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Improving Mathematics Performance among a group of Eighth Graders in a Technical and Vocational Education and Training (TVET) High School in Western Jamaica

Revaldo Love[1], Cedric Scott[1], Keisha Suckra[1], Sashagay Taylor[1], Nadeisha Patterson[1], Paul Andrew Bourne[1*]

[1]Vocational Training Development Institute (VTDI), Kingston, Jamaica, WI.

Abstract

Jamaican students have been underperforming in mathematics for decades. A study by Bourne (2019) indicated that the final external examination at the high school level in Jamaica (Caribbean Secondary Education Certificate (CSEC) has never exceeded 50%. In fact, in 2021, 21% of all Jamaican candidates who earned the Caribbean Secondary Education Certificate (CSEC) were successful in mathematics. The general objectives of this study are as follows: 1) To assess the academic challenges of eighth graders at a TVET high school in Western Jamaica, and 2) To formulate a framework that will improve eighth graders' mathematics performance in a TVET high school in Western Jamaica. This study used a descriptive research design. This design allows data collection on the relationship between multiple variables without manipulating them, providing insight and new information. The average score of the students before the intervention was 46.12%±19.96%, which increased to 70.27%±17.56% and 81.05%±9.82%. The results of the 38 participants in this study revealed that 35 improved performance after the intervention, with a 75.74%±9.82% increase in overall performance. One participant's score improved by 611.21% after the intervention strategies employed in the research (from 11.6% to 82.5%). The findings of the sampled participants revealed that 34.21% saw an improvement in performance over 100%, with 21.05% seeing an improvement of over 200. By creating a dynamic and engaging learning environment, educators can empower students to develop a deeper understanding of mathematical concepts and prepare them for success in high school and beyond.

Keywords: Mathematics performance, grade eight students, TVET.

Introduction

In the formative years of a child's education, the seeds of understanding are sown, and the foundation upon which future learning will be built is established (National Council of Teachers

of Mathematics, 2022, p. 1). At the heart of this educational journey lies mathematics, a discipline that transcends mere numbers and equations to become a fundamental tool for cognitive development and academic success (National Council of Teachers of Mathematics, 2022, p. 1). In the early grades, the value of mathematics extends far beyond arithmetic proficiency; it serves as a gateway to critical thinking, problem-solving, and logical reasoning (National Council of Teachers of Mathematics, 2022, p. 1). Through engaging with mathematical concepts from an early age, students cultivate essential skills and lay the groundwork for a lifelong appreciation of the subject.

Jamaican students have been underperforming in mathematics for decades (Bourne, 2019; Crossfield& Bourne, 2017; Harris & Bourne, 2017; Jamaica Observer, 2022; McBean& Bourne, 2016; Murphy, 2022; Patterson, 2021; Thomas, 2019). A study by Bourne (2019) indicated that the final external examination at the high school level in Jamaica (Caribbean Secondary Education Certificate (CSEC) has never exceeded 50%. In fact, in 2021, 21% of all Jamaican candidates who earned the Caribbean Secondary Education Certificate (CSEC) were successful in mathematics. A former Minister of Education, Mr. Karl Samuda, lamented the dilemma in Jamaica's secondary education system when he articulated the underperformance of Jamaican students in mathematics. The underperformance in mathematics extends to the teachers in the discipline; as Murphy (2022) wrote, “It was found that 35 per cent of mathematics teachers did not attain a pass in the subject at the CSEC level or before they entered teacher training colleges”. Patterson (2021) indicated that the underperformance of Jamaican students in mathematics extends to the primary level. He opined, “The exam performance of Jamaica’s students is well below the nation’s expectations and international standards. This policy brief examines their performance levels since 2002 in 7 major tests: the GSAT, GNAT, CSEC, CAPE, and the recent PEP exam, as well as the earlier Grade-4 Literacy & Numeracy tests. We also attempt to explain two puzzles that emerge from the analysis” (p. 2).

Despite the plethora of studies in the area of mathematics, the lamentation of the Minister of Education, and various intervention programs established by the Ministry of Education, Smith (2023) noted that 44.7% of Jamaican candidates were successful in the CSEC mathematics examination. Mathematics is critical in many subjects, such as engineering, actuarial science, demography, finance, technology, economics, and critical problem-solving skills. However, most Jamaican students are underperforming in this discipline. Mathematics is vital to many areas of our existence (Wells, 2009). However, there is a barrier between learning the basic principles of this subject matter by many Jamaicans. This study recognises the current reality in Jamaica relating to mathematics, and the researchers believe this can be addressed. Hence, the current research seeks to improve students' performance in mathematics at the secondary level.

Significance of this Study

Improving mathematics performance among eighth graders is crucial for their academic success and future opportunities and providing job-ready employees for society. As such, a study that addresses students' underperformance in mathematics at the high school level is critical to national development. This action research project addresses the underperformance in mathematics among eighth graders in Technical and vocational education training (TVET)

schools in Western Jamaica. Collecting data on student performance, teacher perspectives, and student challenges, the study will comprehensively understand the factors impacting mathematics achievement in this context. This data will be instrumental in designing and implementing a targeted framework to improve student learning in mathematics. The project's goal of a 20% increase in Mathematics performance for participating eighth graders has the potential to impact their academic trajectory significantly. Improved mathematics skills are essential for success in higher-level mathematics courses and various STEM fields. This project's findings can benefit the immediate participants and inform future efforts to enhance Mathematics education within the school and potentially across the broader Jamaican educational system. Additionally, based on a comprehensive review of the literature, no existing literature currently addresses the mathematics performance of eighth graders in the Jamaican context.

Purpose Statement

This research project aims to investigate and address the factors contributing to low mathematics performance among eighth graders in a TVET high school in Western Jamaica. By implementing a series of interventions and closely monitoring their impact, the research seeks to improve student achievement in Mathematics. The ultimate goal is to identify effective strategies that can be adopted within the classroom to enhance student's learning, boost confidence in their Mathematical abilities, and contribute to a positive learning environment for this specific group of students.

Statement of the Problem

Mathematics plays a vital role in all aspects of life. It has been seen that mathematics supports the development of critical and logical thinking, whether in everyday matters such as time tracking, driving, and cooking or in jobs such as accounting, finance, banking, engineering, and software (Choudhary, 2022). Additionally, when paying Taxi or Bus fare, purchasing lunch, going to the Supermarket, etc., we have to do some form of basic Mathematical calculation to ensure that we are given the right changes and provide the correct sum, whether through addition, subtraction, division or multiplication we are using Mathematics.

A review of the Mathematical performance of eighth graders at a Western Jamaica TVET high school revealed that 79% of these students must maintain the minimum required average of 60% (Teachers' Register 2024). With that said, if students cannot meet the minimum average created by the school, it therefore suggests a problem. Against this background, this research paper aims to address the topic "Improving the Mathematics Performance among a Group of Eighth Graders in a TVET High School in Western Jamaica." To adequately address this topic, several investigations are carried out to assess the challenges eighth graders at TVET high schools in western Jamaica have with mathematics and implement best practices that may be used to improve the Mathematical performance of eighth graders.

General objectives

The general objectives of this study are as follows:

- To assess the academic challenges of eighth graders at a TVET high school in Western Jamaica.
- To formulate a framework that will improve eighth graders' mathematics performance in a TVET high school in Western Jamaica

Specific

The specific objectives of this study are as follows:

- To collect data on the academic performance of eighth graders in Mathematics in a TVET high school in Western Jamaica.
- To collect data from eighth-grade teachers on the academic performance of eighth-graders in Mathematics in a TVET high school in Western Jamaica
- To collect data from eighth-grade students on their academic challenges experienced in Mathematics.
- To implement a framework that will improve eighth graders' mathematics performance.
- To improve mathematics performance by 20% for a group of eighth-grade students at a western Jamaica TVET high school.

Research Question

The research questions of this study are as follows:

1. What is the current performance of eighth graders in Mathematics?
2. What factors prevent grade eighth (8) students in a TVET high school in western Jamaica from achieving the minimum average of sixty per cent (60%) in mathematics?
3. What instructional strategies do the teachers use to teach mathematics to eighth graders?
4. What strategies are there to improve the performance of grade eight students in Mathematics?
5. To what extent can the additional strategies improve the Mathematics performance of eighth graders?

Definition of Key terms

Mathematics performance; grade eight students, TVET

According to Hasanah (2024), a hallmark feature of TVET is that it involves “in addition to general education, the study of technologies and related sciences as well as the acquisition of practical skills, attitudes, understanding, and knowledge relating to occupations in various sectors of economics and social life”.

According to Suryabrata (2006), academic performance is an assessment of educational outcomes that determines how far students' abilities are after learning and practising. According to Bloom (Hipjillah, 2015), academic achievement is a process experienced by students that produces changes in knowledge, understanding, application, analytical power, synthesis, and evaluation.

Mathematics Performance: Mathematics performance refers to the level of achievement or proficiency in the subject. It can be measured through various indicators, such as academic grades, test scores, or problem-solving abilities (Mapaire, L. 2016).

Literature Review

Introduction

This review aims to identify potential areas for intervention and strategies to improve mathematics learning outcomes in this specific context by reviewing existing research. Mathematics plays a vital role in the everyday lives of individuals and, by extension, society. To perform competently in various careers also requires some basic understanding of mathematical concepts (Ocampo et al., 2023). When students are exposed to Mathematical concepts in a way that they can understand and retain from a tender age, these students will grow with a perception that mathematics can be understood rather than aligning their thoughts with the majority of persons who believe that mathematics is a complex subject that cannot be mastered by everyone (Sidabutar, 2016). Therefore, this chapter uses a thematic approach to present the variables for the study.

Factors that Affect Student Mathematics Performance

Several factors influence students' performance in mathematics. These factors are individual factors, instructional supervision, and psychosocial socioeconomic variables. Personal factors refer to cognitive abilities, learning styles, motivation, and self-efficacy (Schunk&DiBenedetto, 2021). The sooner students learn mathematics in a way that makes sense to them, the better they will perceive it and want to know more (Schunk, 2012). This also involves math anxiety, which describes worry or fear about performing math calculations. A person with math anxiety may feel panicked at the thought of working with numbers, making it harder to think (West, 2022).

Additionally, students with positive self-efficacy in mathematics are more likely to persevere in challenging tasks and achieve higher outcomes in Mathematics.

Learning styles are factors that also affect students' learning processes. Students use different styles based on their differences. Recognising the relationship between learning styles and teaching will assist teachers in using suitable teaching methods to deliver lessons that will resonate with students (Biabani&Izadpanah, 2019).

Similarly, Kolbs designed a model to assist learners with the four primary learning abilities: reflection, observation, concrete experiences, active experiments, and abstract conceptualisation. Kolbs further postulated that the four main learning styles are divergent, convergent, assimilative, and accommodative (Biabani&Izadpanah, 2019). While strengths are associated with this model, shortfalls are also attached. Even so, a good lesson will be designed to cater to the different learning styles.

Instructional factors speak to the methods teachers use to impart knowledge to students. Some teachers tend to present subject matters more interactively than others do.

Socioeconomic factors describe people based on education, income, and job type. They are usually described as low, medium, or high. People with lower socioeconomic status typically have less access to financial, educational, and social resources than those with a higher socioeconomic status. Studies have shown that socioeconomic factors influence school achievement significantly, persuasively, and persistently (Letsoalo, 2018). Students from low socioeconomic families have lower education participation, lower retention rates, or leave the school systems earlier than student families of a higher socioeconomic status.

While socioeconomic status affects the mathematical performance of grade 8 students in a school in western Jamaica, many strategies exist for improving their performance. Other factors that impact mathematical performance include students' attitudes toward mathematics, demographic variables such as gender and age, and parents' education and educators (Ferguson et al., 2007).

While many factors affect the performance of grade 8 high school students in western Jamaica, numerous strategies can be utilised to improve their performance.

Strategies that may be used to improve Mathematics Performance

Children who struggle with math may sometimes start to find it futile. As a math teacher, one can improve students' performance in math lessons by disproving such misconceptions. Elaborate on the wonder of math, emphasise how it is used in everyday life, and make it a "fun" adventure instead of sticking only to daunting formulas. Based on a literature review, several strategies may be used to improve the mathematics performance of grade 8 students. Chief among these strategies is implementing an innovative teaching model (Talanquer et al., 2003). Sidabutar (2016) further supported this view by adding that:

"Innovative teaching in math is a teaching approach that provides the latest teaching model based on the needs of the current level of education. Teachers must recognise the need to change what they teach and how they teach to achieve today's educational goals. Innovative teaching in mathematics involves strategy, method, and learning function used in teaching mathematics. Innovative teaching in mathematics has advantages in three (3) aspects, namely, (1) teaching by problem-solving, (2) teaching by experience, (3) teaching by individual and teamwork (p. #10)".

Implementing these strategies in the classroom will allow students to build knowledge and skills that are more significant than those that would have been built if the students had worked individually. Teachers may also use their experiences to explain the concepts to the students. When teaching by teamwork is implemented, it allows students with unique academic abilities to understand mathematical concepts that may seem difficult from different perspectives (Sidabutar, 2016). Evelina et al. (2023) supported this view by further postulating that quality teachers in the classroom can better motivate and relate concepts to real-world situations that students can better identify with.

Another strategy that may be used to improve students' mathematics performance is for the teacher to focus on students completely understanding the concepts being taught rather than just covering the objectives (Tien et al., 2004).3 This view was further endorsed by Boyce et al. (1997), who stated that often teachers are concerned about achieving their lesson objectives

rather than ensuring that the students have understood the concepts being delivered. However, To optimise the learning outcomes of mathematics in the class, the teaching model for mathematics should be practical and selective, that is appropriate to the subject matter in improving the achievement of the student so every mathematics teacher in the class should be alert about the lessons that he teaches in the class (Boyce et al., 1997).

Learning through media may also be used to build understanding and mastery of learning objects, such as utilising Information Communication Technology resources such as Google Classroom platforms and YouTube videos (Etcuban et al., 2019). Mathematics teachers can use YouTube videos to provide various explanations and perspectives to students. Similarly, the Google Classroom platform may be utilised by educators to record and upload videos and other instructions that were given in class (Nuryatin et al., 2023). When this is done, students who were absent from the class and those who were present in class but needed to be reminded of a particular concept may benefit by reviewing the videos in Google Classroom. which will help to build students' knowledge of concepts, even when they are absent from the class, contributing to a class with more knowledgeable students who are up to date even when they are away from the physical classroom (Pandley et al., 1994). For students to better understand and appreciate the concepts the teacher is explaining, the teacher may also relate the concepts to real-world situations (Sidabutar, 2016). When students can relate the concepts to everyday situations, it helps them understand and retain them.

Methods and Materials

Research Design

This study used a descriptive research design. This design allows data collection on the relationship between multiple variables without manipulating them, providing insight and new information (Mcleod, 2010). Calderon (2006) defined descriptive research as a purposive process of gathering, analysing, classifying, and tabulating data about prevailing conditions, practices, processes, trends, and cause-effect relationships and then making an adequate and accurate interpretation of such data with or without or sometimes with, the minimal aid of statistical methods. Additionally, the descriptive design ascertains the prevailing conditions of facts in a group under study that give either qualitative or quantitative, or both, descriptions of the general characteristics of the group as results. This study will employ the approach discussed previously by (Mcleod, 2010) and Calderon (2006).

Data Collection/ Instrument

This action research employed qualitative and quantitative data collection methodologies. “Quantitative research deals with quantity; hence, this type is concerned with numbers and statistics to prove or disprove theories or hypotheses. In contrast, qualitative research is all about quality - characteristics, unquantifiable features, and meanings to seek a deeper understanding of behaviour and phenomenon. These two methodologies serve complementary roles in the research process, each offering unique insights and methods suited to different research questions and objectives” (Bisht, 2024). The method used to gather the necessary data was a survey, and the

instruments implemented were questionnaires, focus groups, and interviews. These instruments gave the researchers a scientific analysis, which was practical, very cost-effective, and gathered large amounts of data in a short period.

The questionnaires consisted of questions formulated to answer the research questions. Thirty (30) questions were constructed with a mixture of open and closed-ended questions. Closed-ended questions allowed the respondents to answer faster, which made the questionnaire more straightforward to manipulate, allowed easy comparison of answers, and allowed questions to be efficiently coded and analysed. In contrast, open-ended questions allowed them to think critically before answering. The questionnaire was created via Google Forms and was shared with participants via email and WhatsApp. Thirty-eight surveys were issued. However, 34 respondents completed the survey.

