Of Oil Absorbed		Time to Absorb	
		Hair Boom	Hair Mat	Hair Boom	Hair Mat
Environmental Variable	**Test Condition**				
Salinity	Freshwater	87 g	61 g	2 min and 28 sec	2 min and 25 sec
	Seawater	95 g	64 g	2 min and 39 sec	2 min and 28 sec
Temperature	Room Temperature (23°C)	87 g	61 g	2 min and 28 sec	2 min and 25 sec
Weather	Normal Weather (Dry)	87 g	61 g	2 min and 28 sec	2 min and 25 sec

The data shows the amount of oil absorbed by the hair boom and hair mat in different environmental variables, including the time of absorption. This shows the capability of hair under different salinity and temperatures and how its oil-absorbing capability is inversely proportional to the temperature of the water where the lower the temperature the easier it is for the hair to absorb oil and the higher the temperature the harder for hair to absorb oil (Ifelebuegu, A., 2015). The comparison of freshwater and seawater only changed the weight of the materials that were used to absorb the oil spills. Hair by-product was found to be significantly better at absorbing crude oil than other materials, although it had a wider variation in absorbency likely associated with the non-homogeneous nature of mixed human hair (Pagnucco & Phillips, 2018).

Length and Density of Human Hair on the Rate and Efficiency of Oil Absorption

Table 4 shows how the length and density of human hair boom and hair mat influence the rate and efficiency of oil absorption (amount of oil absorbed over time) during controlled oil spill simulations, measured at regular intervals.

Table 4. Length and Weight of Human Hair Booms and Mats Impact on the Rate and Efficiency

		Hair Boom	Hair Mat
Length		120 cm	150 cm
Weight		68 g	32 g
Time of Absorption	1 minute	87 g	49 g
	2 minutes	92 g	56 g
	3 minutes	95 g	72 g
	4 minutes	110 g	88 g
	5 minutes	117 g	95 g

The data shows that the weight of the hair boom and hair mat differs from time to time and it gains more weight as time goes by. The exposure time of the hair boom and hair mat on the water with oil spills influences the heaviness of the materials that were used (Tan et al., 2021).

Endurability of Human Hair in Terms of Long-Term Application and Sustainability

Table 5 shows how human hair as an alternative absorbent is endurable in terms of long-term usage and sustainability. The capacity of hair boom and hair mat to absorb oil spills several times and the capability of it to use while sustaining the quality of the materials.

Table 5. Human Hair Endurability to Use for Long-Term Usage and Sustainability

	Hair Boom	Hair Mat
Before the Trials (Weight)	68 g	32 g
Experiment (Absorbed by Gasoline Oil for 5 minutes)		
First Trial	122 g	51 g
Second Trial	97 g	55 g
Third Trial	98 g	57 g
After the Trials (Weight) *Stayed for 5 more minutes	110 g	61 g

The data shows the different weights of the hair boom and hair mat after it absorbed the oil spills for three consecutive trials. Hair can be reused multiple times because of the property of human hair that allows it to absorb oil repeatedly before cleaning it thoroughly (Mousavi-Qeydari, S., 2021). This experiment proves that the use of only one hair boom and hair mat could still sop up the oil spills for how many trials, this leads that the materials were still effective and the amount of oil spills that were absorbed by the hair boom and hair mat only have small difference from each trials (Israel et al., 2018).

CONCLUSION AND RECOMMENDATIONS

Summary

According to the researchers' study, human hair is effortless to obtain, eco-friendly faster, and more cost-effective than standard oil spill absorbents. Hair is more hydrophobic and very absorbent than most materials, which makes it even more biodegradable. Additionally, it is less expensive than other oil absorbents while solving the problem of waste from hair parlors and hair salons.

There are some constraints such as ethical issues, and performance diversity across different regions, and scaling it up poses logistical difficulties. Despite these obstacles, human hair serves as the most eco-friendly and cost-effective method for cleaning oil spills in ecologically sensitive areas like Navotas City.

The primary downside of using human hair as an oil absorbent is that it raises ethical concerns about whether donors gave their agreement and how the general public would feel about such use. There are also collection, processing, and other logistical concerns that restrict large-scale implementation.

Additionally, environmental aspects such as salinity, temperature, and weather are also likely to affect it and these issues need further investigation. However, on all accounts, human hair is a great sustainable and "out-of-the-box" solution in dealing with the negative impacts of oil spills while repurposing waste that would otherwise go discarded.

Conclusion

As the researchers conducted this experiment, the researchers concluded that human hair is significantly more effective as an oil absorbent than cotton wool, fabric towel, and toilet paper, as human hair bases its capacity for absorption for different kinds of oils relative to its weight.

The researchers also concluded that human hair maintains its absorption capability under different environmental variables. While its weight changes when exposed to the condition of seawater, temperature differences do not significantly affect its performance. The weight and length of hair booms and mats affect the amount of oil they can absorb, as it increases its mass allowing for greater oil retention.

Additionally, the duration of exposure impacts their initial weight, with longer exposure

times leading to higher oil absorption. Lastly, the researchers have concluded that hair booms and mats can be reused by deep cleaning them with shampoo to extract the absorbed oil, followed by proper sanitization before reuse.

Recommendations

The researchers' recommendations for this study would help to strengthen the experiment even more and to aim for better results if these could be done by others or if the researchers would continue to create more trials in the future.

1. Implementation in Real-Life Scenarios

Conduct oil spill simulations in different environments, such as other bodies of water like beaches and soil to assess how hair acts under diverse conditions to be used in real-world field testing. To collaborate with local organizations, governments, and coastal communities to integrate hair collection and deployment in oil spill response initiatives that will serve as a partnership plan with local communities. Also, develop an optimized method for deploying hair-based sorbent booms and mats in real-life oil spill scenarios to ensure maximum oil absorption and prevent drift.

2. Hair Collection and Preparation

Collect hair from salons, barbershops, and communities to ensure a consistent supply of clean and good quality supply of oil-absorbent hair. Avoid using hair contaminated with oils or chemicals as a source. Also, explore some pre-treatment methods, including washing and drying to enhance hair's natural oil absorbency before use in spill response scenarios.

3. Hair Absorption Efficiency

Conduct standardized tests to measure the oil absorption capacity of human hair under different conditions, including temperature, oil types, and water salinity. Study how different hair densities and layering techniques in hair boom and hair mats affect oil absorption and use layered sorbent mats for maximum absorption efficiency. Lastly, test the feasibility of reusing hair-based sorbents without compromising oil absorption efficiency and this could also reduce waste.

4. Improvement of Sorbent Performance

Experiment with blending human hair with other natural sorbents, such as coconut husks, rice straws, or dog fur to enhance oil absorption properties. Also, consider developing environmentally safe binding materials to hold hair booms or hair mats together to prevent shedding during oil spill recovery operations.

5. Awareness and Educational Campaigns

Start public awareness and education initiatives to educate people about the advantages of using human hair as an oil absorbent for the environment. By encouraging hair donation drives and educating people about the significance of proper hair disposal, these initiatives can inspire active participation from local groups, salons, and communities. Building local capacity for efficient response efforts may also be achieved through training sessions and workshops for coastal communities on the deployment of hair-based sorbents during oil spill problems.

6. Government Finance Support

Encourage the government to provide money and legislation that encourages the use of environmentally friendly, sustainable materials, such as human hair, in responding to oil spills. Funding for extensive field testing, research and development subsidies, and the incorporation of hair-based sorbents into national oil spill preparedness strategies are several examples of this. Initiatives supported by the government would enable the project to be scaled and guarantee uniform execution throughout coastal regions that are at risk.

7. Integration of Waste Management

Include hair collection in the current recycling and waste management initiatives. It is made simpler to gather huge amounts of useable hair from homes, barbershops, and salons by including hair debris in municipal recycling systems. In addition to lowering landfill waste and advancing circular economy principles, this would provide constant supplies for oil spill response operations.

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Comparative Effects of Organic and Urea Fertilizers on the Vegetative Growth of *Allium cepa* (Onion) in Navotas City

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Abstract: This research focuses on comparing organic and urea fertilizers in promoting onion (*Allium cepa*) growth. Onions are an essential crop in the Philippines, valued for their culinary and overall economic value. Fertilizers play a crucial role in improving crop productivity. Organic fertilizers enhance soil health and sustainability while urea fertilizer provides nitrogen for faster plant growth. This study aimed to determine if there is a significant difference in onion growth when using organic and urea fertilizers. The researchers conducted an experiment with 12 recycled planting pots filled with 5 kilograms of loamy soil. Onion seeds were planted uniformly and fertilizer application began 30 days after planting. Fertilizer was applied weekly throughout the study. The researchers tested two fertilizer concentrations: 5% and 10%. Growth parameters such as plant height, leaf length, root length, and leaf count were measured after harvesting period. Results showed that onions treated with 5% organic fertilizer had the highest plant height, leaf length, and root length, while those given 5% urea fertilizer had the highest leaf count. Onions treated with 10% organic fertilizer showed poor growth while those given 10% urea fertilizer did not grow at all. No bulbs were formed due to time constraint and environmental factors. Additionally, statistical analysis confirmed no significant difference between two fertilizer types. These findings suggest that lower fertilizer concentrations like 5% organic may be better for onion growth while higher concentrations may negatively affect onion development. The researchers also recommend further studies to optimize fertilizer application and improve onion production.

Key Words: Fertilizer; Organic Fertilizer; Urea Fertilizer; Vegetative Growth; Onion; *Allium cepa*

1. INTRODUCTION

1.1 Background of the Study

Agriculture plays a crucial role in the economy, especially in the Philippines, where a significant portion of the population relies on farming as their primary source of livelihood. Among the various crops cultivated, onion (*Allium cepa*) plants, which belong to the family of Amaryllidaceae, is one of the major vegetable crops in the Philippines planted after rice (PhilRice, 2007). *A. cepa* contains high concentrations of folic acid, vitamin B6, magnesium, calcium, potassium, and phosphorus as well as other vitamins and minerals (Chakraborty et al., 2022). It is consumed worldwide in various forms, including raw, cooked, and pickled. Historically, onions have been cultivated not only for their culinary uses but also for medicinal and religious purposes since prehistoric time (Bigliardi, 2019).

Onion production in the Philippines is mainly concentrated in the regions of Ilocos, Cagayan Valley, Central Luzon, and MIMAROPA. Its production is increasing every year due to increasing consumer demand. As cultivation grows to meet increased demand, the agricultural sector faces the issue of not only increasing the yield but also maintaining the quality of crops (Datta, 2013). According to the Department of Agriculture (2022), onion production in the Philippines has improved from 2011 to 2020 with an average annual growth of 10.72% (128,837 metric tons to 229,539 metric tons). However, this progress has not matched the rapid growth seen in Indonesia, which almost doubled its harvest volume and cultivation area during the same period.

Fertilizers play a significant role in boosting the productivity of crops, especially plants like onions that have shallow and unbranched root systems (Brewester, 1994). Many studies, such as Li et al. (2017), Dhaker et al. (2017), Prabhakar et al. (2012), Lee (2010), and De L Cruz et al. (2021), confirm that the growth of most

vegetable crops, including onions, is improved by treating them with different organic fertilizers. Organic fertilizers which are derived from plant or animal sources, are known for their environmental benefits, including improved soil health and sustainability. However, the slow mineralization rate of organic fertilizers often leads to insufficient levels of plant-available nitrogen, causing crop yields in fields treated with organic fertilizer lower than in those treated with chemical fertilizer (Blatt, 1991).

Nitrogen is an essential nutrient for plants as it plays a crucial role in their growth and development. Onions require high nitrogen availability and fertilizer application rates compared to other vegetables (Greenwood et al., 1980). Urea, chemically known as carbamide ($CO(NH_2)_2$), is a white crystalline and a quick acting fertilizer that promotes green leafy growth and aids the photosynthesis process of plants (National Center for Biotechnology Information, 2024). This fertilizer contains high nitrogen content and can be used for all types of soil and crops because of its neutral PH. Urea is particularly effective for crops like onions, which require a consistent nitrogen supply throughout their growth cycle to develop healthy and robust bulbs.

The main purpose of this study is to explore and compare the effects of organic and urea fertilizers on the growth of *A. cepa*. By analyzing factors such as growth rate, this research aims to provide valuable insights into which type of fertilizer is more effective for improving *A. cepa* production. Despite extensive studies on the general effects of these fertilizers, there is limited specific information on their impact on *A. cepa*, particularly in terms of the ideal concentrations needed to maximize its growth.

1.2 Statement of Objectives

The main objective of this study is to explore and compare the effects of organic and urea fertilizers on the growth of *A. cepa*. Whereas, specifically, the objectives of the study are to determine whether there is a significant difference in the growth rate of *A. cepa* when using organic and urea fertilizers and to identify the ideal concentration(s) of organic and urea fertilizer that maximize onion growth. By analyzing factors such as growth rate, this research aims to provide valuable insights into which type of fertilizer is more effective for improving *A. cepa* production. Despite extensive studies on the general effects of these fertilizers, there is limited specific information on their impact on *A. cepa*, particularly in terms of the ideal concentrations needed to maximize its growth.