An interview was also conducted with the teacher to understand the views as to why the students responded in the way they did and how the lessons were delivered. In Addition, a focus group discussion was also used with ten (10) random students from the class; this was done to get a collaborative view of students' insight on Maths. Students Mark Book was also used to collect averages and grades based on academic year performance. These instruments were selected as the researchers aimed to gather and interpret information by identifying the information gathered with similarities and differences and discussing the gaps in the overall research.

Population and Sample

A Target population may be defined as an entire group of individuals or objects from which the research sample was drawn, and the researchers are interested in generalising the conclusions (Kumar, 2024). The population being studied in this action research consists of all the students who attend the specific western Jamaica high school in which the research was carried out. As depicted in Table 1 below, the total student population of the school where the research was conducted is thousand seven hundred twenty-two (1722), which includes seven hundred fifty-three (753) boys and eight hundred ninety-three (893) girls. Of this figure, three hundred and forty (340) of these students represent eighth-grade students.

Because of the nature of the study, the researchers employed a purposive sampling technique. A specific eighth-grade class was chosen for the sample class, as it was brought to the researchers' attention that several students in this class are not maintaining the school's minimum required average of 60%. This class comprises 38 students, twenty-one (21) girls and seventeen (17) boys.

Table 1: Student Enrolment at the Sampled School

Student Enrollment			
Grade	**BOYS**	**GIRLS**	**TOTAL**
7	189	208	397
8	161	179	340
9	140	143	283
10	136	197	333
11	127	166	293

Pathway 1 (Gr. 12)	6	15	21
Pathway 2 (Gr. 12)	10	16	26
HTM	6	6	12
13	3	14	17
TOTAL (Gr. 7-11)	753	893	1646
Grand Total	778	944	1722

Inclusion criteria

Two criteria will be used to select students for this study. First, they must be part of the eighth-grade class performing below the school's expected standard. Second, they must be present on the day of the intervention.

Exclusion criteria

Students were excluded from this research based on the following: first, students performing above the school's minimum required average of 60%; second, those who were not part of the sample class; and third, those students who did not give consent or assent to the research.

Conceptualisation and Operationalization of Variables

According to Hasanah (2024), a hallmark feature of TVET is that it involves "in addition to general education, the study of technologies and related sciences as well as the acquisition of practical skills, attitudes, understanding, and knowledge relating to occupations in various sectors of economics and social life".

According to Suryabrata (2006), academic performance is an assessment of educational outcomes that determines how far students' abilities are after learning and practising. According to Bloom (Hipjillah, 2015), academic achievement is a process experienced by students that produces changes in knowledge, understanding, application, analytical power, synthesis, and evaluation.

Mathematics Performance: Mathematics performance refers to the level of achievement or proficiency in the subject. It can be measured through various indicators, such as academic grades, test scores, or problem-solving abilities (Mapaire, L. 2016).

Reliability and Validity

This research established reliability by using established research instruments. Data collection relied on established instruments, including questionnaires, document reviews, interviews, and focus group discussions. These instruments have been utilised in previous research and have demonstrated consistent results in similar contexts. The data collection method for this research is also predominantly primary.

Validity was established through the researchers' use of the following strategies: Triangulation: Multiple data collection methods (questionnaires, interviews, focus groups, document review)

were employed to gather information from diverse perspectives. This triangulation approach strengthens the validity of the findings by providing a more comprehensive understanding of the issue (Noble &Heale, 2019).

Scholarly Review: Throughout the research process, drafts and interpretations were shared with relevant scholars for feedback and to ensure alignment with established knowledge in the field. By employing these strategies, the researchers strived to ensure the research findings were reliable (consistent) and valid (accurately reflecting the reality being studied).

Data Analysis

Students were asked to complete a survey questionnaire carefully developed to gather specific information on the student's performance in mathematics using Google Forms. Google Forms is a web-based online application that is part of the free Google Workspace suite and is effective for real-time data collection and analysis.

The quantitative data was retrieved in Microsoft Excel. The researcher analysed the data based on the research questions using descriptive statistics (mean, mode) and percentages. The analysed data was then presented using graphs and tables. On the other hand, the qualitative data were analysed using narrations and presented in a tabular form.

Ethical Issues

Before the researchers began this research, they completed two ethical training courses, which would have set the foundation for the research to be conducted ethically. Before the research was conducted, all participants were required to consent before being included in the study, and because these participants were all minors, their parents/guardians had to consent for their child/ward to be included in the study. Participants were informed of the study, their roles and duties, and the right to withdraw. The consent form outlined the rights and approach in the research process, and no personal identifiers were placed on the questionnaire. All the participants were required to consent before being included in the study. The researchers also sought approval from these institutions before the research was carried out.

Limitations of the Study

This action research project acknowledges limitations due to the timeframe and scope of the investigation.

- **Limited Timeframe:** The research, conducted within a three-week timeframe, may not have captured the full range of factors influencing student performance. A longer duration would have allowed for a more in-depth exploration of student challenges and the development of a more comprehensive intervention framework.
- **Single School Setting:** The research was limited to a high school in Western Jamaica. Due to potential variations in teaching methods, student demographics, and school resources, the findings may not be generalisable to a broader population of eighth graders in other Jamaican schools.

While these limitations restrict the generalizability of the findings, the project offers valuable insights into the specific context of the participating school. The results can serve as a foundation for further research and inform targeted interventions to improve Mathematics performance within this school community.

Findings and Interpretations

Introduction

This chapter seeks to understand the factors affecting the mathematics performance of eighth graders and provide information for an intervention that will aim to change students' mathematics performance by at least 20%. Additionally, the information will be presented through graphs and tables, beginning with the sample's demographic characteristics and each research question. Each research question will be presented using pre-test and post-test results.

Demographic characteristics of students

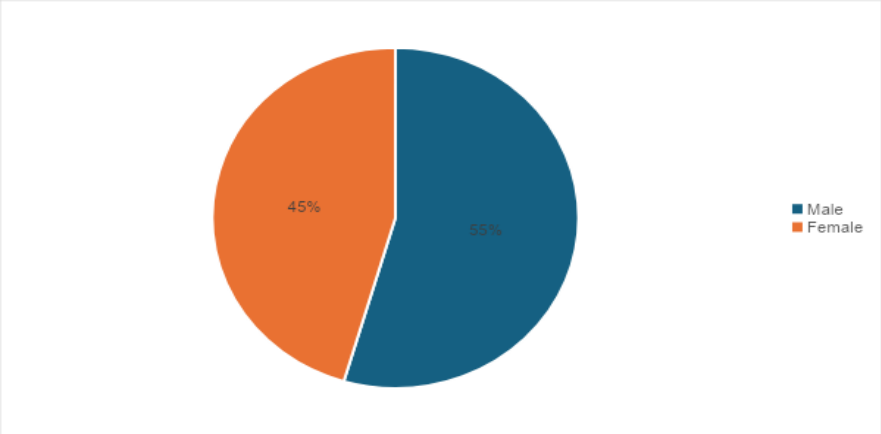

Figure 1.1: Gender of the Respondents (pre-test)

Figure 1.1 shows the percentage of the sample respondents. Most sample respondents were males (55%, n=38).

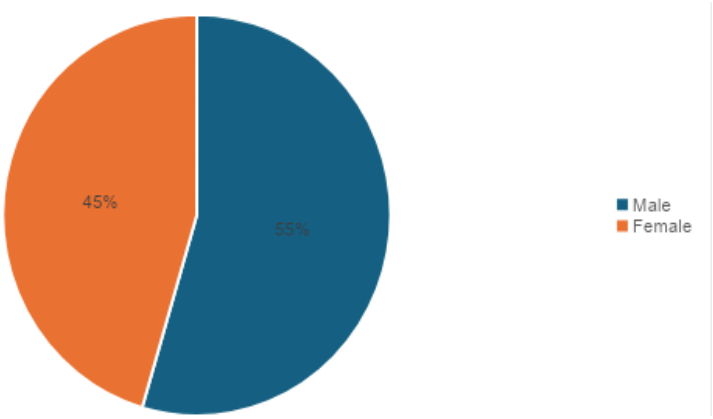

Figure 1.2: Gender of the Respondents.

Figure 1.2 shows the percentage of the sample respondents. Most sample respondents were males (55%, n=38).

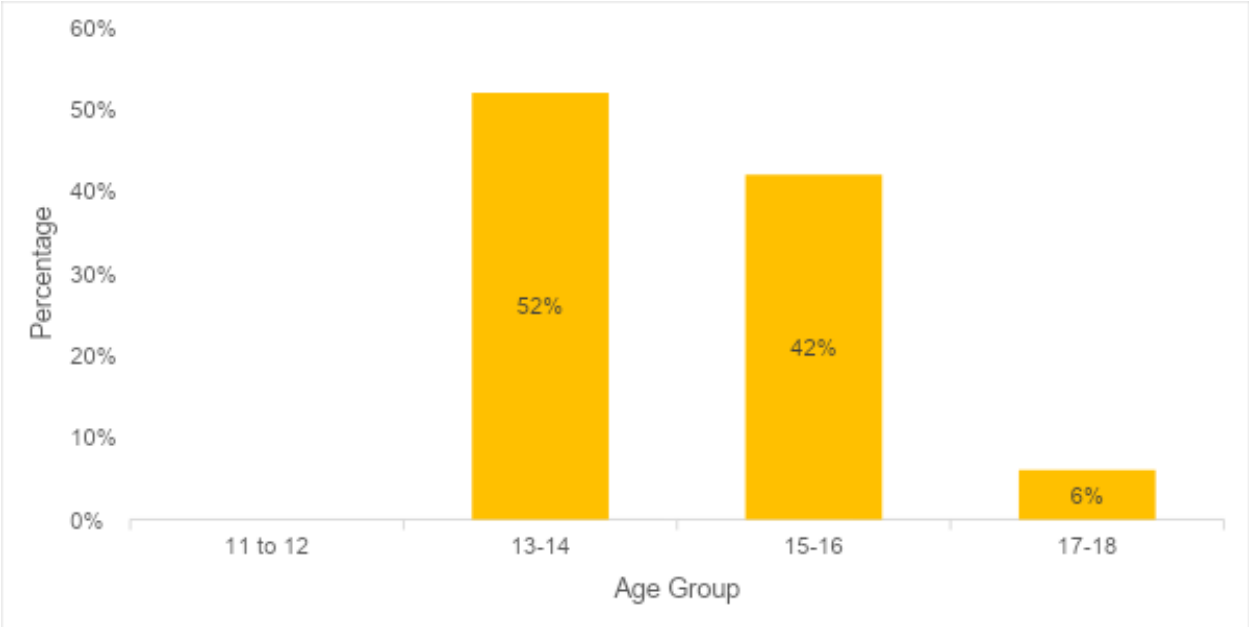

Figure 2.1: Age Group of Respondents (Pre-Test).

Figure 2.1 depicts a bar graph of the respondents' age groups. From the data collected, 52% of the respondents stated that they were ages 13 and 14, 42% indicated that they were ages 15 and 16, and the remaining 6 % stated that they were ages 17 and 18.

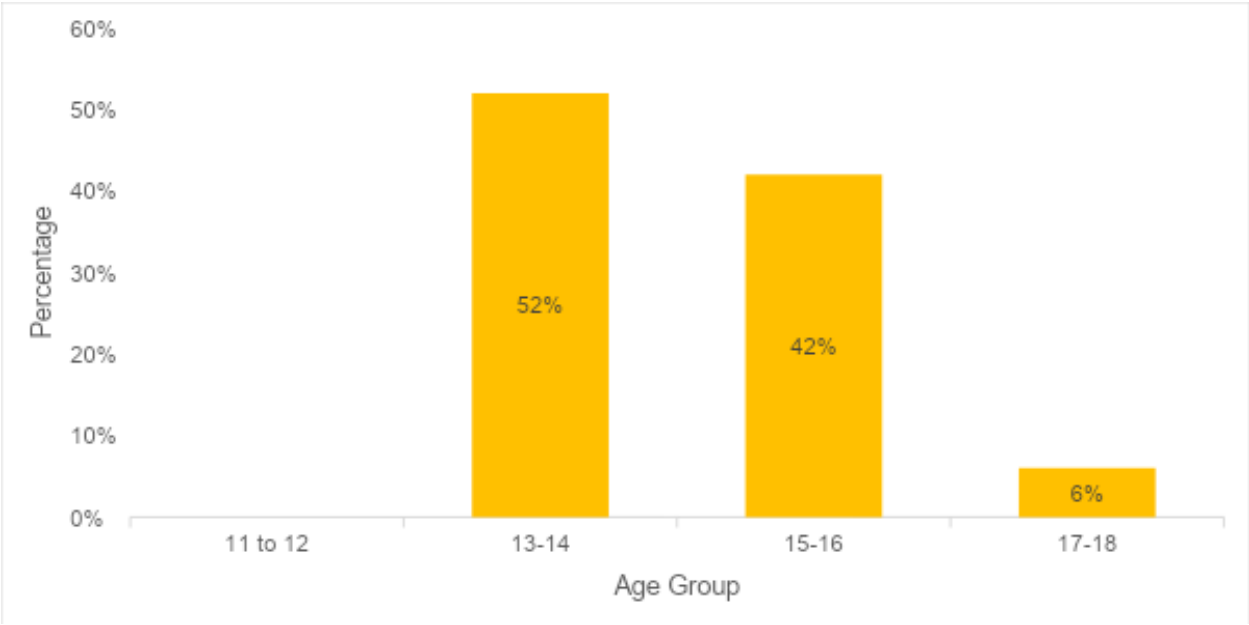

Figure 2.2: Age Group of Respondents (Post-Test)

Figure 2.2 depicts a bar graph of the respondents' age groups. From the data collected, 52% of the respondents stated that they were between the ages of 13 and 14, 42% indicated that they were between the ages of 15 and 16, and the remaining 6 % stated that they were between the ages of 17 and 18.

Research Question 1

What are the factors affecting students' performance in Mathematics?

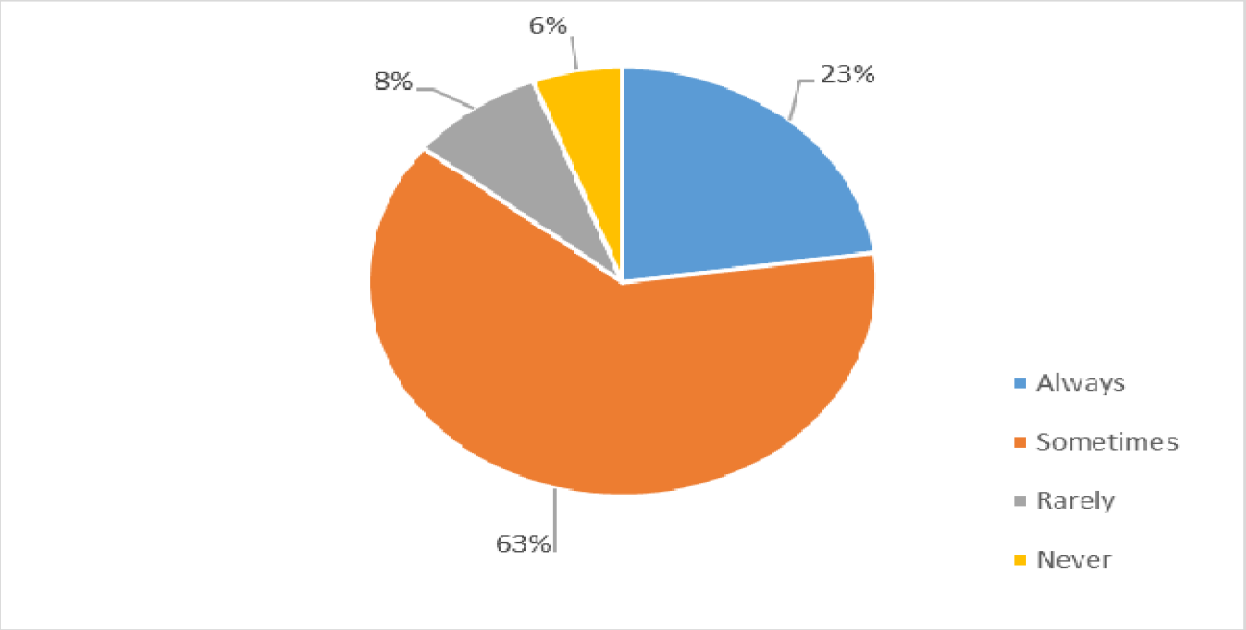

Figure 3.1 Shows the Degree to Which Students Have a Quiet Place at Home to Study Mathematics

Figure 3.1 is a pie chart depicting that in response to the question:Do you have a quiet place at home to study Mathematics? Of the respondents, 23% selected always, 63% chose sometimes, 8% selected rarely, and 6% reported that they never have a quiet place to study mathematics at home.