1.3 Significance of the Study

The research aims to benefit students, farmers, agricultural practitioners, consumers, and future researchers.

For **Students**, the study provides practical insights into crops and fertilization. Students can have a better understanding of the important role for farming choices, the production of food by examining the impacts of organic and urea fertilizers on onions (*Allium cepa*). They can be motivated to pursue jobs in farming businesses by this knowledge. Additionally, the findings can be applied in lab experiments and class discussions to help students connect ideas into real-life situations.

For **Farmers**, they can gain knowledge between organic and urea fertilizers that produce the best results, helping them to enhance their farming methods. By understanding which fertilizers enhance crop growth, farmers can make better decisions about what to use in their fields.

For **Agricultural Practitioners**, they can have the ability to help use the information to provide better advice and recommendations to farmers. The results of the study can help these experts with the precise knowledge of organic and urea fertilizers of onion (*Allium cepa*) that enable them to provide targeted solutions. This implies that they can recommend effective strategies that strengthen the overall effectiveness of farming. This can provide them the supported information that they need in order to remain in the competition in the industry of business.

For **Consumers**, they can benefit from improved onion growth which may lead to a more stable supply in the market and help reduce shortages and sudden price increases. With a consistent supply, onions can become more accessible and affordable. In the long run, the study's findings can support a more reliable and sustainable food system that meets consumer needs.

For **Future Researchers**, they will benefit from the study's data as they investigate new advancements in the use of organic and urea fertilizers. This study serves as a reference for further investigations on organic and urea fertilizers. It provides baseline data that can help identify gaps and guide future research efforts in improving onion farming practices.

1.4 Scope and Delimitation

This study focuses on how urea and organic fertilizers affect the growth of *A. cepa*. The questions stated in the statement of the problem are the only problems this research will aim to answer and fulfill. This experiment will be used to evaluate the efficacy of this study by determining if applying urea or organic fertilizers significantly affects various growth metrics such as growth rate, plant height, leaf length, root length, and leaf count. By examining these factors, the research aims to determine whether urea or organic fertilizer is more effective in improving onion growth.

This study is limited to comparing only organic and urea fertilizers, excluding other types of fertilizers that might also affect the growth of onion (*Allium cepa*). The experimental phase will be conducted in Navotas

City over a period of 3 months, meaning the findings may be specific to the region's soil and climatic conditions and may not be directly applicable to other regions without further validation. Lastly, the study focuses exclusively on onion (*Allium cepa*) and does not extend to other crops.

2. METHODOLOGY

2.1 Research Design

This study used an experimental research design to examine the comparative effects of organic and urea fertilizers on the vegetative growth of *Allium cepa* (Onion) in Navotas City. The experiment involved growing onions under controlled conditions with varying fertilizer types and concentrations. The independent variable was the type and concentration of fertilizer (organic or urea), while the dependent variable was the vegetative growth of onions, measured through parameters such as plant height, leaf length, root length, and leaf count. Controlled variables included soil type, water supply, and environmental conditions to ensure consistency.

Data were collected through measurements of onion growth parameters which were then analyzed using an independent sample t-test to determine significant differences between treatments. Furthermore, the average growth parameters of onion across varying fertilizer concentrations were computed to identify the ideal concentration for vegetative growth.

2.2 Research Instrument

This study utilized onion seeds of a uniform variety, specifically *Allium cepa*, selected for their consistent growth characteristics. Eggshells were used as the primary component of the organic fertilizer because they naturally enrich the soil and gradually supply nutrients. Urea fertilizer served as the nitrogen source to promote fast-acting plant growth. The experiment was conducted in 5 kilograms of well-drained loamy soil to provide ideal growing conditions for onions (*Allium cepa*). The soil was carefully prepared to ensure it was free from contamination caused by previous crops. Watering was done manually in a garden at home to ensure the plants received adequate water throughout the study. Tools like measuring tapes were used to measure growth factors.

2.3 Data Gathering Procedure

The researchers began by preparing the materials needed for the experiment. Twelve plastic gallons were repurposed as planting pots by cutting off their upper sections. These pots were filled with soil sourced from six bags of loamy soil, ensuring a suitable environment for the growth of *Allium cepa* (onion) plants. Uniform *Allium cepa* seeds were planted in the prepared pots. The pots were divided into four groups, with each group receiving different fertilizer treatments. Two groups were treated with organic fertilizer at concentrations of 5% and 10%, while the other two groups received urea fertilizer at the same concentrations. The fertilizers were applied according to recommended guidelines to maintain accuracy and consistency in the experiment. The researchers began applying fertilizers 30 days after planting the seeds and continued with weekly application. At harvest, growth and quality factors were measured and evaluated.

To systematically record plant development, growth measurements were taken after harvest using measuring tapes for plant height, leaf length, and root length. Leaf count was also recorded to assess plant health. The data was organized using a table to facilitate comparison:

Table 1. Effect of organic and urea fertilizer on growth of *Allium cepa* (Onion)

Fertilizer Type	Fertilizer Concentration	Trial	Plant Height (cm)	Leaf Length (cm)	Root Length (cm)	Leaf Count
Organic	5%	1				
		2				
		3				
Urea	5%	1				
		2				
		3				
Organic	10%	1				
		2				
		3				
Urea	10%	1				
		2				
		3				

2.4 Data Analysis Procedure

The collected data were analyzed using statistical methods to determine the effects of organic and urea fertilizers on the growth of onions. The Independent Sample t-Test in Jamovi was used to examine whether there were significant differences in growth between organic and urea fertilizers in terms of plant height, leaf length, root length, and leaf count. If the p-value from the Independent Samples t-Test was less than 0.05, the difference between the two fertilizer types was considered statistically significant. The average growth parameters were analyzed to identify the most effective fertilizer concentration in promoting onion growth.

2.5 Systematic Methods

Preparation of Planting Pots and Soil

The researchers prepared 12 plastic gallons, each cut at the top to create planting pots for the experiment. These pots were repurposed from previously used plastic containers, supporting the goal of reusing and recycling materials to reduce waste. The recycled plastic gallons were chosen to simulate the ideal growing conditions for onions while also contributing to sustainability by giving new life to materials that would

otherwise be discarded. Six bags of well-drained loamy soil were used for the experiment, each plastic gallon containing 5 kilograms of soil. The soil was inspected and ensured that it was free from any contaminants or previous crops that could affect the results.

Planting of Onion Seeds

A uniform variety of onion (*Allium cepa*) seeds was used. The seeds were evenly distributed across the prepared soil in the 12 pots with 6 seeds per pot, ensuring each pot had an equal number of seeds for consistency in the experiment.

Fertilizer Application

After 30 days of planting, the researchers applied fertilizers to the *Allium cepa* (onion) plants. Two types of fertilizers were used: Organic Fertilizer (Egg Shells) and Urea Fertilizer. Each pot contained 5 kg of soil with 5 grams of fertilizer applied for the 5% concentration and 10 grams for 10% concentration. The application of fertilizers was done weekly and consistently maintained for the duration of the study.

Monitoring and Harvesting the Plants

The researchers began tracking the growth factors of the onion (*Allium cepa*) plants after harvesting. Each onion sample was harvested individually and differences in growth between the fertilizer treatments were carefully observed. After harvesting, the green onion was cleaned, measured, and examined for any signs of disease or pest damage. The collected data was then analyzed and used to determine the best fertilizer concentration for optimal onion production.



Figure 1. Effect of Fertilizer Treatments on Onion *(Allium cepa)* Growth after Harvesting

3. RESULTS AND DISCUSSION

Table 1 shows the effect of different concentrations of organic and urea fertilizers on the growth parameters of onion, including plant height, leaf length, root length, and leaf count. These measurements were taken by the researchers using a tape measure.

Table 1. [Effect of Different Concentrations of Organic and Urea Fertilizer on Growth Parameters of Onion]

Fertilizer Type	Fertilizer Concentration	Trial	Plant Height (cm)	Leaf Length (cm)	Root Length (cm)	Leaf Count
Organic	5%	1	41	33	8	4
		2	-	-	-	-
		3	27	23	4	5
Urea	5%	1	28	25	3	4
		2	19.5	16	3.5	6
		3	-	-	-	-
Organic	10%	1	15	13.5	1.5	1
		2	-	-	-	-
		3	-	-	-	-
Urea	10%	1	-	-	-	-
		2	-	-	-	-
		3	-	-	-	-

The data shows the highest plant height (41 cm), leaf length (33 cm), and root length (8 cm) were observed in the first trial with 5% organic fertilizer. The highest leaf count (6) was found in the 2nd trial with 5% urea fertilizer. The lowest plant height (15 cm), leaf length (13.5 cm), root length (1.5 cm), and leaf count (1) were recorded in the first trial with 10% organic fertilizer. Several trials, particularly those with 10% fertilizer showed no measurable growth resulting in missing data for all growth parameters.

Table 2 shows the results of the independent sample t-test analyzing whether there is a significant difference in the growth parameters of onions (*Allium cepa*) when using organic and urea fertilizers.

Table 2. [Independent Sample t-Test of Growth Parameters of Onion]

		Statistic	df	p
Plant Height	Student's t	0.679	10.0	0.512
Leaf Length	Student's t	0.651	10.0	0.530
Root Length	Student's t	0.786	10.0	0.450
Leaf Count	Student's t	0.000	10.0	1.000

The data shows that there was no significant difference between the effects of organic and urea fertilizers on plant height ($p = 0.512$), leaf length ($p = 0.530$), root length ($p = 0.450$), and leaf count ($p = 1.000$) as all p-values were greater than 0.05 ($p > 0.05$).

Table 3 shows the average growth parameters of onions treated with different concentrations of

organic and urea fertilizers, including plant height, leaf length, root length, and leaf count.

Fertilizer Type	Fertilizer Concentration	Average Plant Height (cm)	Average Leaf Length (cm)	Average Root Length (cm)	Average Leaf Count
Organic	5%	34	28	6	4.5
Urea	5%	23.75	20.5	3.25	5
Organic	10%	15	13.5	1.5	1
Urea	10%	-	-	-	-

The data shows that onions treated with 5% organic fertilizer had the highest average plant height (34 cm), leaf length (28 cm), and root length (6 cm), while those with 5% urea fertilizer had a higher average leaf count (5). Meanwhile, onions treated with 10% organic fertilizer exhibited lower growth across all growth parameters, with an average plant height of 15 cm, leaf length of 13.5 cm, root length of 1.5 cm, and a leaf count of 1. No growth was observed for onions treated with 10% urea fertilizer.

4. CONCLUSIONS AND RECOMMENDATIONS

4.1 Conclusion

The results of the study confirmed that fertilizer type influences onion growth but the differences between organic and urea fertilizers were not statistically significant. Statistical analysis showed that the p-values for growth parameters were all greater than 0.05, indicating no significant difference between the effects of organic and urea fertilizers on onion growth. This means that neither fertilizer type had a clear advantage over the other in terms of promoting vegetative growth within the study period. The results also showed that among the tested concentrations, 5% organic fertilizer had the highest plant height, leaf length, and root length, while urea fertilizer produced higher leaf count. Meanwhile, onions treated with 10% organic fertilizer showed minimal growth and no growth was recorded for those treated with 10% urea fertilizer. This suggests that excessive fertilizer concentrations may have a negative impact on onion development. These findings highlight that both organic and urea fertilizers can support onion growth but using the right concentration is essential. The results suggest that 5% of organic or urea fertilizer is more suitable for maximizing onion growth while higher concentration should be avoided. The research objectives were met as the study provided valuable insights into the effects of different fertilizer types and concentrations on onion growth.

4.2 Recommendations

To further improve the study, the researchers suggest continuing the study and offer these improvements:

(1) **Extend the study period.** Conduct the experiment for a longer time to see how fertilizers affect onion growth throughout the full growth cycle.
(2) **Test different organic fertilizers.** Try using different types of organic fertilizers, like compost or manure, to compare their effects on onion growth.
(3) **Investigate different onion varieties.** Study different types of onions to see if they react differently to organic and urea fertilizers.
(4) **Explore additional fertilizer concentrations.** Test more fertilizer levels to find out the best concentration that helps onions grow without causing negative effects.
(5) **Compare combined fertilizer applications.** Experiment with mixing organic and urea fertilizers to check if a combination leads to better growth than using them separately.