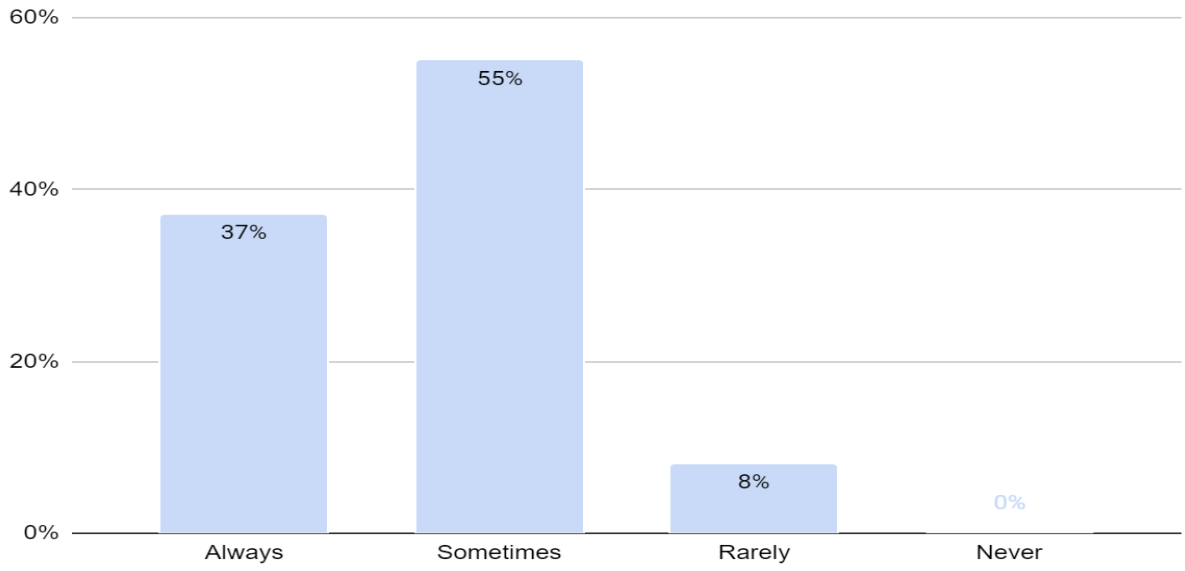

Figure 3.2 Shows the Degree to Which Students Have a Quiet Place at Home to Study Mathematics (Post-Test)

Figure 3.2 is a bar chart depicting that in response to the question, do you have a quiet place at home to study Maths? Of the respondents, 37% selected always, 55% chose sometimes, and 8% selected rarely. No respondent indicated that they never had a quiet place to study mathematics.

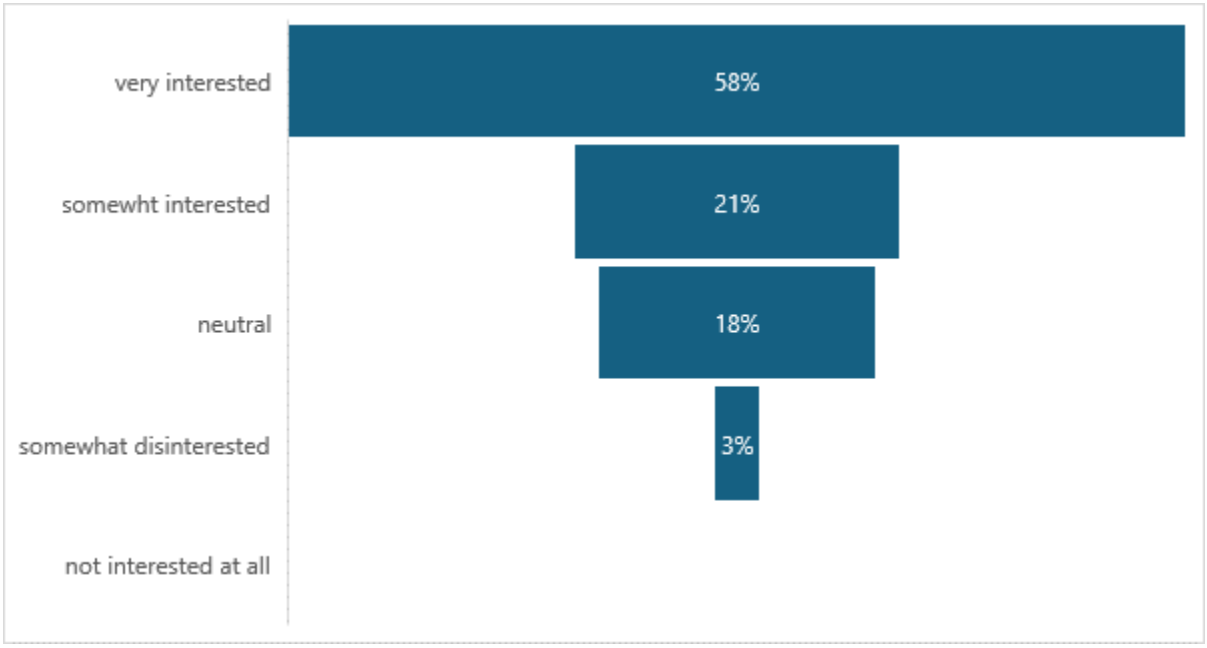

Figure 4.1: Students' Interest in Mathematics (Pre-Test).

Figure 4.1 depicts a funnel chart representing students' responses to the question, "How would you describe your overall interest in mathematics? Based on the data collected, 58% of the respondents reported being very interested in mathematics, 21% were somewhat interested, 18% felt neutral, and 3% were slightly disinterested in mathematics.

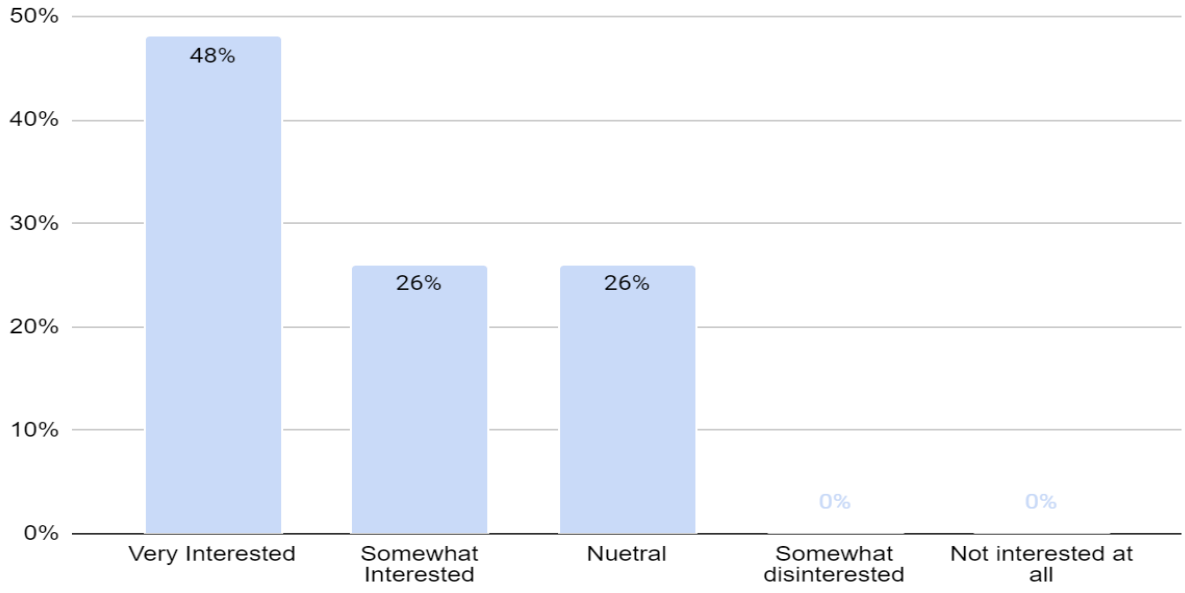

Figure 4.2: Students' Interest in Mathematics (Post-Test)

Figure 4.2 depicts a bar chart representing students' responses to the question, "How would you describe your overall interest in mathematics? Based on the data collected, 48% indicated they were interested in mathematics after the intervention.

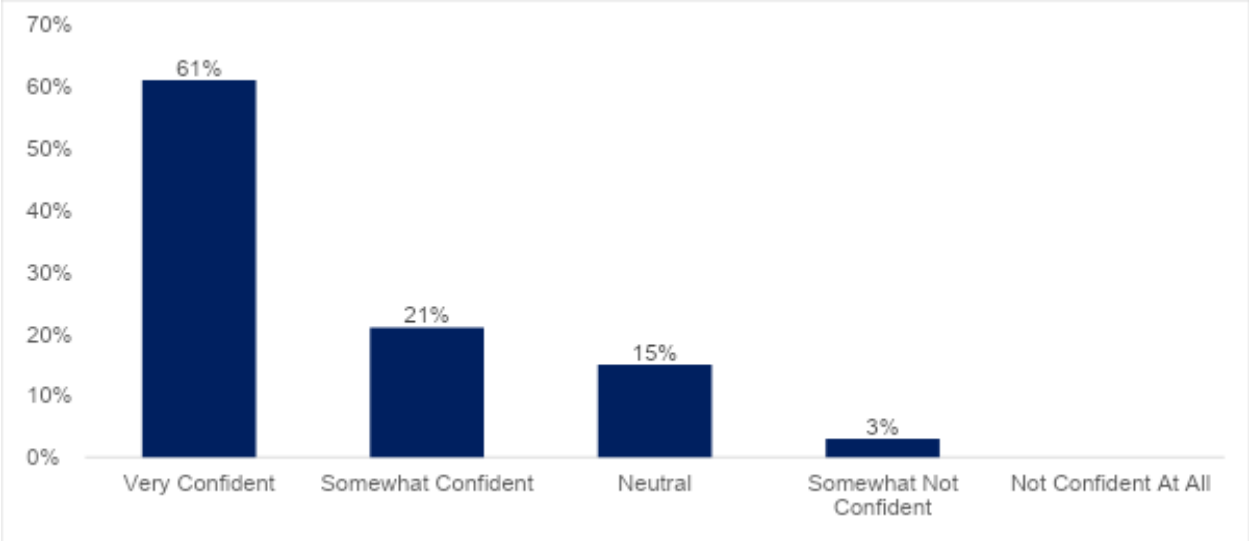

Figure 5.1: Confidence of Students to Do Well in Mathematics (Pre-Test).

Figure 5.1 depicts a bar graph showing students' responses to the question, "In your opinion, how confident are you in your ability to do well in mathematics?" Based on the responses received, 61% of the respondents were very confident in their ability to do well in mathematics, 21% were somewhat confident, and 15% felt neutral. In comparison, the other 3% were somewhat unsatisfied with their ability to do well in mathematics.

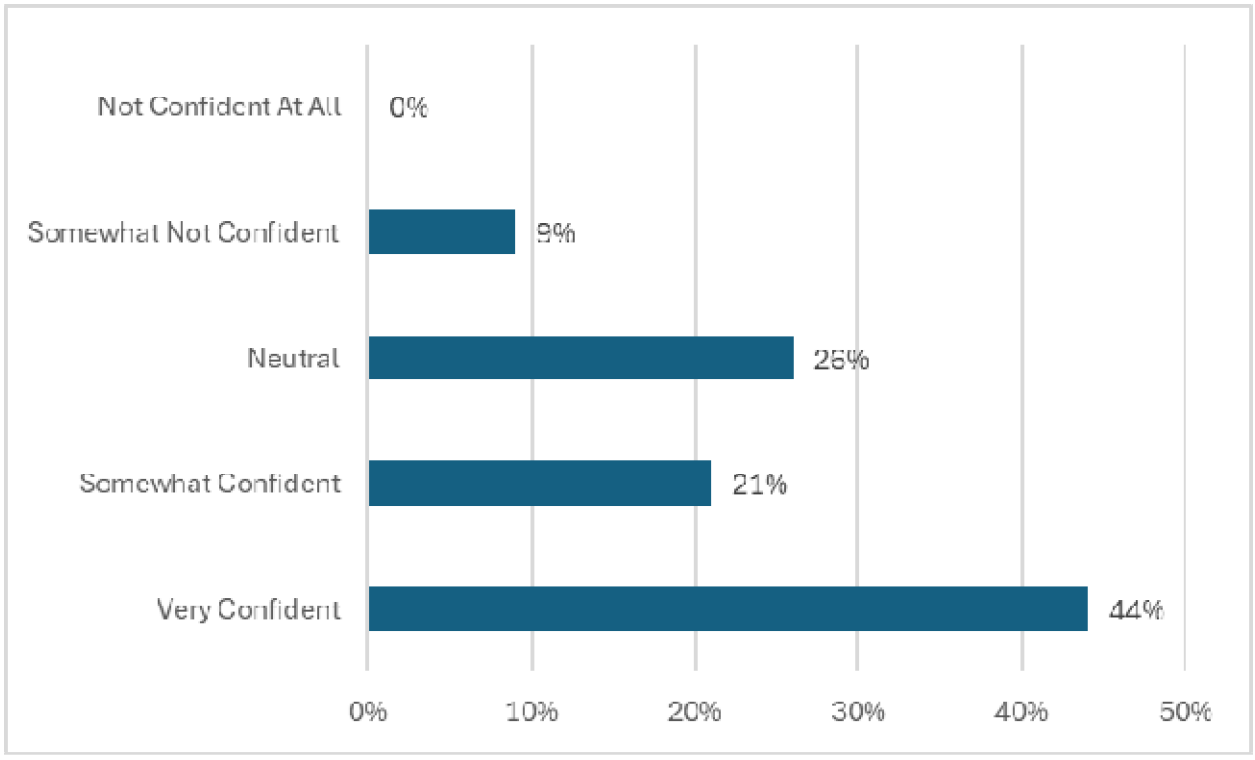

Figure 5.2: Confidence of Students to Do Well in Mathematics (Post-Test)

Figure 5.2 depicts a bar graph showing students' responses to the question, "In your opinion, how confident are you in your ability to do well in mathematics?" Based on the responses received, 44% of the respondents were very confident in their ability to do well in mathematics, 21% were somewhat confident, and 26% felt neutral. Nine per cent(9%) were somewhat not confident in their ability to do well in mathematics.

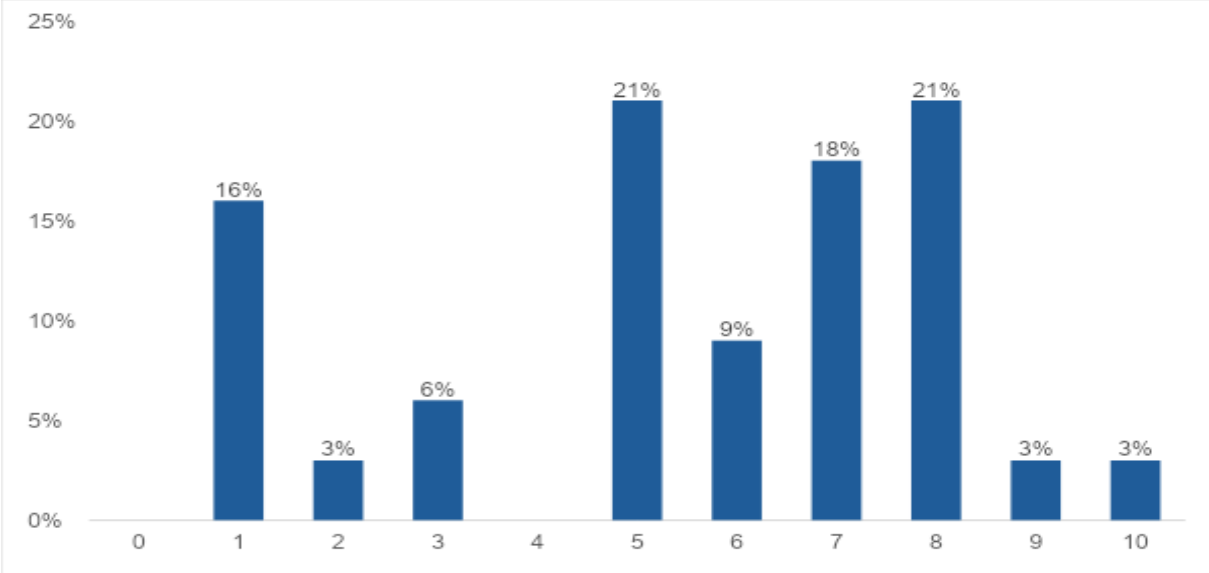

Figure 6.1: Perceived Difficulty of Mathematics (Pre-Test).

Figure 6.1 depicts the responses to the question, "On a scale of 0 to 10, with 0 being not difficult at all, five being moderately difficult, and ten being extremely difficult, rate the level of difficulty you experience in mathematics?" based on the ratings received, 3% of the respondents gave ratings of 10, 9 and 2, 6% of the respondents gave a rating of 3, 9% gave a rating of 6, 16% gave a rating of 1, 18% gave a rating of 7; 21% of the respondents gave ratings of 5 and the other 21% gave a rating of 8.

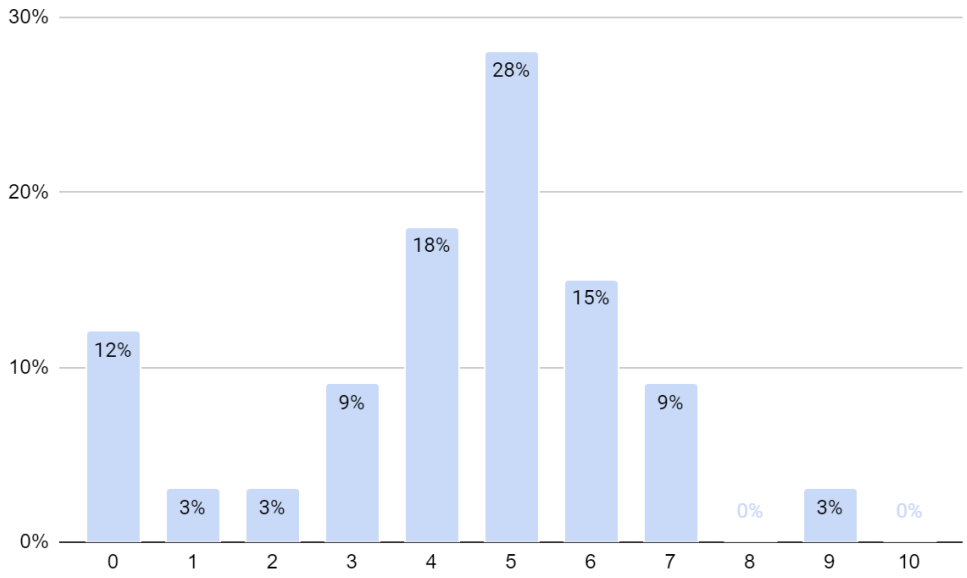

Figure 6.2: Perceived Difficulty of Mathematics (Post-Test).

Figure 6.2 depicts the responses to the question, "On a scale of 0 to 10, with 0 being not difficult at all, five being moderately difficult, and ten being extremely difficult, rate the level of difficulty you experience in mathematics?" based on the ratings received, 3% of the respondents gave ratings of 9, 2 and 1; 9% of the respondents gave a rating of 3 and 7; 12% gave a rating of 0; 15% of the respondents gave a rating of 6; 18% gave a rating of 4 while the other 28% gave a rating of 5.

Table 2 represents the challenges that students highlighted with Mathematics. From the data collected, the challenges students face are studying; sometimes the concept slips their minds, some parts of the concepts are complex, anxiety, and the way the teacher explains the topics.

Table 2: Students' Mathematical Challenges (Pre-Test).

Challenges students face in learning Mathematics
Studying
Sometimes, things slip my mind.
I don't have any
Some parts of the concepts
Subtracting and Multiplication
It is very challenging; it is just rarely hard for me to understand
The way the teacher explains the topics
Algebra (transposition and equation)
I get anxious sometimes and lose focus in class; I am easily distracted.
My biggest challenges are number lines and number bases.
When the teacher called me to the board

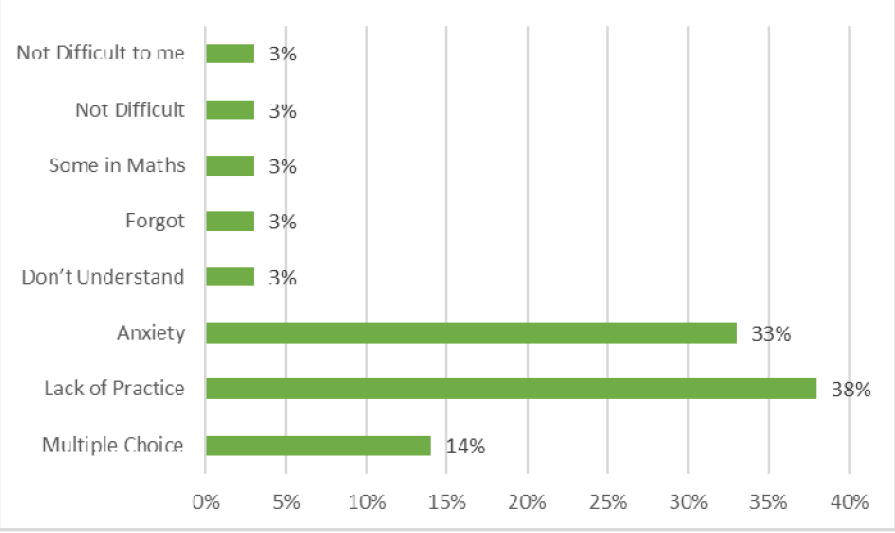

Figure 7.1: Follow on to Fig 6 Cause of Mathematics Difficulty (Pre-Test)

Figure 7.1 depicts a bar graph of the respondents' reasons for the level of difficulty they experienced. 39% indicated it was a lack of practice, 33% because of anxiety, 14% because of multiple-choice options, and 3% each stated that they forgot and it was not difficult.

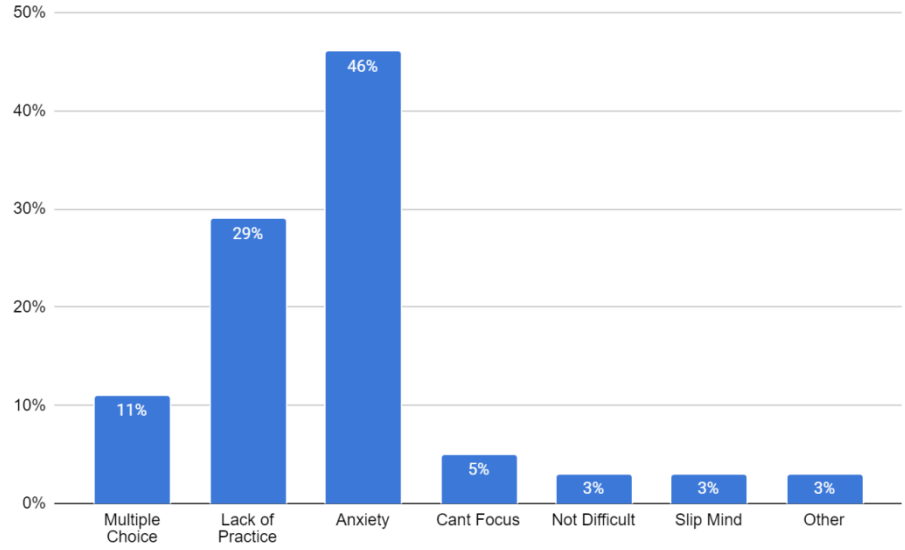

Figure 7.2: Follow on to Fig 6 Cause of Mathematics Difficulty (Post-Test).

Figure 7.2 depicts a bar graph of the respondent's reason for the level of difficulty experienced. 29% indicated it is a lack of practice, 46% because of anxiety, 11% reason multiple choice options, 5% indicate they are unable to focus, while the other 3% each stated that it slip their mind and is not difficult.

Table 3 shows why students are interested or lack interest in mathematics. Students are curious because it is easy, it is needed to get a job, fun, and To learn the concepts. Students stated that they lack interest because they are not used to the concepts and forget their concepts. Sometimes, the teacher needs to provide clear Explanations.

Table 3: Reason for Students' Interest or Lack of Interest in Mathematics (Pre-Test).

Interest	Lack of interest
Mathematics is an excellent subject, and I love mathematics	I am not used to the concept
It is fun	Sometimes, I have quietness.
I love math because it is straightforward	Sometimes, I am not at my original home
I love math and I have no issues with mathematics	I do not understand
Because I am interested	My wifi is not very good.
To learn and understand the concept	I do not understand some things.
It helps in getting jobs and answering questions easily	Sometimes, the teacher does not explain clear
Because not all of the topics are hard	I forget the concepts
Because it gives you a good understanding	

Interest	Lack of interest
Mathematics is an excellent subject, and I love mathematics	I am not used to the concept
It is fun	Sometimes, I have quietness.
I love math because it is straightforward	Sometimes, I am not at my original home

l love math and l have no issues with mathematics	I do not understand
Because I am interested	My wifi is not very good.
To learn and understand the concept	I do not understand some things.
It helps in getting jobs and answering questions easily	Sometimes, the teacher does not explain clear
Because not all of the topics are hard	I forget the concepts
Because it gives you a good understanding	

Table 4 presents why students are interested or not interested in Mathematics. Among the common reasons why students are interested in mathematics is just trying to get higher grades; it is a fun subject because of the switch in teaching approach. Some common reasons students are not interested are the sometimes tricky questions, test anxiety, and sometimes students forget the concepts.

Table 4: Reason for Students' Interest or Lack of Interest in Mathematics (Post-Test).

Interest	Lack of interest
I was trying to get higher grades.	Because sometimes I do not remember the formula
Because I learn a lot in mathematics	Because sometimes music is playing or other things
Because mathematics is my favourite subject	Because of the kids in my home
It is a fun subject	The questions are sometimes tricky.
Because of the new stitch	I understand, but I always forget.
Because it is my favourite subject	Anxiety in tests
Because it helps us with getting jobs	I would not say I like math, but I am not interested in it.
Because the teacher makes it easy in mathematics class	

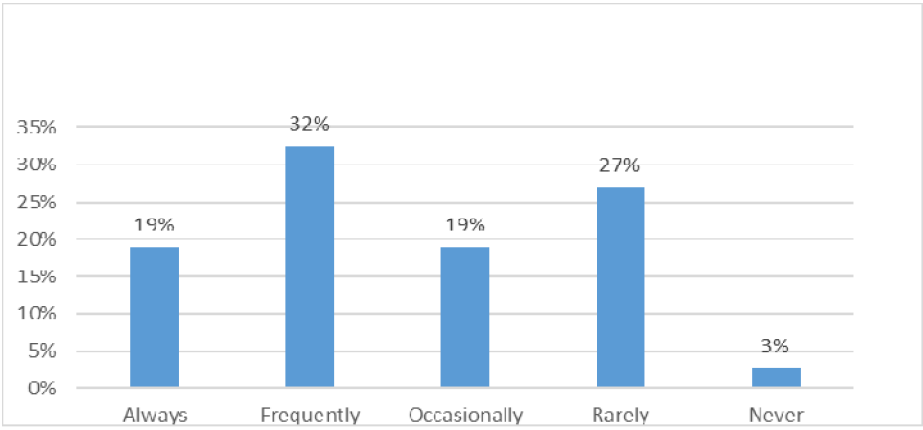

Figure 8.1: The Frequency of Respondents Finding Math Concepts Challenging to Understand (Pre-Test).

Figure 8.1 depicts a bar graph of how often respondents find it challenging to understand the concepts of mathematics taught in class. Of the respondents, 19% said they always find it difficult to understand math concepts taught in class, 32% frequently found it difficult, and

another 19% occasionally found it challenging. Of these respondents, 27% said they rarely found it challenging to understand, while 3% never.

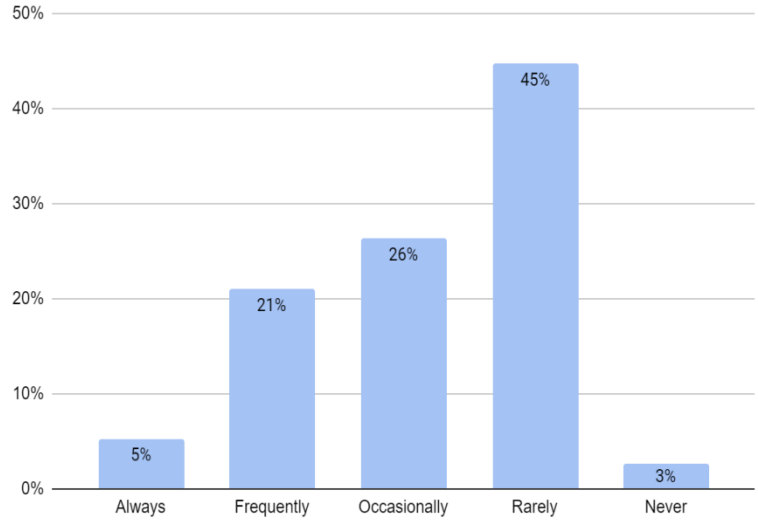

Figure 8.2: The Frequency of Respondents Finding Math Concepts Challenging to Understand (Post-Test).

Figure 8.2 depicts a bar graph of how often respondents find it challenging to understand the concepts of mathematics taught in class. Of the respondents, 5% said they always find it difficult to understand math concepts taught in class, 21% frequently found it difficult, and another 26% occasionally found it challenging. Of these respondents, 45% said they rarely found it challenging to understand, while 3% never.

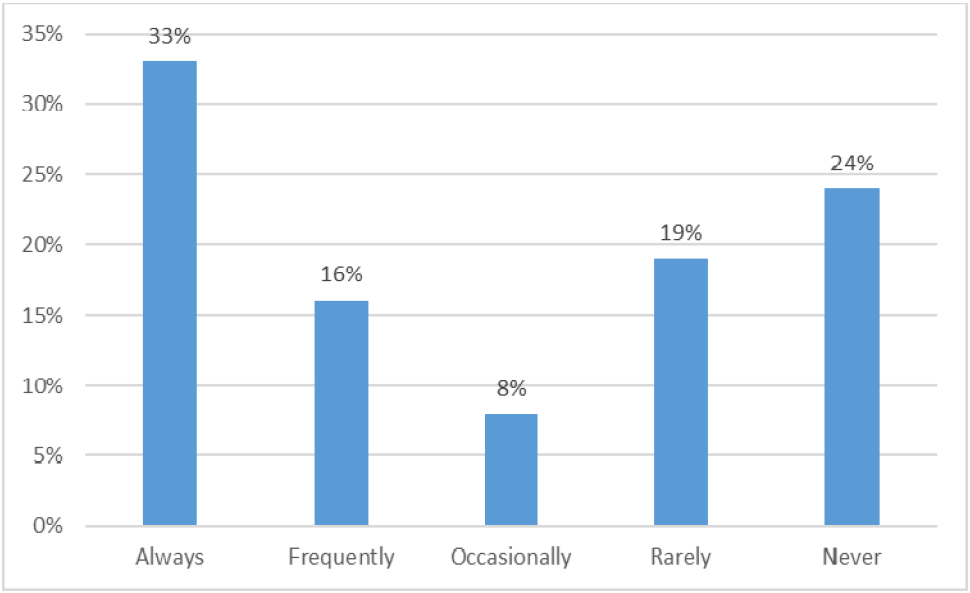

Figure 9.1: Comfort in seeking Clarity from Mathematics Teacher (Pre-Test)

Figure 9.1 depicts a bar graph of how comfortable students seek clarification from the mathematics teacher when they do not understand a topic or concept. 33% indicated they are

always relaxed, and 27% are uncomfortable. The other 43% of respondents were 16% frequently, 8% occasionally, and 19% rarely comfortable.