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Exploring the Potential of Pineapple Crude Extract Derived from Smooth Cayenne Pineapples (Ananas comosus) as a Natural Treatment for Escherichia coli in the Navotas City River

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Abstract: The degrading quality of bodies of water worldwide has always been one of the pressing environmental concerns nations all over the world are facing, most especially in the Philippines. Water pollution is a threat to both saltwater and freshwater bodies; given that freshwater is a significant element in sustaining life of all forms, this problem puts several sectors of society at risk, most significantly the public health sector, as contaminated and polluted water does not only deplete marine life but also brings about different diseases to humans. In Navotas City, the Navotas River is the main water form that fuels the flow of life of Navoteños as the community and the fishing and marine industry thrive in this river. However, due to several causes such as the release of untreated wastewater, the presence of informal settlers, unsafe fishing practices, and other activities, the quality of the city's main river is slowly worsening, which is manifested through the presence of different bacteria in its water—including E. coli. As a probable prevention to this, this study explores the potential of the crude extract from Smooth Cayenne Pineapples and its efficacy in reducing E. coli content in the water of Navotas River. A quantitative approach was used to test two treated samples of different dilution percentages of the extract and one untreated sample per area from two sites of the river, particularly from Tangos and North Bay Boulevard North areas. The findings have shown that the Smooth Cayenne pineapple's crude extract is insufficient in purifying and cleansing the contaminated samples, as there were no differences between the E. coli content of the treated and untreated samples. It is suspected that there were changes in the E. coli content of the samples, but they were insignificant enough not to appear in the final results of the test.

Key Words: escherichia coli; E. coli; river; Navotas River

1. INTRODUCTION

1.1 Background of the Study

The degradation of water quality is one of the most alarming environmental concerns that the globe has faced for the past century. Signs and manifestations of water degradation may differ from nation to nation; however, it brings about similarly harmful impacts (Biswas & Tortajada, 2019). As water pollution worldwide— particularly in freshwater forms— exacerbates continuously, it poses more and more threats to multiple aspects of the world such as the environment, ecosystems, and numerous economies. Since the use of freshwater is considered by society as an essential component that sustains life, further worsening of water pollution puts the public health sector at a great risk.

According to the World Health Organization (WHO) (2023), approximately 2 billion people reside in water-stressed countries in 2021. Meanwhile, 1.7 billion people consume drinking water from sources contaminated with feces, along with other microbes and pathogens. Other means of usage and exposure to contaminated water, such as using this for domestic purposes, livelihood, production of food, and the like, make individuals more vulnerable to the dangers that degraded water brings—particularly diseases. Some of the most prominent diseases that one could get include diarrhea, cholera, giardiasis, dysentery, typhoid fever, E. Coli infection, and salmonellosis. Additionally, several body systems, such as the gastrointestinal, reproductive, and neurological systems, could also potentially be affected (National Institute of Environmental Health Sciences, n.d.). Along with the several natural and human-induced factors, such as "population growth, expansion of anthropogenic activities, and increased climate variability," that affect this challenge, immediate responses to ease the problem of freshwater pollution are needed before the matter could even escalate into a bigger, much more impactful concern (Plessis, 2022).

In the Philippines, there are also several "water-related challenges," most particularly regarding safe water and sanitation. According to the Environmental Performance Index of Yale University (2024), the Philippines ranks 157th with a score of 10.6 in the Water Resources category and 111th with an EPI score of 42.7 in the Sanitation and Drinking Water category. With the 421 rivers, 221 lakes, and other freshwater resources that provide for the needs of the people, the majority of these resources are also experiencing contamination and degradation. Some of these causes stem from natural factors such as the country's geographical profile and climate change; most of the causes, however, are manmade. For example, polluting water in multiple ways, over 90% of households and the industrial sector of the country releasing untreated wastewater into the water resources, and 688,981 families that account for 2.6% of the country's population practicing open defecation to freshwater forms severely damage the quality of water in the country based on the data gathered from the 2022 Annual Poverty Indicator Survey (Philippine Senate, 2023; Asia-Pacific Network for Global Change Research, 2023).

Despite having a law under the Republic Act (RA) 9275 or The Philippine Clean Water Act of 2004, that prohibits the release of untreated wastewater in different bodies of water, some still do—with the industrial sector being accountable for the majority of such acts (Department of Environment and Natural Resources, 2020). Moreover, Filipinos are also concerned about the impacts of these causes, particularly those that are human-induced. According to the Planet Water Foundation (n.d.), 53% of the households in the country do not have access to a potable water supply, while 23% do not have proper water sanitation. Individuals, particularly children, also become more and more vulnerable to different illnesses and diseases caused by contaminated water. One of the most prominent of these diseases is diarrhea, with over 361,000 kids under 5 years old dying every year due to this. Finally, exposure to contaminated water, along with lack of basic sanitation, is also one of the causes of transmission of several waterborne diseases across the country. (UNICEF, 2017).

The City of Navotas is one of the cities in the National Capital Region (NCR) that is surrounded by numerous bodies of water. With 14 barangays comprising the city, 11 of these are located near the coastline of Manila Bay. Given its geographical profile, Navotas City mainly thrives in the fishing industry, playing a significant role in the livelihood and vitality of the Navoteno community. According to Dacumos (2012), 70% of the population of Navotas City relies on fishing and other related livelihood. However, the quality of water in the city, specifically in the Navotas River, as stated by the local government, is "greatly polluted" (City Government of Navotas, 2015). The Navotas River, also known as the Malabon-Navotas-Tullahan River, is the major body of water in the city. The quality of this freshwater body is slowly degrading mainly due to anthropogenic activities. Citizens, particularly informal settlers, still practice releasing untreated wastewater in this river; businesses and other industries, on the other hand, deposit solid and liquid discharge in these waters (Gan, 2017). Additionally, other activities such as urbanization, deterioration of natural habitats, and unsafe fishing practices also add to the damage and degradation of the water quality of the Navotas River, resulting in contamination, murky quality, and foul odor (Encarnacion et. al., 2024).

1.2 Statement of Objectives

This study aims to explore the potential of pineapple crude extract, a substance with bromelain which is a naturally occurring enzyme extracted from pineapples, as a sustainable and effective alternative for reducing E. coli levels in the Navotas City river. Specifically, this study sought to investigate the efficacy of the crude extract derived from the smooth cayenne pineapples in reducing the E. coli content in the water samples taken from selected sites of the Navotas River, the difference between the E. coli content values of the treated and untreated water samples, as well as the potential environmental and economic benefits of using the Smooth Cayenne Pineapple crude extract as a natural treatment for E. coli reduction in the Navotas River.

1.3 Significance of the Study

The researchers anticipate that the findings of this study will be extremely valuable to numerous groups of individuals. The researchers believe that this study is significant as it can be a helpful tool in formulating a more natural and environmentally sustainable method for treating the contamination, particularly the presence of E. coli, in the rivers of Navotas City. The following groups will benefit from this study.

Local Government of Navotas City. The study will provide a baseline for Navotas City's local government in considering the use of natural water treatment substances instead of utilizing chemicals to reduce the degradation of the quality of the city's rivers. The findings of the study are also beneficial in the long run in the sense that once its findings are acknowledged and accepted, the methods of treating the waters of Navotas City could be further improved. It can also lessen the costs of treatment, therefore being able to obtain more coverage for water treatment and maximize its efficacy.

Navoteño Community. Considering that the majority of the community of Navotas City thrives in the industry of fishing and other related activities, the water wherein these activities are done must be clean. Therefore, this study could help enlighten Navoteños about the risks of consuming and being exposed to water that is contaminated with E. coli, as well as the importance of the proper practices in using water available at households and the water resources surrounding the city. The study could also impact the quality of public health, as the treatment of E. coli in the rivers of Navotas City could potentially decrease cases of several diseases linked to the presence of this bacteria.

Department of Environmental and Natural Resources—Environmental Management Bureau (DENR – EMB). This study is beneficial to this national department as they could consider, adapt, and improve the findings of the study in a way that will be fit to help ease the water-related challenges that the country is facing. Since water pollution and contamination are country-wide concerns, this study has the potential to be of help in treating waters at a national scale.

Future Researchers. This study will be beneficial to future researchers, as this is one of the first studies about the topic of the paper. Therefore, they could use this study as a foundation for studying related topics and even refine the information and findings in their own research papers. Moreover, this study could increase the researchers' interest in the field that the paper focuses on and help them realize the significance of their involvement and role as members of the community that has a responsibility to take care of the environment and the city they reside in.

2. METHODOLOGY

2.1 Research Design

A quantitative approach was used in this study by the researchers, as this procedure is the most suitable one to use in order to achieve the objectives of the study, which is to determine the potential of the crude extract from Smooth Cayenne Pineapples as a natural treatment for E. coli found in the water of Navotas River. A pre-experimental design is used in this study, as this is deemed beneficial because it can be used for exploratory research to test its efficacy for future researchers. This design relies on interpretations of the experimental data collected during the data-gathering process as the foundation for the findings that will address the questions at the beginning of the study. The researchers utilized a pre-experimental research design because they sought to conduct a test with a dependent and independent variable, as well as to test the effectiveness of the crude extract of the pineapple against the E. coli pathogen found in Navotas River.

2.2 Research Instrument

To achieve the major objective of the study, the researchers have conducted a test to determine the E. coli content on the treated and untreated water samples collected from selected sites of the Navotas River through the Multiple Tube Fermentation Method/Technique. The Multiple Tube Fermentation Method/Technique (MTFM or MTFT), is a microbiological test conducted to determine the presence of coliform group/s in a water sample. It is composed of three experimental stages namely: the presumptive stage, the confirmed stage, and the completed stage. The presumptive test involves the inoculation of the lauryl tryptose/lactose broth with the graduated amounts of the sample in presumptive tubes, followed by the incubation of the said tubes at 35 ±0.5 ℃ for at least 24 hours. If there is the presence of lactose-fermenting bacteria as manifested through the formation of gas, then E. coli or coliform is presumed to be present in the samples. Samples that have shown gas

formation will undergo the next step, which is the confirmatory stage. In this experimental stage, the positive samples from the previous stage are inoculated in a new fermentation tube with a green lactose bile broth and the tubes are incubated at 35 ±0.5 ℃ for at least 48 hours. If the formation of gas is evident on the tubes, then the confirmed test is positive. Finally, the completed stage involves taking samples from the positive samples in the confirmed test and streaking these samples on plates of eosin methylene blue (EMB). These plates will then be incubated at 35 ±0.5 ℃ for at least 24 hours. After the incubation, one or more typical colonies are transferred to a fermentation tube containing lauryl tryptose broth and streaked on a nutrient agar slant. The tubes and agar slant shall be incubated at 35 ±0.5 ℃ for at least 24 hours, or 48 hours if no gas formation is evident. From these agar slants and their corresponding fermentation tubes, samples that have shown the formation of gas will be observed microscopically to confirm the presence of E. coli and/or coliform. However, the gas formation is already a confirmation that the test is satisfactorily completed.

2.3 Data Gathering Procedure

In preparing the pineapple extract, the researchers bought Smooth Cayenne Pineapples in a local market located at Agora, Navotas City. After, the pineapples were extracted manually by the researchers by processing the fruit using a blender and straining the processed substance until it was pure. In order to obtain the water samples, the researchers went to two different sites of the Navotas River, particularly in the North Bay Boulevard North (NBBN) and Tangos areas. The researchers collected three 120 ml samples per site using sterile glass containers. Following this is the actual experimentation of mixing the pineapple crude extract in the samples. In doing this, the researchers used two different dilution percentages for the samples, particularly 50% and 100%. Since there are three 120 ml samples per site, one sample per site is left untreated for the comparison of E. coli levels of the treated and untreated samples. To ensure organized handling of the samples, the researchers labeled the samples according to the site they were taken from, if they were untreated or treated, and the dilution percentage that the sample contained (for treated samples). A table is utilized for easier identification and organization of the data, which can be found below:

Table 1. Treated and Untreated Water Samples from Navotas River

Site	Sample Code	Treated/ Untreated	Dilution Percentage
Tangos	TNS-01-50	Treated	50%
	TNS-02-100	Treated	100%
	TNS-03-00	Untreated	0%
North Bay Boulevard North	NBBN-01-50	Treated	50%
	NBBN-02-100	Untreated	100%
	NBBN-03-00	Untreated	0%

After the researchers had performed the treatments, the water samples were taken to the Philippine Institute of Pure and Applied Chemistry in the Ateneo De Manila University Main Campus for the testing of E. coli presence in the samples. The laboratory follows the standard methods of extraction and examination of water from the Standard Methods for the Examination of Water and Wastewater (SMEWW) 22nd Edition book of the American Public Health Association (APHA), American Water Works Association (AWWA), and the Water Environment Federation (WEF). After the examinations for the E. coli content of the waters, the researchers took the results of quantitative data analyses.

2.4 Data Analysis

With the results given by the PIPAC Laboratory, the researchers organized the quantitative data into tables for comparison. Due to the limited number of samples (6), the researchers have opted to analyze the data descriptively. In order to determine the efficacy of the pineapple crude extract in reducing the E. coli content of the water samples taken from the Navotas River, the researchers will use the MPN (Most Probable Number) value of the E. coli in the untreated water samples as the basis for comparison. If the treated water samples yielded a lesser MPN value than the MPN value of the untreated water samples, then the pineapple crude extract is deemed to be effective; therefore, there is a potential for the pineapple crude extract to be used as a natural treatment to reduce E. coli in environmental waters such as the Navotas River.

3. RESULTS AND DISCUSSION

This section provides the presentation of statistical data relative to the problems posted. The corresponding analysis and interpretation of data are incorporated in this portion of the study. To ensure validity within the study, the samples presented below were received and analyzed by the Philippine Institute of Pure and Applied Chemistry (PIPAC) at Ateneo de Manila University Campus on February 10, 2025. This chapter will contain the results of the laboratory and the researcher's interpretation of the data gathered through the feedback of PIPAC.

Table 2. Report Analysis of Untreated Samples

Sample Code	Parameter	Result(s)
NBBN-03-00	E. coli, MPN/100mL	> 16,000
TNS-03-00	E. coli, MPN/100mL	> 16,000

Tangos. The result of the Multiple Tube Fermentation on the untreated sample shows that the water area connecting Navotas River to Barangay Tangos has a probable amount of greater than 16,000 E. coli content.

North Bay Boulevard North (NBBN). The result of the Multiple Tube Fermentation on the untreated sample shows that the water area connecting Navotas River to North Bay Boulevard North has a probable amount of greater than 16,000 E. coli content.

Table 3. Comparison of the Report Analysis of the Treated Samples (50%) and Untreated Samples - NBBN

Sample Code	Parameter	Result(s)
NBBN-03-00	*E. coli, MPN/100mL*	*> 16,000*
NBBN-01-50	E. coli, MPN/100mL	> 16,000

Treated. The result of the Multiple Tube Fermentation test on the treated sample shows that the water area connecting Navotas River to the North Bay Boulevard North area has a probable amount of greater than 16,000 E. coli content. The water sample was diluted at a ratio of 50:50 with the Smooth Cayenne Pineapple crude extract.

Untreated. The result of the multiple tube fermentation on the untreated sample shows that the water area connecting Navotas River to North Bay Boulevard North has a probable amount of greater than 16,000 E. coli content. The water sample is untreated, thus remaining at 100% pure environmental water.

Table 4. Comparison of the Report Analysis of the Treated Samples (100%) and Untreated Samples - NBBN

Sample Code	Parameter	Result(s)
NBBN-03-00	*E. coli, MPN/100mL*	*> 16,000*
NBBN-02-100	E. coli, MPN/100mL	> 16,000

Treated. Identical to the sample diluted at 50%, the result of the Multiple Tube Fermentation test shows that the sample retained its value at a probable amount of greater than 16,000 E. coli content. No difference was seen between the treated (100%) and untreated samples.

Untreated. The result of the multiple tube fermentation on the treated sample, similar to Tangos, shows that there was no significant change in the E. coli content of the sample after dilution. The result retained its value at a probable amount of greater than 16,000 E. coli content in the sample.

As shown in Tables 3 and 4, there is no difference between the E. coli content of the diluted samples and the untreated samples taken from the North Bay Boulevard North (NBBN) site.

Table 5. Comparison of the Report Analysis of the Treated Samples (50%) and Untreated Samples - Tangos

Sample Code	Parameter	Result(s)
TNS-03-00	*E. coli, MPN/100mL*	*> 16,000*
TNS-01-50	E. coli, MPN/100mL	> 16,000

Treated. The result of the Multiple Tube Fermentation test on the treated sample shows that there was no significant change in the E. coli content of the sample after dilution. The result retained its value at a probable amount of greater than 16,000 E. coli content in the sample. The ratio of the treatment in the sample is 50:50.

Untreated. The result of the Multiple Tube Fermentation test on the untreated sample shows that there was no significant change in the E. coli content of the sample after dilution, similar to the treated sample. The result retained its value at a probable amount of greater than 16,000 E. coli content in the sample.

Table 6. Comparison of the Report Analysis of the Treated Samples (100%) and Untreated Samples - Tangos

Sample Code	Parameter	Result(s)
TNS-03-00	*E. coli, MPN/100mL*	*> 16,000*
TNS-02-100	E. coli, MPN/100mL	> 16,000

Treated. The result of the Multiple Tube Fermentation test on the treated sample shows that there was no significant change in the E. coli content of the sample after dilution. The result retained its value at a probable amount of greater than 16,000 E. coli content in the sample. The ratio of the treatment in the sample is 1:1.

Untreated. The result of the multiple tube fermentation on the untreated sample shows that there was no significant change in the E. coli content of the sample after dilution, similar to the treated sample. The result retained its value at a probable amount of greater than 16,000 E. coli content in the sample.

As shown in Tables 5 and 6, there is no difference between the E. coli content of the diluted samples to the untreated samples taken from the Tangos site.

4. CONCLUSION AND RECOMMENDATIONS

The primary objective of this study is to determine if the crude extract derived from Smooth Cayenne Pineapples has the potential to reduce the E. coli content present in the Navotas River

As implied by the test results, the researchers found that the crude extract from Smooth Cayenne Pineapples is not effective in reducing E. coli levels in the Navotas River. The crude extract of Smooth Cayenne Pineapples presents itself not to be a viable cause in combating E. coli in environmental waters the analysis of the data gathered indicates that the crude extract of Smooth Cayenne pineapples is not enough in purifying and cleansing the contaminated samples.

The degree of dilution of the samples remained ineffective in reducing the E. coli content of each sample. The 50% and 100% treated samples of both areas resulted in the same number as the untreated samples. This signifies that there was no difference between each sample- both treated and untreated. All of the tests resulted in the conclusion that there are more than 16,000 E. coli bacteria within 100 mL of each sample. The researchers could argue that there were changes in the E. coli content of the samples, but they are, however, insignificant enough not to appear in the final results of the test.

Given the absence of difference from the report analyses regarding the E. coli content of the treated and untreated Navotas River water samples, the researchers determined that Smooth Cayenne Pineapple crude extract is not suitable for treating E. coli-infected water. The findings reveal that treating the water samples with E. coli content using the crude extract does not reduce the amount of E. coli as well. The use of Smooth Cayenne Pineapple crude extract is, for now, a 'far-fetched dream' in being a natural solution for E. coli contamination in environmental waters.

Based on the concluded information about the research problem and the study itself, the researchers would recommend the local government of Navotas City conduct a series of thorough examinations and tests of the Navotas River's water by conducting tests for the presence and amount of different bacteria, pathogens, and even chemicals to ensure its quality. Since Navotas River fuels the flow of life of Navotenos, Navotas City's local government could also consider enforcing stricter policies in the industries thriving in the Navotas River and imposing safety guidelines concerning the use of the water from

the river. Additionally, as mentioned in the introduction of the context of the study, anthropogenic activity also impacts the contamination and presence of bacteria, such as E. coli, in water bodies; with this, it is also recommended for the Navotas City LGU to formulate and conduct an action plan with regards to the settlers residing along the area of the river.

Originally, the paper was supposed to explore the E. coli reduction potential of bromelain, the naturally occurring enzyme found in pineapples in the water of Navotas River. However, due to several hindrances, particularly a lack of experimental and financial resources, the researchers had to make several adjustments.

Given that the study was not able to determine any potential in the Smooth Cayenne Pineapple crude extract as a natural treatment to reduce the E. coli content in Navotas River due to the lack of differences in the amount of E. coli in the treated and untreated water samples, it is recommended for future researchers to have a more in-depth focus on the study regarding the variables and experimentations conducted in order to ensure the success of the study, most especially the methodology, as well as to actually meet the goals of the paper stated in the Statement of the Problem section. To attain this, listed here are some specific ways:

- **Using bromelain (the specific antibacterial enzyme present in the pineapple fruit) instead of just the crude extract.** Since no laboratories were accepting and facilitating the procedure needed to extract the bromelain enzyme from the Smooth Cayenne Pineapple crude extract, which is Membrane Filtration/Ultrafiltration (UF), the whole study was compromised; because of this adjustment, the researchers suspect that the failure to reduce the E. coli content of the water samples was due to the downgrade in the substance used as treatment—from the bromelain enzyme itself to just the crude extract.
- **Including more sites of the Navotas River for water sampling.** The original methodology of the study includes three sites of the Navotas River, requiring the researchers to submit more samples, thus resulting in a more costly expense. By having more samples from more sites of the river, the results could be more extensive and accurate, as the researchers believe that two sites alone are not enough to completely generalize the state and quality of the water of the Navotas River. Additionally, future researchers could also find out if there are differences in the quality of the water of the river taken from different sites.

Finally, future researchers could also delve deeper into the study by using other natural substances as a substitute treatment for reducing E. coli in environmental water. They could also examine the presence of other bacteria commonly present in various water forms or go as far as comparing different natural substances to see which treatment performs better in bacterial content reduction and further contribute to the springboard that the study of the researchers has provided.

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Investigating the effectiveness and potential of *Averrhoa bilimbi* (kamias) as a unique and eco-friendly alternative dental acid etchant in oral health care

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Abstract: This research aims to investigate the potential of *Averrhoa bilimbi* in dentistry. In this study, the researchers discussed turning the *Averrhoa bilimbi* into dental acid etchant to make it budget-friendly and lessen the chemical usage that was seen in traditional dental acid etchant. This study can help dentists, dental students, public dental services, and even patients to lessen their chemical intake whenever their dentists use the traditional dental acid etchant on their teeth. This paper addresses environmental concerns in dental health and shows an eco-friendly dental acid etchant that offers a sustainable alternative that can help lessen the chemicals that cause pollution compared to the use of the original dental acid etchant. This paper shows that the use of chemical-based acid etchants, phosphoric acid, has raised worry about its potential health risks and environmental impact. The researchers formulated a natural dental acid etchant with the use of *Averrhoa bilimbi* extract with a pH level of 2, combined with colloidal silica to achieve an ideal gel consistency. The data collection will be used in human testing to see if the *Averrhoa bilimbi* can roughen the teeth' enamel; with this, if the *Averrhoa bilimbi* roughens the teeth enamel under different concentrations, the results meet the researcher's objectives. Results from human testing indicate that Averrhoa bilimbi extract can serve as an alternative to conventional dental acid etchants. The experimental and testing showed us that in different concentrations of 70%, 80%, and 90%, The 90% concentration was the most effective among the tested formulations.

Key Words: Dental Acid Etchant; Phosphoric Acid; Acidity; dentistry field; teeth enamel

1. INTRODUCTION

1.1 Background of the Study

Metro Manila, the Philippines' most densely populated metropolitan area, faces growing concerns regarding chemical pollution in various industries, including dentistry. Traditional dental acid etchants, primarily composed of phosphoric acid, are widely used in dental procedures to roughen the enamel surface and enhance the adhesion of restorative materials. However, the extensive use of chemical-based etchants raises environmental concerns and potential health risks for both patients and dental professionals. Prolonged exposure to phosphoric acid has been linked to dental erosion, hypersensitivity, and environmental contamination due to chemical waste disposal.

Dental health plays a vital role in overall well-being, yet many dental treatments rely on synthetic chemicals that may pose health and environmental risks. One such chemical, phosphoric acid, is widely used in dental acid etchants to roughen tooth enamel, improving the adhesion of restorative materials such as composite resins and adhesives. However, the continued use of phosphoric acid-based etchants raises concerns due to potential enamel damage, oral tissue irritation, and environmental pollution from chemical waste disposal. In response to these challenges, there is a growing need to develop natural, cost-effective, and eco-friendly

alternatives to synthetic etchants. This study explores the potential of Averrhoa bilimbi (kamias) extract as a sustainable dental acid etchant. *Averrhoa bilimbi,* a tropical fruit abundant in the Philippines, is naturally acidic, with a pH level ranging from 1 to 2.5, making it a strong candidate for enamel etching. It contains ascorbic acid, oxalic acid, citric acid, and phosphorus, which contribute to its etching properties and may offer a safer alternative to commercial etchants.

Beyond its chemical effectiveness, *Averrhoa bilimbi* presents several advantages. First, it is a locally available and affordable resource, reducing dependence on imported synthetic dental materials. Second, it is biodegradable, which helps address the issue of chemical waste in dental clinics. Third, natural etchants derived from fruits, such as citrus and tamarind extracts, have been explored in previous studies for their biocompatibility and reduced toxicity, suggesting that *Averrhoa bilimbi* may provide a safer option for patients with sensitivity to synthetic acids. By assessing the etching ability of Averrhoa bilimbi extract, this research aims to contribute to sustainable dentistry by offering a viable alternative to phosphoric acid-based etchants. If proven effective, a *Averrhoa bilimbi*-based etchant could promote safer, more affordable, and environmentally responsible dental practices, benefiting dentists, dental students, patients, and public dental services. Furthermore, the study supports the broader movement toward natural and locally sourced materials, reinforcing the importance of innovation in eco-friendly healthcare solutions.

1.2 Statement of the Problem

Dental health care and pollution are interrelated concerns that affect both the environment and human health. Traditional phosphoric acid-based etchants contribute to chemical waste and potential health risks, necessitating safer and more sustainable alternatives.