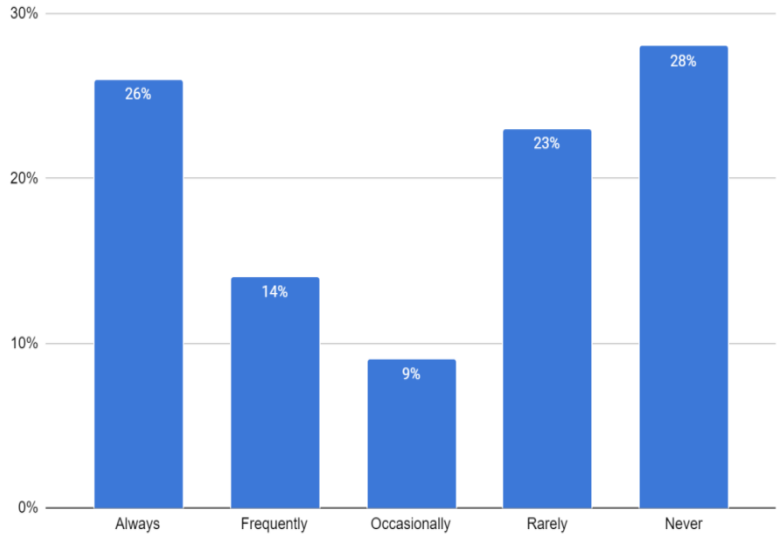

Figure 9.2: Comfort in Seeking Clarity from Mathematics Teacher (PoPost-Test

Figure 9.2 depicts a bar graph of how comfortable students feel in seeking clarification from the mathematics teacher when they do not understand a topic or concept. 26% indicated they were always comfortable, and 28% were never comfortable. Of the respondents, another 14% responded that they are frequently comfortable, 9% occasionally and 23% rarely.

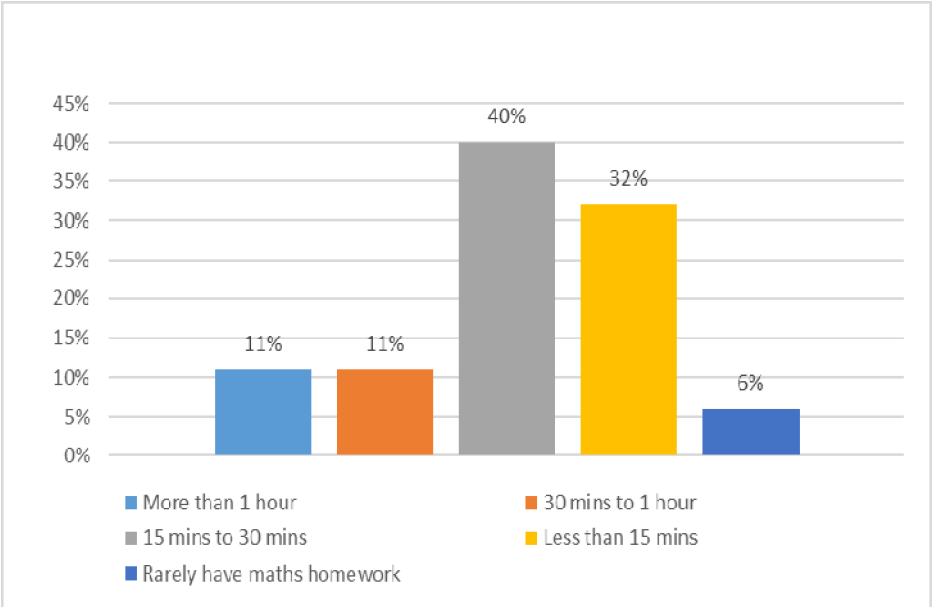

Figure 10.1: Time Spent on Mathematics Homework Outside of Class Hours (Pre-Test).

Figure 10.1 depicts a bar graph of how much time is spent doing mathematics homework outside class hours. 40% of respondents spent 15 to 30 minutes outside of class doing mathematics homework, 32 % spent less than 15 minutes, and 6% rarely had mathematics homework. The other 22% evenly spent 30 to 60 minutes and over 60 minutes on mathematics homework.

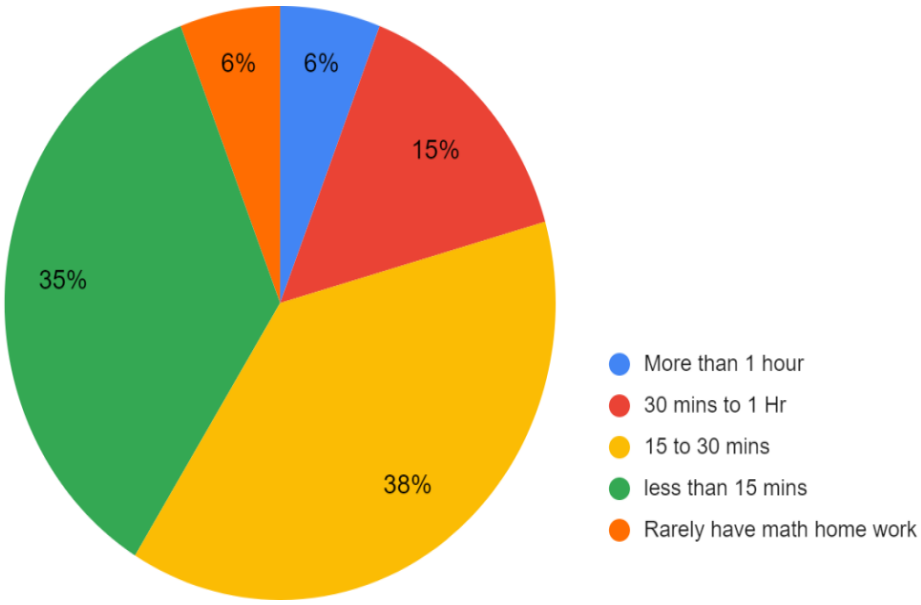

Figure 10.2: Time Spent on Mathematics Homework Outside of Class Hours (Post-Test)

Figure 10.2 depicts a pie graph of how much time is spent doing mathematics homework outside class hours. 38% of respondents spent 15 to 30 minutes outside of class doing mathematics homework, 35 % spent less than 15 minutes, 6% indicated that they rarely had mathematics homework, and 15% spent 30 to 60 minutes on mathematics homework. Another 6% indicated they spent more than 1 hour on mathematics homework outside class hours.

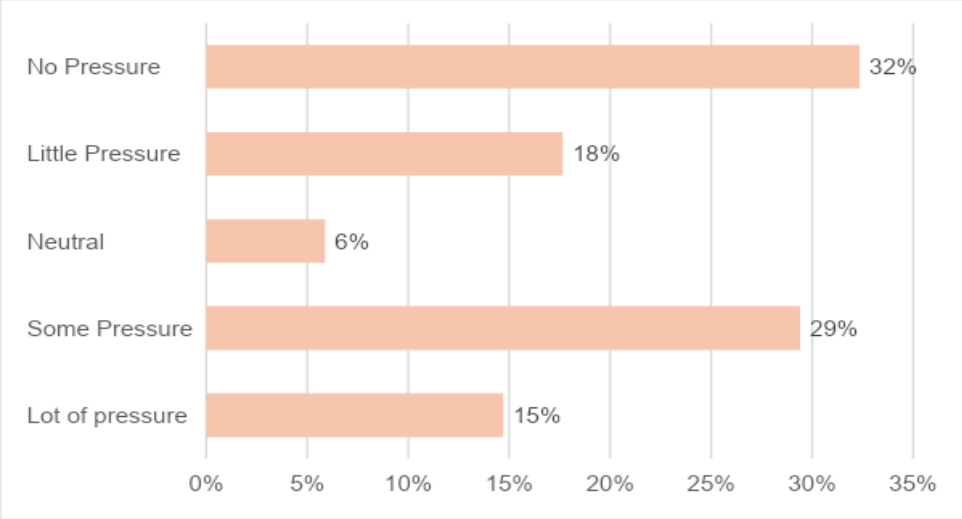

Figure 11.1: Family and Teacher Pressure to Perform Well in Mathematics (Pre-Test)

Figure 11.1 depicts a bar graph depicting the respondents' experience of pressure from family members or teachers to do well in mathematics. Of the respondents,32% indicated that they experience no pressure, 15% indicated that they experience much pressure, 29% indicated that they experience some pressure, 18% experienced little pressure, and 6% experienced a neutral amount of pressure.

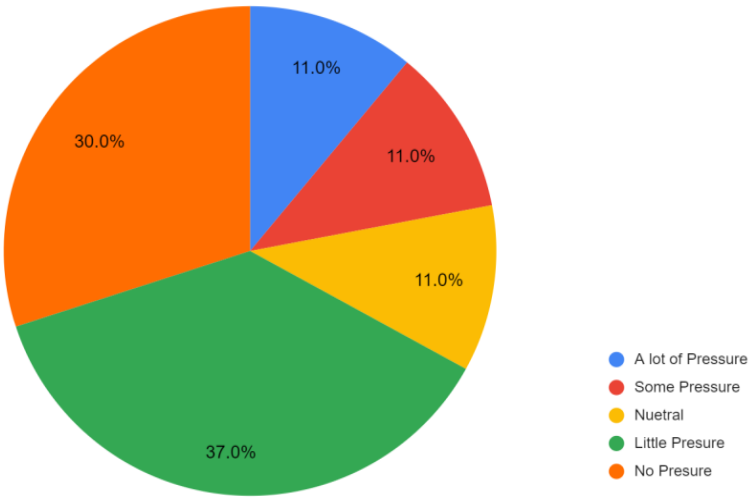

Figure 11.2:Family and Teacher Pressure to Perform Well in Mathematics (Post-Test)

Figure 11.2 depicts a pie chart of respondents' pressure from family or teachers to do well in mathematics. Of the respondents, 30% indicated that they experienced no pressure, 11% indicated that they experienced much pressure, 11% indicated that they experienced some pressure, and 11% experienced a neutral amount of pressure. The final 37% indicated they experience a little pressure from family members or teachers to perform well in Mathematics.

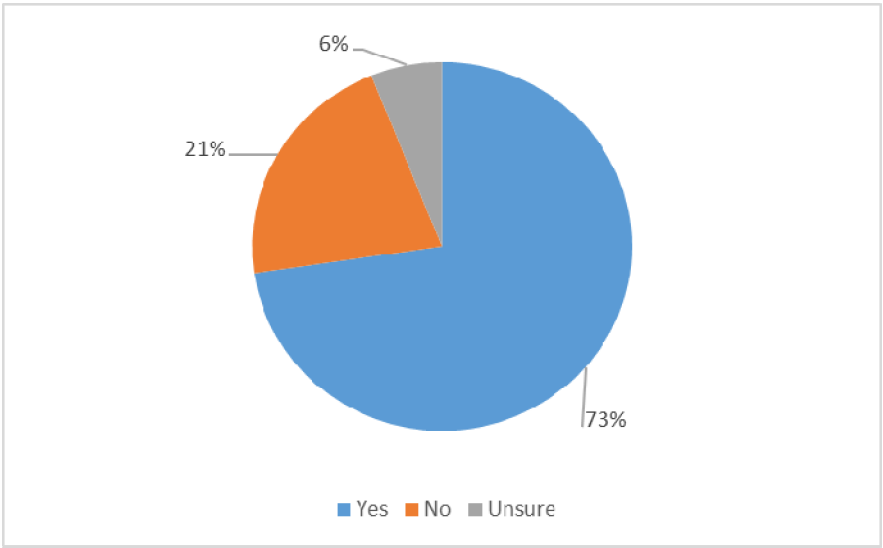

Figure 12.1: Anxiety Experienced Doing Mathematics Tests or Class Work (Pre-Test)

Figure 12.1 depicts a pie chart depicting whether or not students experience anxiety when doing mathematics tests or class work. 73% of the respondents indicated that they experienced math anxiety, 21% indicated that they felt no anxiety, and the other 6% were unsure if they experienced anxiety while doing mathematics tests or classwork.

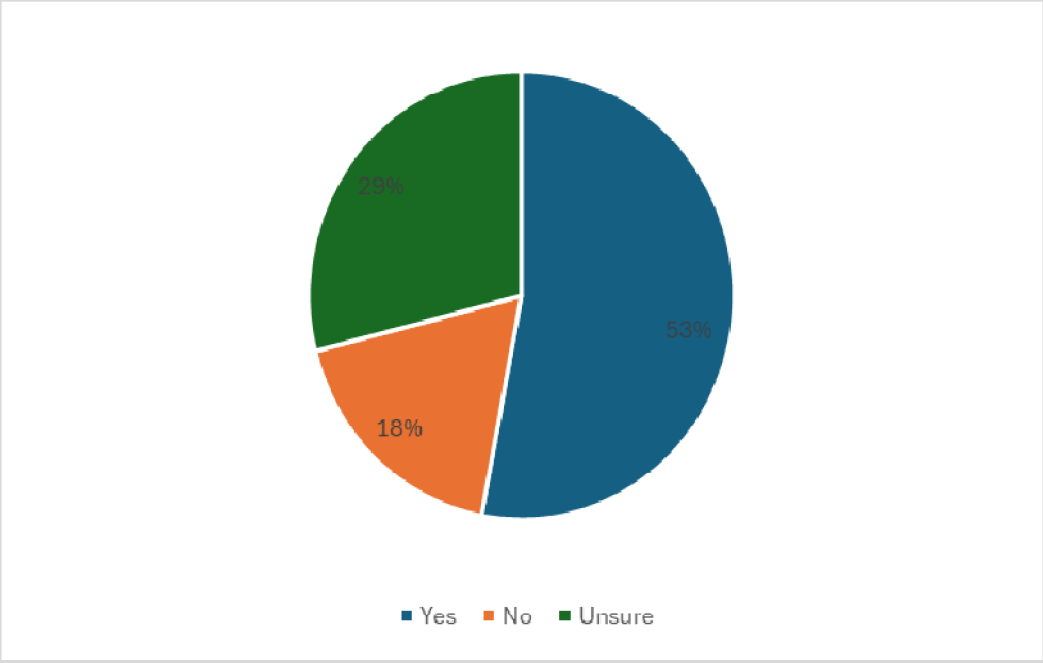

Figure 12.2: Anxiety Experienced Doing Mathematics Tests or Class Work (Post-Test)

Figure 12.2 depicts a pie chart depicting whether or not students experience anxiety when doing mathematics tests or class work. 53% of the respondents indicated that they experienced math anxiety, 18% indicated that they felt no anxiety, and the other 29% were unsure if they experienced anxiety while doing mathematics tests or classwork.

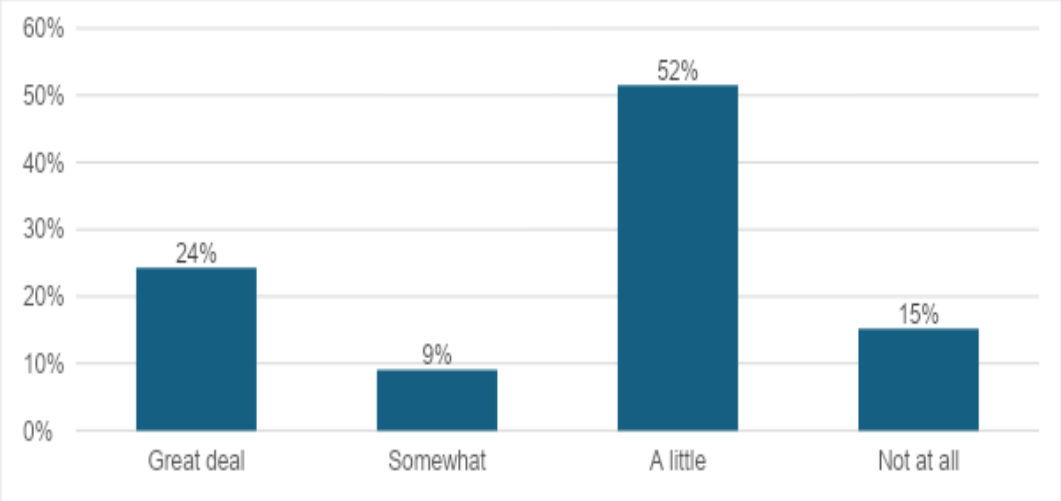

Figure 13.1: How Anxiety Affects Students' Performance in Mathematics (Pre-Test)

Figure 13.1 depicts a bar graph representing how anxiety affects the respondents' performance in mathematics. Of the respondents, 52% indicated that it affects their performance a little, 15% indicated that it does not affect their performance at all, 24% stated that it affects their performance a great deal, and 9% indicated that it somewhat affects their performance.