This study aims to investigate the potential of Averrhoa bilimbi (kamias) extract as an alternative dental acid etchant by addressing the following research questions:

1. Does *Averrhoa bilimbi (kamias)* produce more natural acid etchant than the traditional acid etchant?
2. Can the use of Averrhoa bilimbi extract provide a more cost-effective alternative for dentists?
3. Do the *Averrhoa bilimbi (kamias)* have enough acidity to become an alternative dental acid etchant?

1.3 Research Hypothesis

Different objectives was obtained by the researchers, and with that, different research hypothesis was constructed:

1. **Null Hypothesis (Ho):** There is **no significant difference** in etching effectiveness, bond strength, or performance between ***Averrhoa bilimbi* extract** and conventional dental acid etchants.
2. **Alternative Hypothesis (Ha): *Averrhoa bilimbi* extract** exhibits a significant difference in etching effectiveness, bond strength, or overall performance compared to traditional dental acid etchants.

1.4 Scope and Delimitation

This research investigates the potential application of *Averrhoa bilimbi (kamias)* as a substitute etchant in the field of dentistry. The research is primarily experimental and aims to investigate the effectiveness of *Averrhoa bilimbi (kamias)* in comparison to traditional etchants. The research will take place within the academic semester, adhering to a predetermined academic timetable. The research will involve working with experienced dentists to lead the experimental processes and assist in assessing *Averrhoa bilimbi (kamias)* effectiveness as an etchant.

This research solely focuses on examining *Averrhoa bilimbi* as an etchant in dentistry and does not explore other possible uses of *Averrhoa bilimbi (kamias)* in the field. The research is confined to a single academic semester, potentially constraining the extent of longitudinal inquiries or prolonged experiments. The study's sample population consists only of dentists and their patients, with no comparison made between *Averrhoa bilimbi (kamias)* and other potential etchants. The research did not investigate the chemical makeup of *Averrhoa bilimbi (kamias)* for purposes other than as an etchant.

1.5 Significance of the Study

This research contributes to the field of dentistry by exploring a natural and cost-effective alternative to synthetic dental etchants. The study benefits multiple stakeholders, including:

For Dentistry Students – Encourages research on eco-friendly dental materials.

For Dentists – Provides an alternative etchant that is safer, more natural, and cost-effective.

For Patients – Offers a natural option for those sensitive to synthetic chemicals.

For Dental Clinics – Promotes the use of sustainable dental materials to attract environmentally conscious patients.

For Public Dental Services – Encourages the adoption of affordable and accessible natural products in healthcare.

For Future Researchers – Serves as a foundation for further studies on natural acid etchants.

For San Jose Academy – providing an alternative, natural option for dental school treatments.

1.6 Research Framework

input:	process:	output:
Averrhoa bilimbi (kamias) (in gel form)	Preparation The researchers will compare -Turning *Averrhoa bilimbi (kamias)* as Gel in if the *Averrhoa bilimbi (kamias)* does a better job in order to make Dental acid than the dental acid etchant. etchant 2. Application -The researchers will apply the *Averrhoa bilimbi (kamias)* through the Teeth 3. Statistical analysis -the researchers will analyze if the *Averrhoa bilimbi (kamias)* can be an alternative dental acid etchant	The Researchers will compare if the *Averrhoa bilimbi (kamias)* does a better job than the dental etchant

1.7 Definition of Term

Acidity – Refers to the pH level of a substance and its ability to donate hydrogen ions, which affects its etching properties in dental applications.

Alkaline - A natural water sample can be thought of as a measurement of the solution's proton deficit in relation to an arbitrary zero proton level.

Colloidal Silica – A thickening agent used to enhance the consistency of dental etchants, improving their application.

Averrhoa bilimbi (Kamias) – A tropical fruit rich in organic acids (e.g., oxalic acid, citric acid) that may serve as a natural alternative to synthetic dental acid etchants.

Phosphoric Acid - A synthetic acid commonly used in commercial dental etchants to roughen enamel for improved bonding strength. Phosphoric acid, on the other hand, is frequently used as an etching agent in dentistry. The surface of teeth, typically enamel, is roughened with inorganic acid to facilitate the effective bonding of dental materials like resins.

2. METHODOLOGY

2.1 Research locale

The researchers conducted this study at the school laboratory of San Jose Academy in San Jose, Navotas City. The laboratory was chosen as the primary experimental site because it is equipped with the necessary tools and equipment for testing the effectiveness of *Averrhoa bilimbi* as an alternative dental acid etchant. Conducting the study in this location ensured a controlled environment for accurate experimentation and data collection. Navotas City was

selected as the study area due to its abundance of *Averrhoa bilimbi* trees, which can be found in many backyards and open spaces. The easy accessibility of *Averrhoa bilimbi* made it a practical and sustainable choice for the researchers. Additionally, the study aligns with the increasing interest in natural remedies and alternative dental practices, especially within educational institutions that promote scientific inquiry and innovation. The primary researchers involved in this study were Grade 12 STEM students, who aimed to explore the potential of *Averrhoa bilimbi* in dental applications. This research was conducted to highlight the underestimated benefits of *Averrhoa bilimbi* and to prove that natural and organic alternatives can be as effective as chemical-based compounds, which may pose risks to human health and the environment.

2.2 Research Instrument

This study explores the development and effectiveness of a natural dental etchant using *Averrhoa bilimbi* (kamias) extract with a pH of 2, combined with colloidal silica to achieve an ideal gel consistency suitable for dental applications. The research evaluates the etching capability of different concentrations (70%, 80%, and 90%) to determine the most effective, affordable, and sustainable alternative to commercially available phosphoric acid-based etchants. By assessing factors such as pH stability, enamel surface roughness, and etching efficiency, the study provides insights into *Averrhoa bilimbi* extract's potential for safe and eco-friendly dental use. The findings aim to benefit dentistry students, dentists, patients, dental clinics, and public dental services, contributing to advancements in biodegradable and cost-effective dental materials while promoting environmentally conscious practices in oral healthcare.

Preparation and Formulation Process

1.) Extraction of *Averrhoa bilimbi* Juice – Fresh bilimbi fruits were washed, sliced, and blended into a thick liquid. The juice was extracted using cheesecloth and collected in three beakers (70%, 80%, and 90% concentrations).
2.) Gel Base Preparation – Colloidal silica was gradually mixed with distilled water, and the *Averrhoa bilimbi* extract was incorporated while stirring until a uniform gel-like consistency was achieved.
3.) Fermentation for Acid Stability – The mixture was stored in a sealed, sterilized container for 24 to 48 hours to enhance its acidity through microbial activity.
4.) pH Testing and Validation – The final solution was tested to ensure it maintained a pH level of 1–2.5, confirming its suitability as a dental etchant.

2.3 Research Design

This study employed an experimental research design to determine the effectiveness of *Averrhoa bilimbi* (kamias) extract as an alternative dental acid etchant. The experiment specifically examined the etching ability of *Averrhoa bilimbi* extract at three different concentrations (70%, 80%, and 90%) and compared its performance to that of a commercially available acid etchant.

The experimental research design was chosen because it is the most appropriate and reliable method for establishing a cause-and-effect relationship between the independent variable (*Averrhoa bilimbi* extract concentration) and the dependent variables (etching effectiveness and enamel roughness). By directly applying the *Averrhoa bilimbi*-based etchant on sample tooth enamel and measuring its effects, the study ensured controlled testing conditions that minimized external influences.

Variables of the Study:

- **Independent Variable**: Different concentrations of *Averrhoa bilimbi* extract (70%, 80%, and 90%) and a commercial acid etchant.

- **Dependent Variables**: pH level of the etchant solutions, surface roughness of the enamel, and overall effectiveness in etching teeth.

2.4 Data collection and procedure

Materials/Equipments	Purpose
Fresh *Averrhoa bilimbi*	Natural acid source for etchant
pH test strips	To monitor the acidity levels
Blender/Food processor	Crashed the *Averrhoa bilimbi* into juice
Syringe	Precise liquid measurements
Cheesecloth	To extract pure *Averrhoa bilimbi* juice
Silica gel (colloidal)	Thickening agent for gel consistency
Distilled water	Ensures purity in formulation
Sterile mixing container	Prevents contamination
Glass stirring rod	Ensures uniform mixing
Sample tooth (dentures)	Test subject for etching effectiveness

2.5 *Averrhoa bilimbi* extract dilution ratio

Averrhoa bilimbi extract (%)	Distilled water with colloidal (%)	Expected pH level
70% *Averrhoa bilimbi*	30% water and colloidal	pH 1-2.5
80% *Averrhoa bilimbi*	20% water and colloidal	pH 1-2.5
90% *Averrhoa bilimbi*	10% water and colloidal	pH 1-2.5

2.6 Data Analysis

Formulation of the etching gel with colloidal silica

The etching gel was formulated using this Equation to ensure proper consistency

$$W\ final = + Rbase + S\ colloidal + A\ Averrhoa\ bilimbi$$

Where:
W final = Final Etching Gel
R base = Distilled Water
S colloidal = colloidal Gel
A Averrhoa bilimbi= *Averrhoa bilimbi* extract (pH 2) at different concentrations (70%, 80%, 90%)

Summary of Findings

- The pH levels of all formulations remained within the expected range (pH 1-2.5) confirming their suitability for etching applications.
- The gel's viscosity was optimal, ensuring ease of application and stability over time
- Microscopic analysis showed that the gel effectively created enamel porosity, with increased etching effects at higher concentrations of *Averrhoa Bilimbi* extract

2.7 Data Collection Parameters

Parameter	**Measurement Method**	**Expected Outcome**
pH Levels	pH meter/test strips	Should remain in 1 - 2.5 pH range
Viscosity & Stability	Visual & Texture analysis	Gel should be smooth & applicable
Etching Effectiveness	Microscopy	Visible enamel porosity & roughness

3. RESULTS AND DISCUSSION

3.1 Results

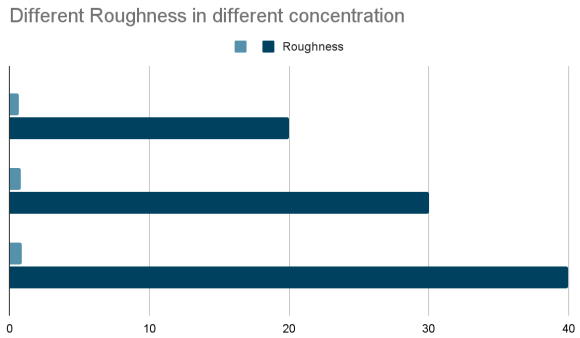


Figure 1. Roughness of different concentration of *Averrhoa bilimbi*

The figure 1 shows the different roughness in different concentrations of *Averrhoa bilimbi*. 70% of concentration shows that there's 70% of roughness out of 100% in the teeth enamel, for the 80% of concentration, it shows that there's 80% of roughness out of 100%, and lastly for the 90% of concentration shows that there's 95% of roughness out of 100%. This shows that 90% of concentration is the most effective of them all since it has more acidity than 70% and 80% of concentration.

- **70% Concentration** – Produced 70% enamel roughness, indicating moderate etching ability.
- **80% Concentration** – Increased to 80% enamel roughness, demonstrating a stronger etching effect.
- **90% Concentration** – Achieved 95% enamel roughness, confirming its superior effectiveness due to higher acidity and enhanced demineralization.

The results suggest that *Averrhoa bilimbi* extract is a viable natural alternative to conventional phosphoric acid-based etchants, offering eco-friendly and cost-effective benefits. However, differences in consistency were noted—while commercial etchants exhibit a gel-like texture, the *Averrhoa bilimbi* etchant tends to be more liquid.

3.2 Discussion

The information gathered by the researchers demonstrates *Averrhoa bilimbi (kamias)* efficacy as a substitute dental etchant. This study demonstrates how varying concentrations of *Averrhoa bilimbi (kamias)* produce varying levels of tooth enamel roughness and satisfy the researchers' expectations regarding the extract's ph level of 1-2.5, indicating that *Averrhoa bilimbi (kamias)* can roughen and etch teeth. Furthermore, the evidence indicates that *Averrhoa bilimbi*, an alternative dental etchant, doesn't have chemicals, making it potentially safe for patients' chemical intake and making it an environmentally friendly product.

Comparing these findings with previous research on natural acid etchants can provide a broader perspective on *Averrhoa bilimbi*'s effectiveness. This study has explored the potential of naturally derived acids in dental applications, particularly in enamel etching. Studies on citric acid-based etchants, for example, have shown similar effects on enamel roughness, demonstrating their ability to create a surface suitable for bonding dental materials. These findings reinforce the potential of fruit-derived acids as alternatives to synthetic etchants, which are commonly used in dental procedures but may pose risks such as excessive enamel demineralization or biocompatibility concerns.

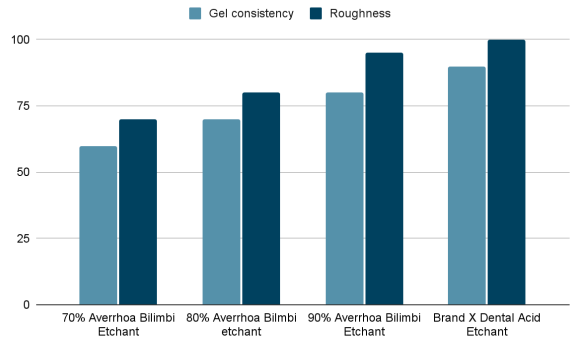


Figure 1. Comparison of Brand X to different *Averrhoa bilimbi* etchant

Figure 1 shows that researchers compared *Averrhoa bilimbi* etchants at different concentrations (70%,

80%, and 90%) to the Brand X dental acid etchant. The results indicate that while the enamel roughness produced by Averrhoa bilimbi etchants is nearly comparable to that of the Brand X etchant, there is a notable difference in consistency. The Brand X etchant exhibits a gel-like consistency, whereas the Averrhoa bilimbi etchants have a more liquid form. Despite this difference, the 90% Averrhoa bilimbi etchant demonstrated the highest enamel roughness among the three concentrations, approaching the effectiveness of the commercial Brand X etchant.

By analyzing the similarities and differences between *Averrhoa bilimbi* and other fruit-based etchants, such as those derived from citrus fruits and tamarind, a clearer understanding of its effectiveness can be established. This comparison not only highlights the practical applications of *Averrhoa bilimbi* in dentistry but also underscores its potential as an eco-friendly and accessible alternative, particularly in regions where synthetic etchants may be costly or less available.

4.CONCLUSION AND RECOMMENDATIONS

4.1 Conclusion

According to the overall data that was collected by the researchers, *Averrhoa bilimbi* can be an alternative dental acid etchant. One of the researcher's conclusions is that *Averrhoa bilimbi* can help many people who are in the dentistry field when it comes to budgeting their equipment or tools. One of the also major findings is that with the natural fruit it can be turned into something useful that can help the country to lessen the usage of the phosphoric acid which also helps the patients to lessen their chemical intake that can affect their health. Overall *Averrhoa bilimbi* etchant can be an alternative etchant and has the same purpose of the traditional dental acid etchant.

Summarizing the key findings, this study demonstrated that *Averrhoa bilimbi* extract contains natural acids,*Averrhoa bilimbi* is known for being high in protein, fiber, iron, calcium, carotene, ascorbic acid, vitamin C, niacin, riboflavin, thiamine, and phosphorus. The findings suggest that it is a potential eco-friendly and cost-effective alternative to commercial dental etchants. The long-term implications of this research indicate that incorporating natural etchants in dentistry could contribute to reducing environmental impact and promoting safer dental procedures for patients. However, further research is needed to fully establish its efficiency and safety compared to traditional etchants.

4.2 Recommendations

1. **For the dentists,** Dentists may consider using *Averrhoa bilimbi* extract to reduce patient exposure to synthetic chemicals.
2. **For the patients,** this study can help them for those who are sensitive when it comes to chemicals.
3. **For the Dentistry students,** they can use this study to investigate it further. If they encounter similar activities, they can utilize this subject for their research.
4. **For Dental Schools,** further investigate on some natural materials that can help the school in terms of budgeting.
5. **For Dental Clinics,** they can use the researcher's study to use them for their equipment, this study can help the dental clinic who are having hard time budgeting their money.
6. **For Public Dental Services,** they can use *Averrhoa bilimbi* to lessen their expenses or to save their money for other dental equipments.
7. **For the future researchers,** further investigate this study and compare the original dental acid etchant to the *Averrhoa bilimbi* etchant.
8. **To San Jose Academy,** this study can help the school to find or recommend more natural materials study related to the students so that it can help the school's community and environment.

In addition, future improvements to this study should include larger testing and additional natural acids to compare their effectiveness as dental etchants. It is also recommended to use larger sample sizes for further validation of the results. Conducting more in-depth analyses on enamel surface changes, bonding strength, and the longevity of *Averrhoa bilimbi* etching effects would further enhance the credibility of this research. The researchers also recommend conducting this experiment in a larger science laboratory with much more and more accessible laboratory equipment. Additionally, analyzing potential improvements or limitations of the study, such as the need for more controlled pH testing, variations in enamel composition, and long-term effects on tooth structure, can help refine future research.

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Comparing the Effectiveness of Different Natural Cleaning Solutions on Bacteria

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Abstract: The study investigated the effectiveness of natural cleaning solutions, specifically with regard to their antibacterial properties, in comparison to conventional disinfectants based on chemicals. The commercial formulations of vinegar, lemon juice, and baking soda were the subject of the research, which assessed how well they eliminated microorganisms. As a result, the study was comparative experimental, examining how the cleansers affected bacterial cultures in terms of bacterial presence decrease at various doses. The potential synergy between these natural cleansers was also examined in the study. All-natural cleaning solutions were discovered to have a strong antibacterial effect since they completely absorbed the germs. Because of this, these naturalities are excellent in terms of both their effectiveness and their potential as safe substitutes for traditional chemical disinfectants. The result has significant ramifications for a number of sectors, including the home, cleaning service providers, and industries—all of which have been demonstrated to gain from cleaner, greener practices. As a result, it has demonstrated the effectiveness of natural cleaning solutions, advancing the adoption of environmentally friendly and human health-promoting techniques that rely less on dangerous chemicals.

Key Words: natural cleaning solution, bacteria

1. INTRODUCTION

1.1 Background of the Study

The never-ending argument between natural cleaners and our traditional antimicrobial cleaners. While some research demonstrates the antibacterial efficacy of natural substances under certain settings, several other studies list the limitations of their efficacy in particular situations. Because natural substances exist in a variety of forms, it is impossible to predict the results, thus it is necessary to carefully study concentration and application method optimization. Moreover, the purported environmental advantage of using natural cleaners is seldom guaranteed. The majority of natural items require cautious intake since they may be harmful to the environment if consumed in excess.

As a result, several researchers carried out the analyses related to the antibacterial activity of various natural compounds. Mandal and Mandal (2011) have reported that vinegar inhibits the development of Salmonella and E. Coli on surfaces via denatured bacterial proteins and acidity. Similarly, because lemon juice has a high quantity of citric acid, Al Nabulsi and Al Smadi (2014) demonstrated that it is efficient against Staphylococcus aureus. These findings support the overall hypothesis put out by Davidson and Taylor (2007) that organic acids have the ability to damage microbial cell membranes and interfere with necessary metabolism.

However, it must be remembered that a variety of parameters, including concentration, contact duration, and the specific microbial species in issue, affect how effective natural cleansers are. Cutler and Wilson (2004) point out that studies have shown that higher concentrations and longer contact times tend to boost antibacterial activity. Furthermore, the susceptibility of certain bacteria to natural chemicals is widely diverse, and so unique cleaning techniques must be utilized for individual purposes. Given this, Weber et al. (2000) offered a very helpful comparison of natural and other home disinfectants' effectiveness against possible human diseases. The study's findings suggest that using a mix of natural substances, such as vinegar, club soda,

and tea tree oil, might result in disinfection levels that are on par with bleach solutions. This raises the possibility that combining several natural chemicals might create synergistic visions that could potentially surpass the limitations of each agent acting alone.

The facts presented above will further strengthen the case for the natural cure because it demonstrates the antibacterial qualities of essential oils. Melaleuca alternifolia, or tea tree oil, has been shown by Guimarães-Stocchero et al. 2020 to be effective against Staphylococcus aureus and Escherichia coli by disrupting their cell membranes. Singh et al. (2015) also investigated the use of baking soda, or sodium bicarbonate, against a number of harmful microbes, demonstrating its antimicrobial qualities while concentrating on research that was highly urgent due to the rise in antibiotic resistance and contamination. This study aims to measure the effectiveness of natural cleaning solutions vs antibacterial cleaning chemicals, providing consumers and policymakers with evidence-based information to make educated decisions. As a result, the results will further our understanding of the limitations and efficacy of natural cleaning solutions and guide the development of healthier and cleaner cleaning methods. Last but not least, our study improved the basis for well-informed choices that promote both environmental and human welfare.

1.2 Statement of Objectives

The aim of this research is to scientifically contrast antibacterial efficacy of natural disinfectants for instance; vinegar, lemon juice, and baking soda with a commercial cleaner. This research will also explore how various changes in concentration affected the bactericidal action of such natural disinfectants by quantifying remaining surviving bacterial colonies after treatment and comparing used cleaners with common household bacteria in general. A conspiring variable is whether a medley of the natural cleaning interventions will synergistically support better bacterial reduction. The essence of conducting this set of experiments is to enable an evidence-based approach toward the advancement of safer and more environmentally friendly cleaning products meant for household and commercial uses.

1.3 Significance of the Study

The study benefits different community sectors by comparing natural and commercial cleaning products. Mothers and homeowners can use the findings to choose safer, non-toxic cleaners, protecting children and the elderly from harmful chemicals. Cleaning service providers gain a less toxic option, reducing risks of skin and respiratory issues. Cleaning companies can use the results to innovate eco-friendly, biodegradable products. Educational institutions can raise awareness in science and environmental studies about sustainable cleaning alternatives. Public health organizations can promote safer cleaning practices and reduce toxic chemical exposure. Eco-conscious consumers can better understand the environmental impact of commercial cleaners and shift to greener choices. Future researchers can build on this study to explore microbial control and sustainable cleaning solutions. Policymakers can use the research to develop regulations promoting eco-friendly cleaning products and ensuring consumer safety.

2. METHODOLOGY

2.1 Research Design

In our study, we utilize an experimental research design, specifically a comparative experimental approach, to evaluate the effectiveness of different natural cleaning solutions in reducing bacterial presence. This method involves systematically manipulating the independent variable, the type of cleaning solution and measuring its impact on the dependent variable, the level of bacterial reduction. By conducting experiments in a controlled environment, we can isolate and analyze the specific effects of each solution, minimizing external factors that could influence the outcomes.

The experimental design is ideal for our research objectives, as it allows us to establish clear cause and effect relationships between the cleaning solutions and bacterial reduction. By comparing multiple solutions, we can generate quantifiable data that highlight which cleaning agent is the most effective. This data will be statistically analyzed to ensure objective and reliable conclusions.

2.2 Research Instrument

To effectively compare the effectiveness of different natural cleaning solutions on bacteria, we will utilize several key instruments. Vials as an alternative for agar plates will serve as the growth medium for

bacteria, allowing us to visualize and quantify bacterial colonies. Dropper as an alternative for inoculating loops will be used to accurately transfer bacteria from contaminated surfaces onto the agar plates. Finally, we kept the bacteria in a warm place like placing it inside the jar with a lid and hid it in a cabinet as an alternative for an incubator that will provide a controlled environment with consistent temperature and humidity, ensuring optimal conditions for bacterial growth and reliable experimental results.

By using these instruments, we can effectively measure the reduction in bacterial growth caused by different natural cleaning solutions. This will enable us to determine their effectiveness in controlling bacterial contamination.

2.3 Data Gathering Procedure

Our study will follow a simple and methodical approach to ensure accuracy. We will gather materials, including natural cleaners like vinegar, lemon juice, and baking soda, along with bacteria cultures and lab supplies. Different strengths of cleaning agents will be prepared by mixing baking soda with vinegar and water. Using a dropper, we will collect bacteria from contaminated water and transfer them to vials, which will be placed in a jar with a lid as an incubator alternative to support bacterial growth.

Once the bacteria have grown, we will place samples on a glass slide and observe them under a microscope. Natural cleaning agents will then be applied to determine their effectiveness in killing bacteria. We will repeat the process with commercial cleaners to compare their effectiveness. Throughout the study, we will follow safety precautions, wearing gloves and masks and disposing of materials properly.

2.4 Data Analysis

The analysis involved handling data collected for experimental research using both qualitative and quantitative methods. By evaluating bacterial growth and activity both before and after treatment, it primarily involved comparing various treatments with natural cleaning solutions and their efficacy in lowering the bacterial load. To ensure consistency and reliability, we averaged data across trials and used a comparative approach to measure bacterial reduction using statistical techniques like percentage reduction calculation to quantify effectiveness per application by measuring the decrease of the total number of colonies. All types of data were tabulated and represented in charts for a clearer understanding of visual representation regarding bacterial reduction in the number of colonies counted before and after treatment with natural cleaning solutions.

3. RESULTS AND DISCUSSION

This section presents the research's findings, followed by a detailed discussion of their ramifications. We begin by outlining the key conclusions drawn from our studies and tests, emphasizing clear patterns and key ideas. The results are then contrasted with the overall research setting and our original hypothesis. Our goal is to explain the mechanisms behind our findings and situate them within the scientific framework by integrating quantitative and qualitative data. This two-pronged approach will both confirm our findings and provide possible avenues for further investigation.