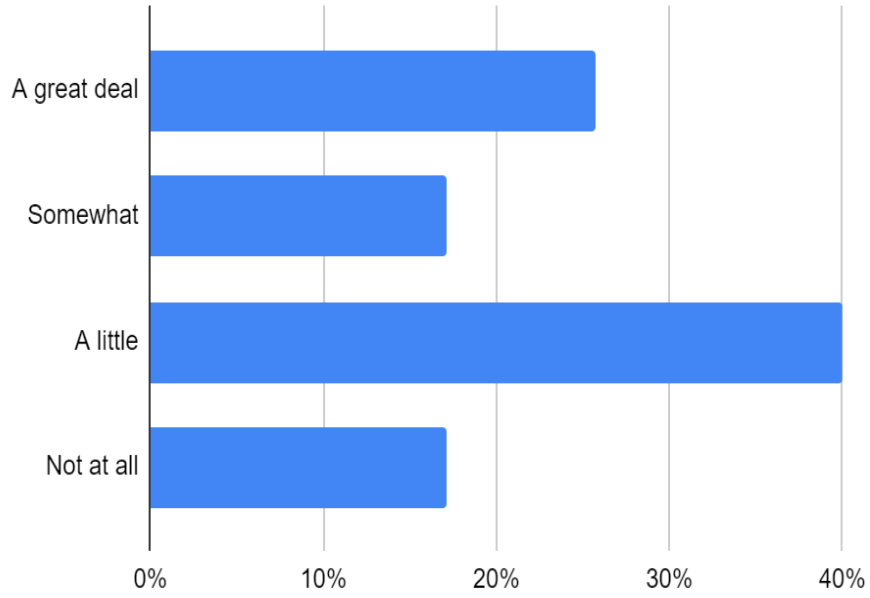

Figure 13.2: How Anxiety Affects Students' Performance in Mathematics (Post-Test)

Figure 13.2 depicts a bar graph of how anxiety affects the respondents' performance in mathematics. Of the respondents, 40% indicated that it affects their performance a little, 26% indicated that it affects their performance a great deal, 17% indicated that it affects their performance somewhat, and another 17% indicated not at all.

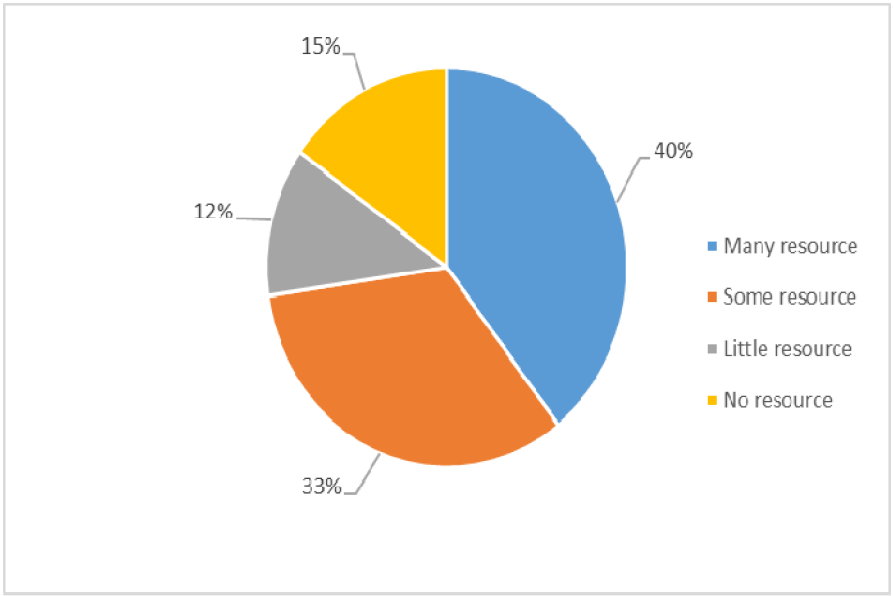

Figure 14.1: Access to Additional Mathematics Resources (Pre-Test)

Figure 14.1 depicts a pie graph of respondents' access to additional mathematics resources such as textbooks, online tutorials, or tutors. 40% indicated that they have access to many additional resources, 33% indicated that they have access to some additional resources, and 12% indicated that they have little access to additional resources. The other 15% indicated that they have no access to additional resources.

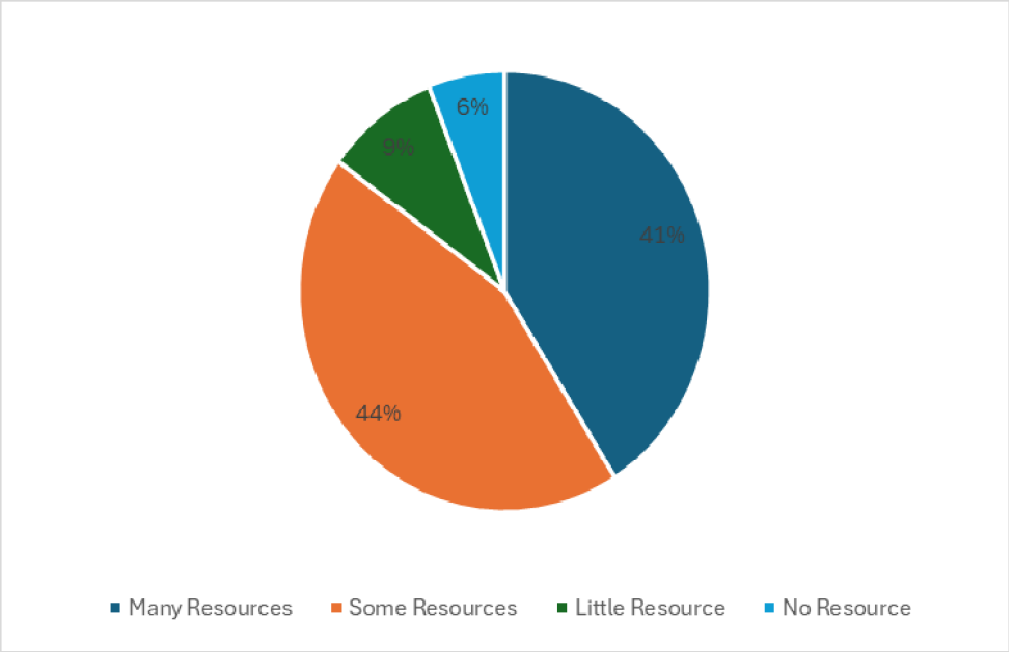

Figure 14.2: Access to Additional Mathematics Resources (Post-Test).

Figure 14.2 depicts a pie chart of respondents' access to additional mathematics resources such as textbooks, online tutorials, or tutors. Of the respondents, 41% indicated that they have access to many additional resources, 44% indicated that they have access to some additional resources, 9% indicated that they have little access to additional resources, and 6% indicated that they have no access to additional resources.

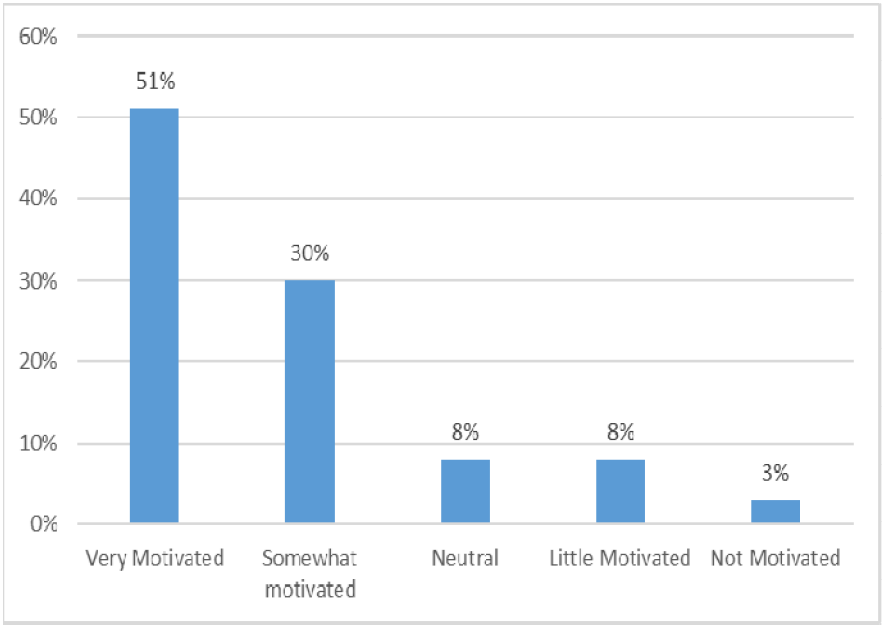

Figure 15.1: Motivation to Improve Performance in Mathematics (Pre-Test).

Figure 15.1 depicts a bar graph of how motivated respondents are to improve their performance in mathematics. Of the respondents, 51% are very motivated, 30% are somewhat motivated, and 8% are neutrally motivated. Another 8% are motivated, while the other 3% are not.

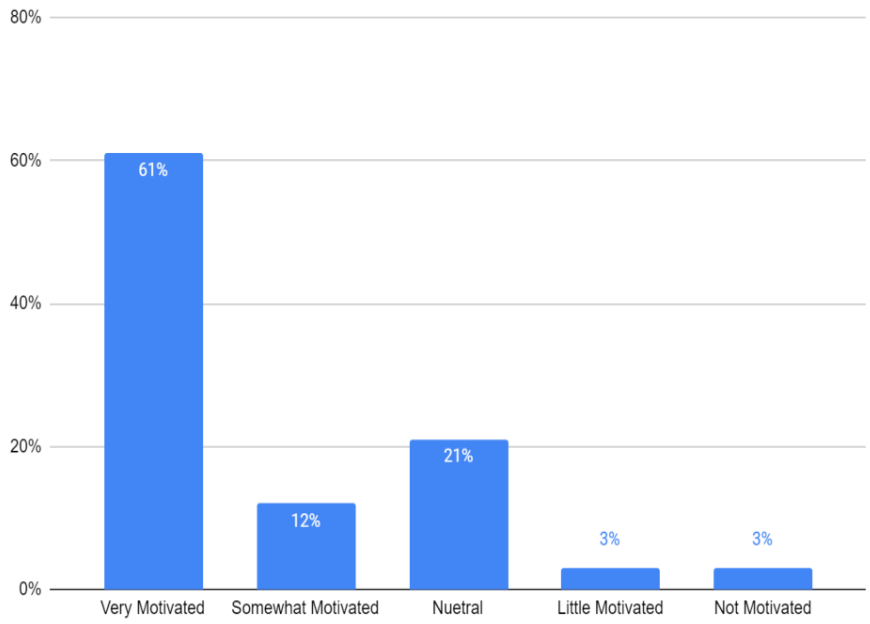

Figure 15.2: Motivation to Improve Performance in Mathematics (Post-Test).

Figure 15.2 depicts a bar graph of how motivated respondents are to improve their mathematics performance. Of the respondents, 61% are very motivated, 12% are somewhat motivated, 21% are neutrally motivated, 3% are slightly motivated, and 3% are not motivated.

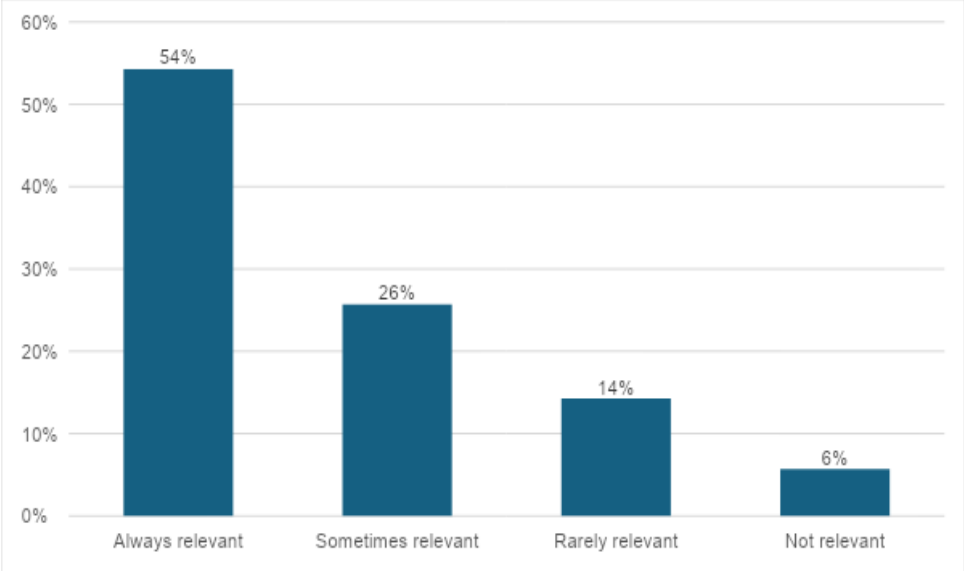

Figure 16.1: Students' Perceived Relevance of the Mathematics Curriculum With Everyday Life (Pre-Test)

Figure 16.1 depicts a bar graph of how relevant the respondents find the mathematics curriculum to everyday life. Of the respondents who find the mathematics curriculum pertinent to everyday life, 54% indicated that it is always relevant, 26% indicated that it is sometimes relevant, 14% indicated that it is rarely relevant, and the other 6% indicated that it is irrelevant.

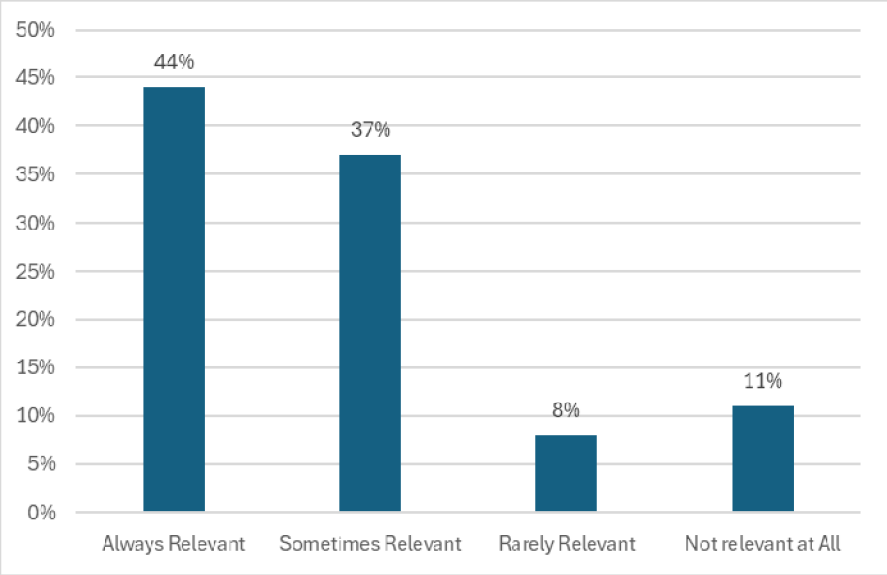

Figure 16.2: Students' Perceived Relevance of the Mathematics Curriculum With Everyday Life (Post-Test).

Figure 16.2 depicts a bar graph of how relevant the respondents find the mathematics curriculum to everyday life. Of the respondents who find the mathematics curriculum pertinent to everyday life, 44% indicated that it is always relevant, 37% indicated that it is sometimes relevant, 8% indicated that it is rarely relevant, and the other 11% indicated that it is irrelevant.

Pre-Intervention interview

Barriers to Achievement

Ms. Johnson (pseudo name), the teacher of Mathematics, acknowledges a significant gap between student achievement levels in her class, with some excelling and others struggling. This highlights the need for differentiated instruction to cater to individual needs. The teacher cited, "There are a few areas that students are constantly struggling in, including basic math operations". A significant barrier to student success in Mathematics is the lack of foundational concepts like multiplication. This creates a domino effect where students struggle with more complex topics built upon the missing skills. Ms. Johnson (pseudo name) further lamented, "One big issue seems to be a lack of foundational skills. Many of the students are getting tripped up on basic multiplication facts. As we move on to more complex concepts, these gaps become even more difficult to bridge".

Barriers to Achievement

Additionally, Ms. Johnson (pseudo name) identifies the fear of making mistakes as a significant barrier affecting students' performance. Creating a safe learning environment where mistakes are seen as opportunities for growth can be crucial. Ms. Johnson (pseudo name) commented, "Mathematics is all about practice and trying different approaches. However, some students seem to shut down as soon as they get something wrong. It is important to remember that mistakes are a natural part of the learning process. The key is to learn from them and keep trying. Sometimes, the wrong answer can lead you to a deeper understanding of the right one."