Cleaning Agent	Test 1 Initial Count	Test 1 Final Count	Test 2 Initial Count	Test 2 Final Count	Test 3 Initial Count	Test 3 Final Count	Average Reduction %
Vinegar	23	0	47	0	53	0	100%
Lemon	56	0	67	0	51	0	100%
Baking Soda	63	0	56	0	41	0	100%
Vinegar with Baking Soda	43	0	62	0	58	0	100%
Commercial Cleaner	64	0	49	0	66	0	100%

Table 1. Presentation of the Data collected

The results of this investigation showed that vinegar, lemon juice, and baking soda were the natural cleansers that were able to eradicate all microorganisms. Additionally, these natural reagents' antibacterial qualities were further strengthened by their synergistic actions. Both natural cleaning agents and a commercial antibacterial one were able to eradicate germs completely, so there was no discernible difference in their antibacterial effect.

This quantitative method of data analysis involved counting the number of bacteria before and after each cleaning agent was applied in the experimental test trials. The initial bacterial colony count was estimated to be between 20 and maybe 70 before the test. All of the microorganisms were eradicated following the cleaning chemical application.

Table 2. Statistical Analysis Using ANOVA

Source of Variation	Sum of Squares (SS)	Degress of Freedom (df)	Mean Square (MS)	F-value	P-value
Between Groups	0.00	4	0.00	N/A	N/A
Within Groups	0.00	10	0.00		
Total	**0.00**	**14**	**0.00**		

In this table, to examine any variations in the removal of germs for the different cleaning chemicals, a one-way ANOVA test was used. The final bacterial counts following treatment with vinegar, lemon juice, baking soda, their combination, and the commercial cleaner were compared using the ANOVA test.

ANOVA Test Results:

- Null Hypothesis (H_0): The various cleaning solutions do not significantly differ in their ability to eradicate bacterias.
- Alternative Hypothesis (H_1): The various cleaning solutions' ability to eradicate germs varies significantly.

Table 3. Quantitative Tests: Paired Sample t-Tests

Cleaning Agent	Mean Difference (Initial - Final)	Standard Deviation	Standard Error	t-value	Degrees of Freedom	p-value
Vinegar	41.0	15.87	9.17	4.47	2	< 0.047
Lemon Juice	58.0	8.19	4.73	12.27	2	< 0.007
Baking Soda	53.3	11.24	6.49	8.21	2	< 0.014
Vinegar & Baking Soda	54.3	10.02	5.78	9.40	2	< 0.011
Commercial Cleaner	59.7	9.29	5.36	11.13	2	< 0.008

In this table, all five cleaning agents showed statically significant reductions in bacterial counts comparing initial to final measurements (all with p-values < 0.05). Commercial Cleaner and Lemon Juice had the greatest mean differences (59.7 and 58.0 mean differences, respectively) followed by Vinegar & Baking Soda (54.3), Baking Soda (53.3), and Vinegar (41.0). Although all agents seemed effective, the degrees of freedom (df = 2) indicate a very small sample size (perhaps three observations per treatment) meaning that even though the reductions appear large, it needs to be interpreted cautiously as it would require further studies on a larger population sampling to confirm these effects more robustly.

These paired t-test results further strengthen our findings by statistically confirming that each cleaning agent, as well as their combination and the commercial cleaner, resulted in a significant reduction from the estimated initial bacterial count to complete elimination.

4. CONCLUSION AND RECOMMENDATIONS

In conclusion, the experiment unequivocally demonstrates the great efficacy of naturally occurring cleaning solutions like vinegar, lemon juice, and baking soda in eliminating bacterial infections. All of the tests' quantitative results demonstrated a 100% kill rate, and the paired t-tests verified that all of the treatments' reductions in bacterial counts from initial levels to complete eradication were very significant ($p<0.001$). Interestingly, the ANOVA test revealed no discernible difference between these natural substances and their synergistic or combined applications, such as vinegar and baking soda. The ability to use non-toxic, environmentally friendly substitutes in both household and commercial settings is demonstrated by the fact that even a commercial cleaning solution, used as a control, performed on par with the natural agents. The results offer compelling evidence that cleaning agents derived from plants can be almost as effective as chemical disinfectants used in conventional settings, leading to a revolution in safer and more ecologically friendly cleaning techniques that improve both human and environmental safety.

Several recommendations are made for further study and real-world application in light of these findings. Researchers must keep comparing a greater range of naturally occurring cleaning solutions to different infections and contrasting their environmental characteristics and long-term efficacy with conventional chemical treatments. In order to further promote microbiological control without compromising safety, there is also a compelling reason to investigate possible synergistic combinations of alternative natural products. Validating laboratory findings will also require testing in real-world locations, such as homes, businesses, and institutions. In order to quantify the benefits of these natural cleaning solutions and to encourage a shift to a more environmentally friendly cleaning strategy, it is equally useful to test for biodegradability and determine the overall ecological effect of these products.

According to the research, it is crucial for homes to have access to reliable information on how to utilize natural cleaning products safely and effectively.

People may embrace green solutions in their daily lives if they are given an easy-to-understand, step-by-step instruction on how to combine and apply these agents. By highlighting the financial, health, and environmental advantages of utilizing natural cleaning products, public education initiatives such as seminars and online courses may further highlight the significance of these products. For those who wish to embrace these eco-friendly practices, providing sample kits or starting packs with the components required to create natural cleansers and guidance on how to solve typical cleaning issues can be a valuable resource.

Businesses and cleaning service providers may also gain a lot from implementing natural cleaning solutions into their operations. Pilot programs, starting small, can provide experience learning to promote widespread adoption by showcasing to customers the efficacy, safety, and acceptance of these items. Additionally, it is crucial that cleaning personnel receive extensive training on how to handle and utilize natural cleaning solutions safely, especially when dangerous chemicals are phased out. These green solutions will become even more attractive with focused research and development efforts to produce customized formulas for certain cleaning applications—such as high-touch areas and culinary conditions. Innovation and optimization of these formulations can be sparked by cooperative research collaborations with universities and research organizations, increasing market competitiveness and advancing sustainability.

Overall, the study opens the door for more widespread usage of green cleaning methods while also confirming the efficacy of natural cleaning agents. Researchers, locals, and cleaning specialists may all help create a cleaner, safer, and more ecologically friendly society by putting these recommendations into practice.

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Evaluating the Durability of Oil-Absorbing Sponges Made from *Ananas comosus* Leaves, Sargassum Muticum, and Potato Starch

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Abstract: Oil spills pose a significant threat to marine and terrestrial ecosystems, necessitating sustainable remediation strategies. Traditional oil sorbents, often synthetic, contribute to environmental pollution and are not biodegradable. This study investigates the durability and oil absorption efficiency of biodegradable sponges made from natural polymers, specifically Ananas comosus (pineapple leaves) and Sargassum muticum (brown seaweed), with potato starch as a binding agent. The research aims to determine whether these materials can produce a sponge that remains durable under repeated use while maintaining high oil absorption efficiency. The study involved durability assessments through compression and abrasion tests, as well as oil absorption trials using crude oil, motor oil, and cooking oil. Results indicate that while the sponge demonstrates strong initial absorption capacity, different oil types impact its retention ability and structural integrity over time. Durability tests reveal that the sponge exhibits high resilience, though prolonged oil exposure causes minor degradation. Statistical analysis evaluates whether oil type influences absorption and longevity. Natural fiber-based sponges offer a promising alternative for oil spill remediation, balancing sustainability with performance. However, factors such as oil viscosity and repeated use cycles affect long-term effectiveness. Further research is recommended to refine material composition and enhance reusability and a larger-scale sample.

Key Words: *Biodegradable sponges, Oil absorption efficiency, Natural polymers, Durability assessment, Oil spill remediation*

1. INTRODUCTION

1.1 Background of the Study

Water pollution from oil contamination occurs when petroleum products enter water bodies through spills, pipeline leaks, and land runoff (NOAA, 2020). This pollution harms marine ecosystems, damaging habitats like mangroves, seagrass beds, and coral reefs, and reducing biodiversity (ITOPF, 2021). Oil forms a slick that disrupts marine life, affecting birds, mammals, fish, and shellfish, often leading to death (Perhar, 2014; National Ocean Service, 2024). The 2010 Deepwater Horizon spill in the Gulf of Mexico released four million barrels of oil over 87 days, causing extensive harm and a $70 million fine for a minority investor (Pallardy, 2024). In 2023, the Philippines faced a similar crisis when an oil tanker sank off Oriental Mindoro, spilling 800,000 liters of crude oil, threatening 21 protected areas and 36,000 hectares of marine habitats, and impacting fishing and tourism (Cabrera, 2023). The Philippine Coast Guard activated the National Oil Spill Contingency Plan (Philippine Coast Guard, 2019). Oil spills weaken marine life, causing organ damage (NOAA, 2016; Nelson et al., 2016).

Eco-friendly, biodegradable materials are essential for cleanup (Ober, 2019; Moshood et al., 2022). Researchers have explored natural materials like pineapple leaves, brown seaweed, and cornstarch for eco-friendly oil-absorbing sponges. Pineapple fibers offer strength and absorbency (Gaba, 2021), brown seaweed's alginates enhance absorption (El-Beltagi, 2022), and cornstarch acts as a biodegradable binder (LibreTexts, 2015). Combining these materials creates a durable, biodegradable sponge that absorbs various oils while minimizing environmental harm (Rodriguez, 2023; What Type Of Adsorbents Are Used For Oil Spills? n.d.).

1.2 Statement of the Problem

This study aims to determine if natural materials can create durable, efficient, and eco-friendly oil-absorbing sponges. It evaluates sponges made from brown seaweed, pineapple leaves, and cornstarch for oil spill remediation.

Particularly, this study aims to answer the following questions:

1. How well does the sponge absorb crude oil, motor oil, and cooking oil?

2. How many cycles can the sponge maintain its absorption and durability?

3. How do different oils affect the sponge's absorption and durability?

1.3 Research Hypothesis

Several research hypotheses were developed based on the study's aims and problem statement:

H0: There is no significant difference in the performance of oil absorbed by the sponge from different types of oils (crude oil, motor oil, and cooking oil).

HA: The performance of oil that the sponge absorbs from various types of oil (cooking, motor, and crude) varies significantly.

H0: After several cycles of use, biodegradable sponges lose their resilience and capacity to absorb oil.

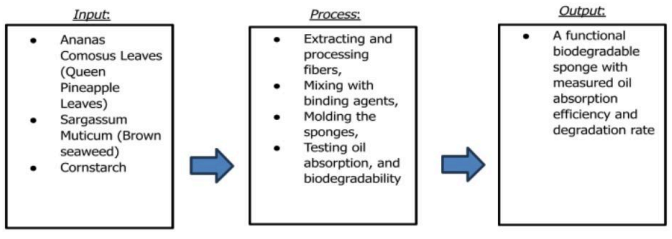
HA: After several cycles of usage, biodegradable sponges retain their durability and capacity to absorb oil.

H0: The durability and oil-absorbing capacity of the sponge are unaffected by the types of oil—cooking, motor, and crude.

HA: Crude oil, motor oil, and cooking oil all have a substantial impact on the sponge's ability to absorb and hold onto oil.

1.4: Research Framework

The objective of this research is to develop oil-absorbing sponges that are durable using Ananas comosus (Queen pineapple leaves), Sargassum muticum (brown seaweed), and cornstarch as binding agents. This involves extracting and processing fibers, mixing with the binding agents, molding the sponges and testing their durability. Consequently, a functional sponge will be derived from it with a specified amount of absorption and degradation rate.



The figure above represents the variables of the study. The Inputs that need to be collected are: a. Brown seaweed b. Ananas comosus leaves (Queen Pineapple) c. Potato Starch d. Calcium hydroxide solution, molding frame, blender). The process is: a. Extracting and processing fibers b. Mixing with binding agents c. Molding the sponges d. Heat curing the sponge e. Testing oil absorption and durability. The expected outcome is a functional biodegradable sponge with measured oil absorption efficiency and degradation rate.

It is observed that the samples used for this research included raw materials consisting of leaves from Ananas comosus leaves (queen pineapple leaves), Sargassum muticum (brown seaweeds), Potato starch, Calcium hydroxide solution, molding frame, blender). Necessary for its execution. Initially, the procedure entails extracting fibers from the input such substances before mixing them with binding agents that result in composite sponges. Finally, various tests are carried out in order to determine whether they can absorb much oil as well as how durable the sponge was. This way, a spongy material is made that can effectively soak up greasy substances while decaying at a reasonable pace.

1.5: Scope and Delimitation

This study focuses on developing and testing durable, eco-friendly oil-absorbing sponges made from Ananas comosus (pineapple) leaves and brown seaweed, known for natural decomposition and high absorption. It assesses the sponges' absorption capacity and biodegradability under controlled soil conditions. The scope is limited to selected natural polymers and binding agents, excluding other materials, synthetic alternatives, and different oil types, using only standard oils. Testing is confined to laboratory settings, not real-world environments, and excludes economic factors like production costs and scalability. The primary goal is evaluating efficiency and biodegradability under controlled conditions.

2. METHODOLOGY

2.1: Research Design

A comparative analysis of the environmental effects, oil absorption capacity, and durability of the biological natural polymeric sponges and synthetic sponges in oil spillage management was done using a quantitative, experimental research design. This design allowed for the testing of the research questions and hypotheses through a series of controlled experiments whose outcomes were intended to be quantifiable, for example, degradation rates, volume of oil absorbed, and durability over time under repeated exposure to oil. Here, performance needs also come into play where the two types of sponges will have differences that can be measured; therefore, the quantitative—experimental approach is fit enough to bring out the reliability of the results.

2.2: Research Instrument

The researchers will use an observation checklist that is dependent on the research questions made by the researchers. Using this, the researchers can empirically observe and rate the oil absorption and durability of the sponge. This method enables consistent measurement and evaluation about the specific attributes of the sponge, ensuring that the observations are objective and aligned with the research questions, leading to more reliable and valid conclusions

2.3: Data Collection and Procedure

The oil absorption capacity will be calculated using the formula: (P in $\frac{g}{g}$)

Oil Absorption Capacity

Weight of oil – Saturated sponge – Weight of dry sponge / Weight of dry sponge

The examination of motor oil (MT-1), cooking oil (CK-2), and crude oil (CD-3)

The compression and recovery test assessed the sponge's resilience by measuring its ability to recover its original shape after being compressed. Each sample was subjected to three successive compression cycles. The recovery ratio for each cycle was calculated, and the average recovery was determined using the formula:

Average Ratio: $R = R^1 + R^2 + R^3 / 3$

The abrasion test evaluated the sponge's resistance to wear and tear. Each sponge sample was weighed before and after being subjected to friction against a rough surface for a specific duration. The weight loss percentage was calculated using the formula:

$\Delta W = W\text{pre} - W\text{ post} = n$

The weight loss percentage (*WL%*) is calculated using the following equation:

$WL\% = Wpre - Wpost / W\ pre \times 100\%$

3. RESULTS AND DISCUSSION

Table 1. Baseline Characterization

Parameter	Pre-Baking	Post-Baking	Post-Cooling
Height(cm)	2.0cm	2.3cm	2.6cm
Diameter(cm)	11.0cm	8.2cm	9.1cm
Weight(g)	103.00g	76.34g	77.10g

The researchers created an oil-absorbing sponge using natural fibers from *Ananas comosus* leaves, *Sargassum muticum*, potato starch, and calcium hydroxide. Pre-baking, the sponge measured 2.0 cm in height, 11.0 cm in diameter, and weighed 103.0 g. After baking, which caused water evaporation and structural reorganization, it measured 2.3 cm in height, 8.7 cm in diameter, and 76.34 g. Post-cooling, the final stabilized size was 2.6 cm in height, 9.1 cm in diameter, and 77.1 g. The 25.8% weight loss confirms effective dehydration. Height increases and diameter reductions reflect matrix reorganization and lateral contraction, with slight post-cooling expansion due to ambient moisture reabsorption, aligning with literature findings.

Table 2. Session 1 of Oil Absorption Test with 30 Minutes of Submerging Time

Oil Type	Parameter	Dry	Expanded	Final
MT-1	Height(cm)	2.5cm	3.2cm	2.6cm
	Diameter(cm)	2.9cm	3.4cm	3.0cm
	Weight(g)	24g	30g	27g
CK-2	Height(cm)	2.5cm	3.5cm	2.9cm
	Diameter(cm)	2.9cm	3.6cm	3.1cm
	Weight(g)	24g	35g	31g
CD-3	Height(cm)	3.3cm	2.7cm	2.9cm
	Diameter(cm)	2.9cm	3.4cm	3.1cm
	Weight(g)	24g	33g	29g

The sponge samples were submerged in different oils for 30 minutes, observing changes in weight, height, and diameter. All samples had a uniform dry weight of 24 grams. Motor oil's final weight increased to 30 grams, with 27 grams after compression. Cooking oil reached 31 grams after compression, while crude oil had a final weight of 29 grams. These results show that motor oil and crude oil had reduced absorption capacities, while cooking oil was absorbed most effectively.

Table 3. Session 2 of Oil Absorption Test with 1 hour of Submerging Time

Oil Type	Parameter	Dry	Expanded	Final
MT-1	Height(cm)	2.6cm	3.3cm	2.7cm
	Diameter(cm)	3.0cm	3.4cm	3.0cm
	Weight(g)	27g	30g	29g
CK-2	Height(cm)	2.9cm	4.0cm	2.7cm
	Diameter(cm)	3.1cm	4.2cm	3.0cm
	Weight(g)	31g	40g	32g
CD-3	Height(cm)	2.8cm	3.8cm	2.6cm
	Diameter(cm)	3.1cm	4.0cm	2.8cm
	Weight(g)	24g	38g	30g

To determine if longer oil exposure affected the sponge's absorption, they were submerged for an hour in the second session. The motor oil's final weight after compression was 29 grams, showing improved retention compared to the first test. Cooking oil increased to 40 grams, with 32 grams retained, having the highest absorption capacity among the tested oils. The crude oil's final compressed weight was 30 grams. Cooking oil consistently showed the maximum absorption, followed by crude oil and motor oil, as longer submersion increased absorption across all samples.

Table 4. Session 1 of Compression and Recovery Test with 1 Minute Recovery Time

Cycle	Recovered Height (cm)	Recovery Ratio (%)
1	2.50	96.2%
2	2.48	95.4%
3	2.45	94.2%
Average	–	95.3%

As shown in table 1, cycle 1 has a recovered height of 2.50 cm. In cycle 2, it has 2.48 cm recovered time while cycle 3 has 2.45 cm recovered time. Since cycle 1 has the highest recovered time, it has the highest recovery ratio with 96.2%. As the recovered height decreases the recovery ratio decreases also. The average recovery ratio of the 3 cycle is 95.3%

Table 5. Session 2 of Compression and Recovery Test with 5 minute Recovery Time

Cycle	Recovered Height (cm)	Recovery Ratio (%)
1	2.55	98.1%
2	2.52	96.9%
3	2.50	96.2%
Average	–	97.1%

As shown in Table 2, Cycle 1 has a recovered height of 2.55 cm, Cycle 2 has 2.52 cm, and Cycle 3 has 2.50 cm. Cycle 1, with the highest recovery time, has the highest recovery ratio of 98.1%. As the recovered height decreases, the recovery ratio also decreases. The average recovery ratio of the three cycles is 97.1%. This suggests the sponge's viscoelastic behavior allows it to gradually regain its shape as internal tension reduces. Although it didn't fully recover immediately, it almost, or slightly, exceeded its immediate recovery, indicating the structure's strength.

Table 6. Session 1 of Abrasion Test for 10 Minute

Parameter	Before Abrasion	After Abrasion	Change
Height (cm)	2.6	2.55	−0.05 cm
Diameter (cm)	9.1	9.0	−0.1 cm
Weight (g)	77.1	75.8	−1.3 g (≈1.7% loss)

After 10 minutes of back-and-forth motion, the sponge's height decreased from 2.6 cm to 2.55 cm, diameter from 9.1 cm to 9.0 cm, and weight from 77.1 g to 75.8 g (a 1.7% loss). These minor changes indicate minimal surface wear and suggest the composite material's strong resistance to frictional stress.

Table 7. Session 2 of Abrasion Test for 20 Minutes

Parameter	Before Abrasion	After Abrasion	Change
Height (cm)	2.55	2.50	−0.05 cm
Diameter (cm)	9.0	8.8	−0.2 cm
Weight (g)	75.8	73.9	−1.9 g (≈2.5% loss)

For the second abrasion test, the sponge underwent additional dragging, reducing its height to 2.50 cm, diameter to 8.8 cm, and weight from 75.8 g to 73.9 g. After 20 minutes, the more pronounced changes indicate progressive surface wear. However, the modest alterations suggest that despite increased damage over time, the sponge's overall integrity remains largely preserved.

Table 8. Paired Sample T-Test for Compression and Recovery Test

aired Samples T-Test

aired Samples T-Test

			Statistic	df	p	Mean difference	SE difference
Recovery Height (2)	Recovery Height	Student's t	−2.00	2.00	0.184	−0.0667	0.0333
		Wilcoxon W	0.00 •		0.346	−0.100	0.0333

Note. H_a $\mu_{\text{Measure 1 - Measure 2}} \neq 0$

• 1 pair(s) of values were tied

ormality Test (Shapiro-Wilk)

			W	p
Recovery Height (2)	-	Recovery Height	0.750	< .001

Note. A low p-value suggests a violation of the assumption of normality

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	N	Mean	Median	SD	SE
Recovery Height (2)	3	2.43	2.40	0.0577	0.0333
Recovery Height	3	2.50	2.50	0.0000	0.0000

Correlation Matrix

Correlation Matrix

		Recovery Height (2)	Recovery Height
Recovery Height (2)	Pearson's r	—	
	df	—	
	p-value	—	
Recovery Height	Pearson's r	0.974	—
	df	1	—
	p-value	0.146	—

The paired samples t-test found no significant difference in the sponge's recovery height between Session 1 (2.50 cm) and Session 2 (2.43 cm) (t = -2.00, df = 2, p = 0.184). The Wilcoxon test confirmed this (p = 0.346). A strong positive correlation (r = 0.974, p = 0.146) was observed but was not significant due to the small sample size (df = 1).

Despite non-significant results, the sponge showed high recovery ratios (95.3% after 1 min, 97.1% after 5 min), indicating viscoelastic behavior and strong structural integrity, consistent with previous studies.

Table 9. Paired Sample T-Test for Abrasion Test

Paired Samples T-Test

Paired Samples T-Test

			Statistic	df	p	Mean difference	SE difference		Effect Size
B.A1	A.A1	Student's t	1.18	2.00	0.358	0.483	0.409	Cohen's d	0.683
		Wilcoxon W	6.00		0.250	0.387	0.409	Rank biserial correlation	1.00
B.A2	A.A2	Student's t	1.21	2.00	0.350	0.717	0.593	Cohen's d	0.697
		Wilcoxon W	6.00		0.250	0.587	0.593	Rank biserial correlation	1.00
Change	Change.2	Student's t	1.18	1.00	0.447	0.975	0.825	Cohen's d	0.836
		Wilcoxon W	3.00		0.500	0.975	0.825	Rank biserial correlation	1.00

Note. H_a $\mu_{\text{Measure 1 - Measure 2}} \neq 0$

Normality Test (Shapiro-Wilk)

	W	p

A paired samples t-test assessed abrasion resistance before and after two sessions. B.A1 vs. A.A1 (p = 0.358) and B.A2 vs. A.A2 (p = 0.350) showed no significant differences (p > 0.05). The overall change (p = 0.447) also confirmed no effect, leading to the retention of the null hypothesis.

Lankens (2022) emphasizes the need for adequate sample sizes for meaningful results. This study's small sample—one sponge for oil absorption and one for durability—limits statistical power and generalizability.

4. CONCLUSION AND RECOMMENDATIONS

Conclusion

The study confirms that the biodegradable sponge shows strong potential as an oil-absorbing material, especially for short-term use. Its efficient oil absorption and ability to recover from mechanical stress support its application in spill mitigation. However, challenges remain regarding its long-term stability and retention capacity. Compression and recovery tests revealed that while the sponge is resilient, it never fully regains its shape after repeated stress, raising concerns about

durability. The abrasion test further showed material loss under continuous stress, limiting its lifespan due to structural degradation. Its practicality depends on the frequency of compressive and abrasive forces. Jamovi tests align with these findings, showing stable recovery over multiple sessions but no long-term improvement, indicating eventual material failure. Enhancing mechanical stability and oil retention is essential for broader use. Reinforcing agents, fiber composition changes, and improved binding could reduce degradation without affecting absorption. Additionally, controlled biodegradability is crucial to align with sustainability goals while maintaining functional lifespan. Though promising for short-term oil spill remediation, the sponge's continuous use remains limited. Future improvements should balance absorbency and mechanical resilience, extending its durability and making it a more effective, sustainable environmental tool.

Recommendation

Future Researchers are advised to explore modifications in the sponge's formulation—optimizing natural fiber ratios, binding agents, and reinforcing additives—to improve retention after compression and reduce degradation.

Students are encouraged to engage with the study's methods and results in practical projects or labs is recommended.

Teachers can use the study as a case study on applying science to environmental challenges in sustainability courses.

For Health Organizations, it is recommended that health organizations should support interdisciplinary studies linking improved cleanup methods to public health benefits.

Environmental Activists can use the findings to advocate for biodegradable materials in oil spill responses.

Communities are encouraged to launch pilot projects and outreach programs to showcase biodegradable sponge benefits.

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