Pre- Intervention Focus Group

Math Anxiety and Challenges:

Based on the initial focus group discussion, many participants were experiencing mathematics anxiety that affected their ability to concentrate and grasp the intricacies of discipline. Mathematics anxiety was identified as one of the factors influencing an understanding of concepts in mathematics, which accounts for the fear and failure of the students to grasp some of the problematic concepts in algebra, geometry, trigonometry, and statistics. John Doe(pseudo name), a participant in the focus group, stated that "sometimes when the lessons are being taught, I do not fully understand and because I am not very outspoken, I do not openly ask questions, but I still have a fear that I might fail assignments that are given in class".

When John Doe (pseudo name) shared his remarks, another student, Mary Yapp (pseudo name), added, "This is true, and sometimes the participants sitting at the back of the class are very disruptive, and that causes me to get distracted and lose focus while the teacher is explaining the concepts and when we get assignments to complete, we cannot do it well because we did not initially understand. Jane Doe (pseudo name), a participant in the focus group, added another example of the teacher explaining the concept in class, and he was understanding. Still, someone in class disrupted him and caused him to lose focus. He had to ask the teacher to repeat the concept so the teacher would get annoyed and resist explaining again. Math anxiety was also said to be caused by participants being unable to understand algebra and perform basic operations such as (addition, subtraction, multiplication, and division). Several participants alluded that they have challenges with these operations, especially division and multiplication. Another contributing factor to participants' math anxiety is their insufficient time learning the concepts, as they would rather have additional time to concretise the concepts before getting their assessments.

From the initial focus group discussion, it was revealed that there is a significant amount of disruption in the class by students, preventing the teacher from providing apparent explanations of the concept in a way that students will understand. Jane Doe (pseudo name) stated that "there are times when the teacher is explaining the lesson, and we are understanding, but someone starts to get disruptive, and the teacher has to stop the explanation to address their behaviour. By the time the teacher resumes the explanation, I get lost".

Post-Intervention Interview

Improved Student Performance

The teacher observed a positive change in student responses to in-class assessments. The teacher stated that since the intervention, the students have responded positively to in-class evaluations and are more interested in the subject. The grades of several students, including those who appear to have been struggling previously, have started to get better grades. The teacher stated, "I now realise that some students are creative and talented. They may not appear very interested in the subject when the traditional chalk and talk is used, but once they are given concepts to research

and come back to class and make their presentations, these students, at times, will blow your mind with the level of work that they produce.

Enhanced Student Engagement

After the intervention, Students seemed more interested in math, evidenced by facial expressions and active participation in class activities. A previously disengaged student has begun completing classwork and proactively seeks information about upcoming topics. The teacher observes a general sense of enthusiasm for the subject among students. Based on how students respond and the class's overall mood, the teacher stated, “These strategies seem to have reached them because the expression on their faces seems like they are enthused about the concepts”. The teacher further shared, “I realise that some students love this approach because there is a particular student in the class that whenever it is math class, he would normally just sit and stare out of space without even taking out a book. However, since the delivery approach was tailored, this child has started completing classwork. The student even saw me in the corridor after the class and wanted to know the next topic we would be moving to so he could start his research and come ready to share with the class”.

Post-Intervention Focus Group Discussion

Reduced Math Anxiety

Most participants reported a significant decrease in math anxiety. They feel comfortable attending class and participating due to the teacher's clear explanations and engaging teaching style. A participant, Milly Joe (pseudo name), stated, “I feel very at ease with the subject now. I am motivated to come to class and participate because the teacher started to take his time to explain the concepts, and we understand them better. On the other hand, Jimmy Sang (pseudo name), another participant, raised the point that he is still experiencing Mathematics anxiety because “Even though the teacher tries to create a classroom environment that is fun and relaxing, sometimes I just cannot remember how to apply the concepts when I am put to the test. As a result, when it is test time, I stay home and do not bother to come to school”. Other participants jokingly responded to him, saying, “You talk too much in class. That is why you do not understand.

Improved understanding and increased confidence

Participants fully grasped mathematical concepts thanks to the teacher's thorough explanations, practical examples, and various teaching strategies. This is reflected in their test scores and overall confidence. Milly Joe (pseudo name) stated, “Previously, I partially understood the concepts when they were explained, but now I fully understand, and it is reflected in my test scores, so I do not have a challenge”. When this was said, other participants said, “Yes, it is true the teacher does his best to ensure that no student is left behind, and we all understand by making the lessons fun and engaging”. Based on their improved understanding and positive learning environment, participants feel confident they have exceeded the minimum required average of 60% in mathematics.

Research Question 2

Instructional Strategies used by teachers to teach Mathematics

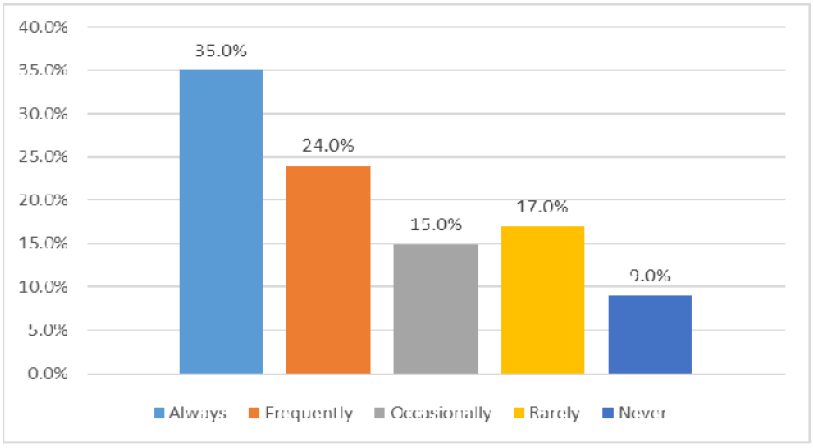

Figure 17.1: Teacher Use of Real-world Examples to Explain Mathematics Concepts(Pre-Test)

Figure 17.1 depicts a bar graph of how often respondents perceive that the teacher uses real-world examples to explain mathematics concepts. Of these respondents, 35% indicated that the teacher always uses real-world examples to explain math concepts, 24 % indicated frequently, and 15% indicated occasionally. Another 17% indicated that the teacher rarely uses real-world examples to explain mathematics concepts, while the other 9% indicated that the teacher never uses real-world examples to explain mathematics concepts.

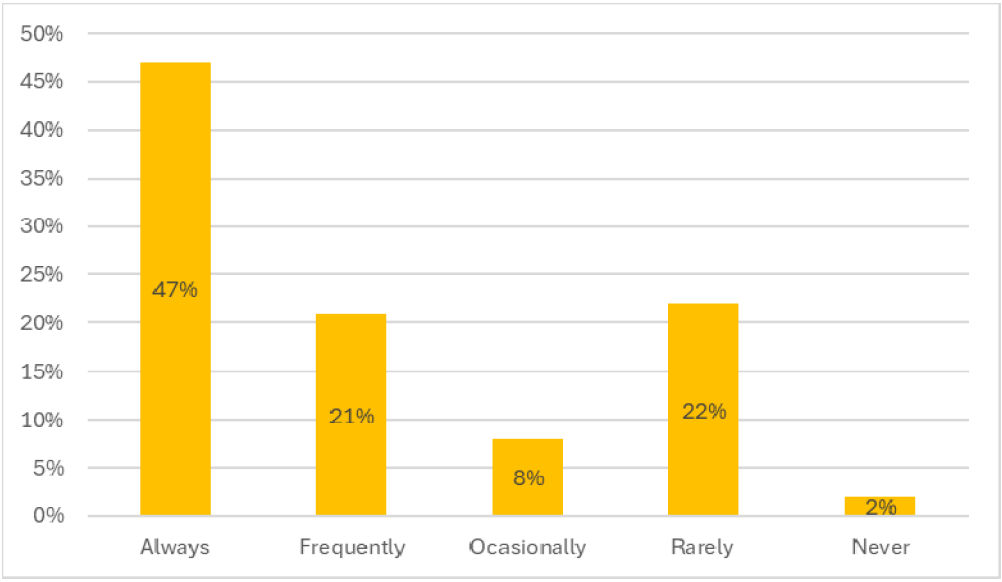

Figure 17.2: Teacher Use of Real-world Examples to Explain Mathematics Concepts(Post-Test)

Figure 17.2 depicts a bar graph of how often respondents perceive that the teacher uses real-world examples to explain mathematics concepts. Of these respondents, 47% indicated that the teacher always uses real-world examples to explain math concepts, 21% indicated frequently, and 8% indicated occasionally. Another 22% indicated that the teacher rarely uses real-world examples to explain mathematics concepts, while the other 2% indicated that the teacher never uses real-world examples to explain mathematics concepts.

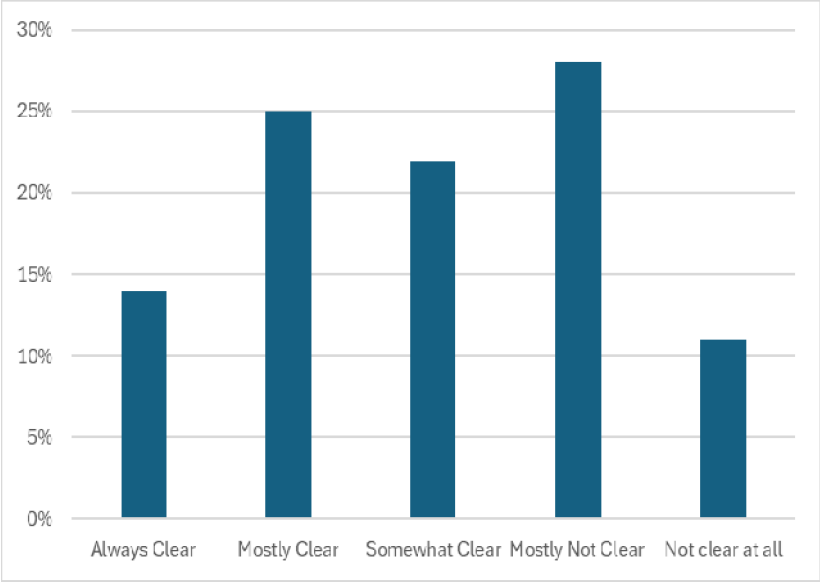

Figure 18.1: Clarity of Teachers' Explanation of the Mathematics Concept (Pre-test)

Figure 18.1 depicts a bar graph showing how clear and easy to understand the respondents find the teachers' explanations of the mathematics concepts. Of the respondents, 14% indicated they are always transparent, 25% indicated they are mostly Clear, 28% indicated they are Somewhat Clear, and 22% indicated they are Not Clear. The other 11% indicated that the teacher's explanation of math concepts is unclear.

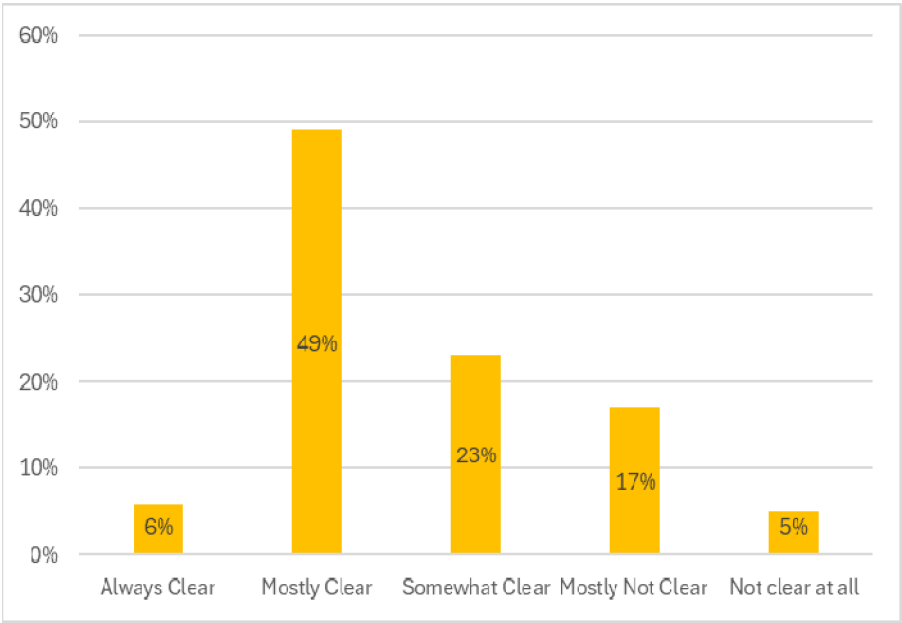

Figure 18.2: Clarity of Teachers' Explanation of the Mathematics Concept (Post-test)

Figure 18.2 depicts a bar graph of how clear and easy to understand the respondents find the teachers' explanations of the mathematics concepts. Of the respondents, 6% indicated they are always transparent, 49% indicated Clear, 23% indicated Somewhat Clear, and 17% indicated Mostly Not Clear. The other 5% indicated that the teacher's explanation of math concepts is unclear.

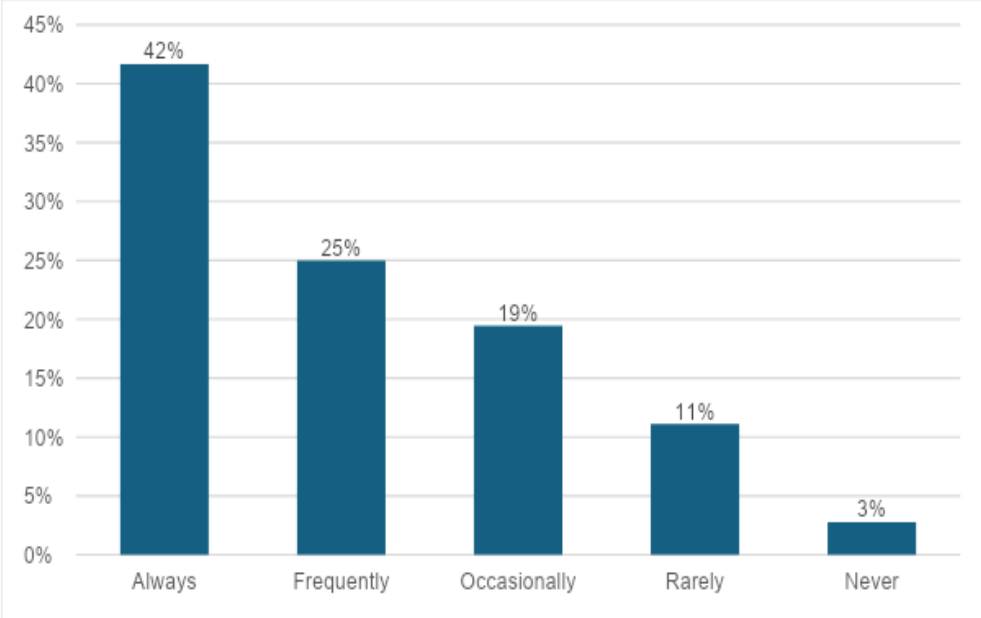

Figure 19.1: Teacher Encouragement of Class Participation (Pre-Test)

Figure 19.1 depicts a bar graph of the respondents' perceptions of the teachers' encouraging class discussion and participation in mathematics class sessions. Of these respondents, 42% indicated that the teacher always encourages class participation, 25% indicated frequently, 19% indicated occasionally, and 11% indicated rarely. The other 3% indicated that the teacher never encourages class participation and discussion.

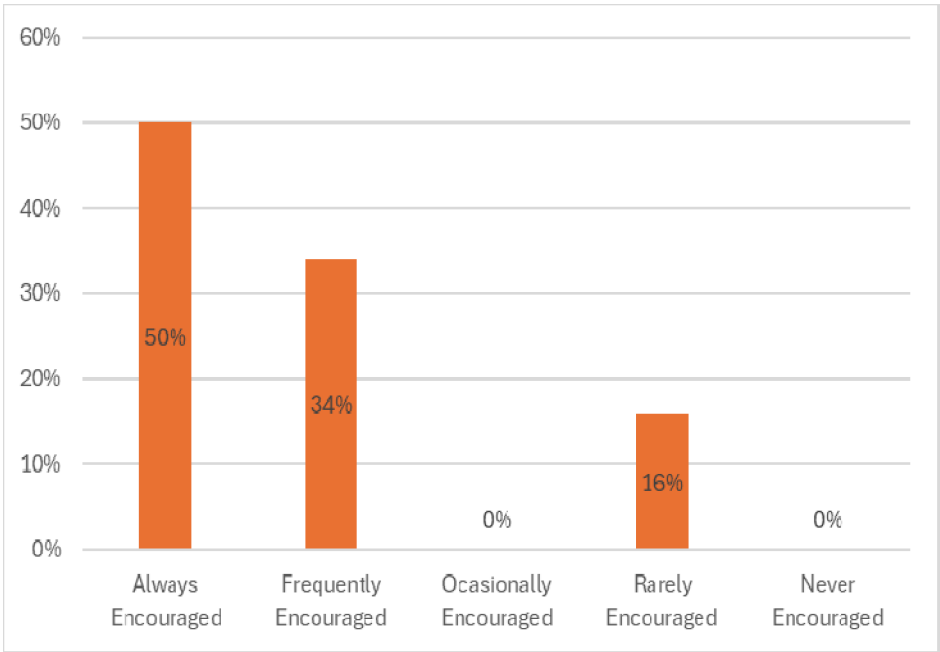

Figure 19.2: Teacher Encouragement of Class Participation (Post-Test).

Figure 19.2 depicts a bar graph of the respondents' perceptions of the teachers' encouraging class discussion and participation in mathematics class sessions. Of these respondents, 50% indicated that the teacher always encourages class participation, 34% indicated frequently, and 16% indicated that the teacher never encourages class participation and discussion.

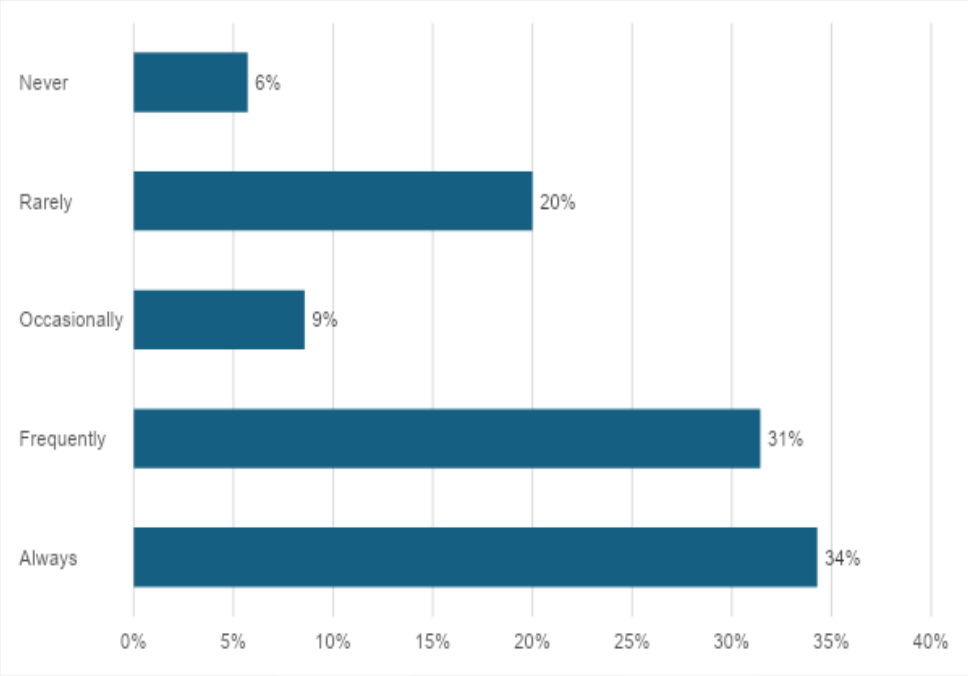

Figure 20.1: Teachers' Use of Group Project and Class Activities (Pre-Test)

Figure 20.1 depicts a bar graph of the respondents' view of the teachers' giving opportunities for group work and activities in mathematics class. Of the respondents, 34% indicated that the teacher always provides opportunities for group work and class activities in mathematics class, 31% indicated frequently, 9% indicated occasionally, and 20% indicated rarely. In comparison, the other 6% indicated they never get to participate in group projects or class activities.

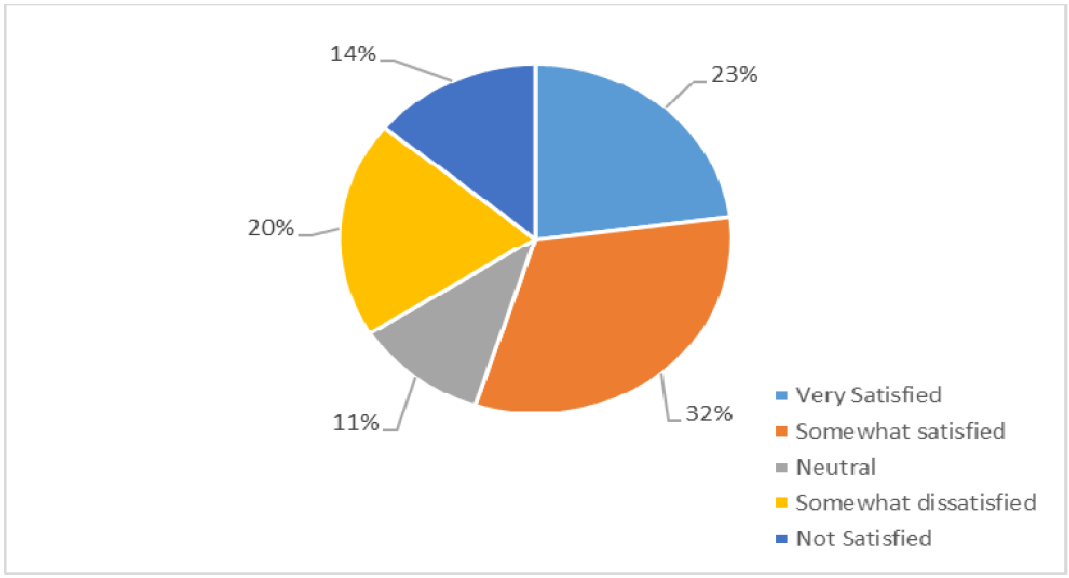

Figure 21.1: Respondent Satisfaction With the Teaching Methods (Pre-Test)

Figure 21.1 depicts a pie graph of the respondents' satisfaction with the teachers' methods for teaching mathematics lessons. Of the respondents, 23% indicated they were delighted with the teachers' teaching strategies, 32% indicated they were somewhat satisfied, 11% were neutrally satisfied, and 20% were somewhat dissatisfied. The other 14% indicated that they were not satisfied.

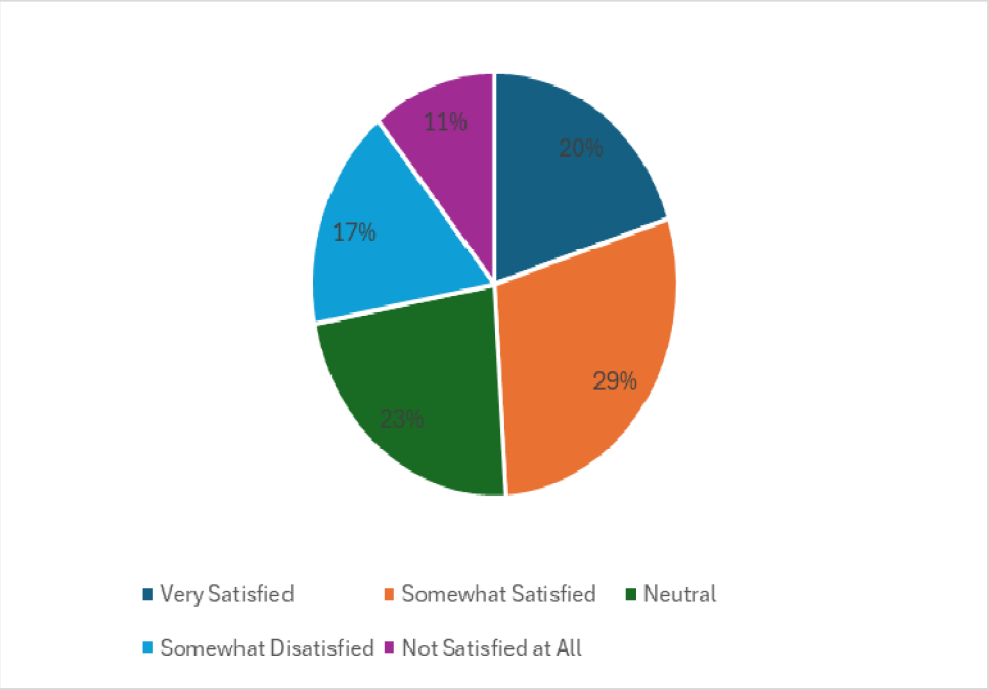

Figure 21.2: Respondent Satisfaction With the Teaching Methods (Post-Test)

Figure 21.2 depicts a pie graph of the respondents' satisfaction with the teachers' methods for teaching mathematics lessons. Of the respondents, 20% indicated they were delighted with the teachers' teaching strategies, 29% indicated they were somewhat satisfied, 23% were neutrally satisfied, and 17% were somewhat dissatisfied. The other 11% indicated that they were not satisfied.

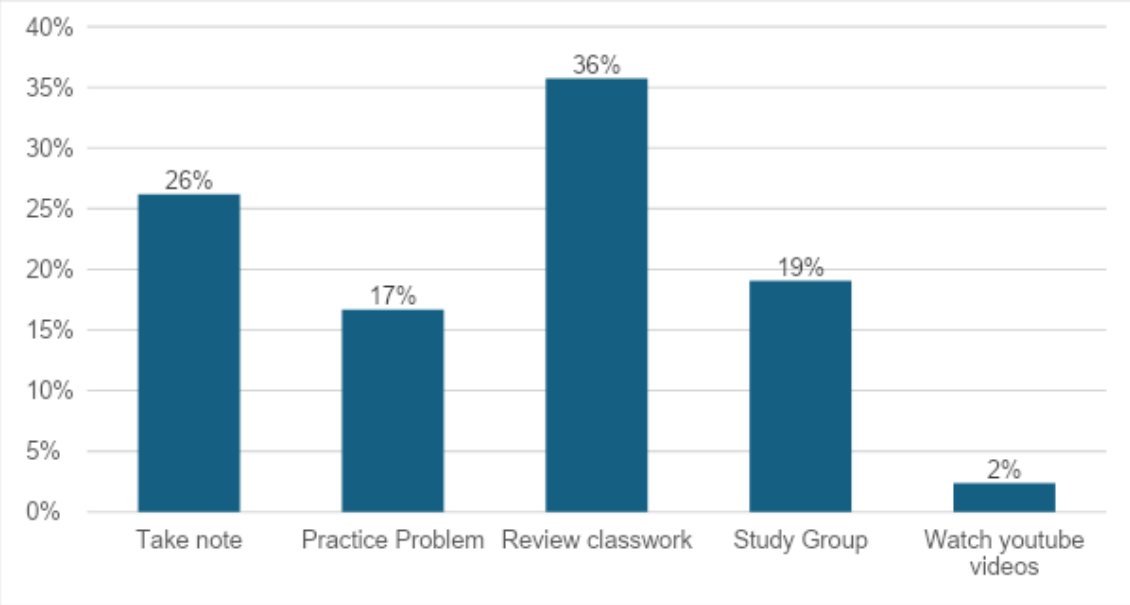

Figure 22.1: Study Strategies Outside of Class (Pre-Test)

Figure 22.1 depicts a bar graph of the respondents' study strategies for mathematics outside of class. 26% take notes, 17% complete practice problems, 36% review classwork, 19% study in groups, and 2% watch YouTube videos.

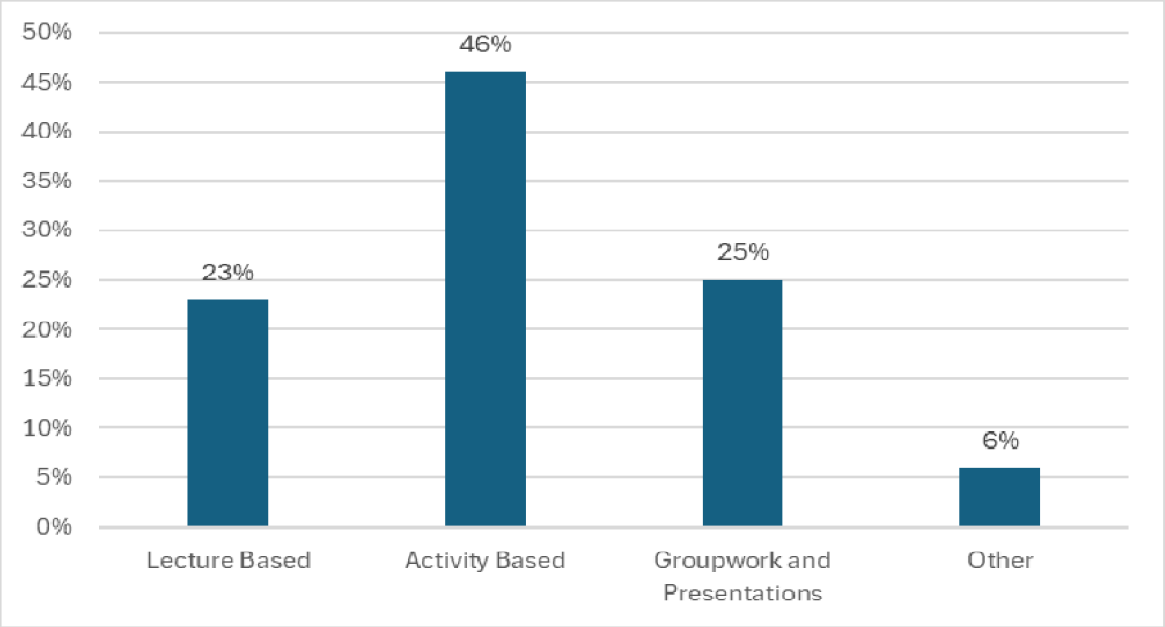

Figure 23.1: Teaching Style of Mathematics Teacher (Pre-Test)

Figure 23.1 depicts a bar graph of the respondent's view of the teacher's teaching style in mathematics. Of the respondents, 23% indicated that the teaching style of the mathematics teacher is lecture-based, and 46% indicated that it is activity-based. The other 6% indicated other, stating that the teachers' teaching style is confusing and same-day topic, same-day test.

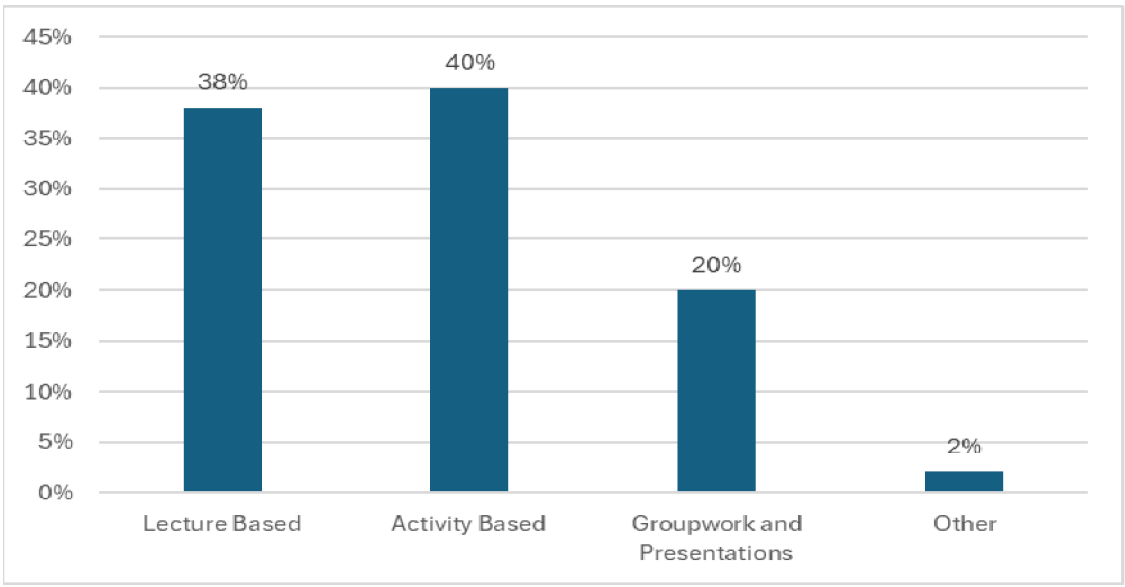

Figure 23.2: Teaching Style of Mathematics Teacher (Pre-Test)

Figure 23.2 depicts a bar graph of the respondent's view of the teacher's teaching style in mathematics. Of the respondents, 38% indicated that the teaching style of the mathematics teacher is lecture-based, 40% indicated activity-based, and 20% indicated that it is activity-based. The other 2% indicated other, stating that the teachers' teaching style is confusing.

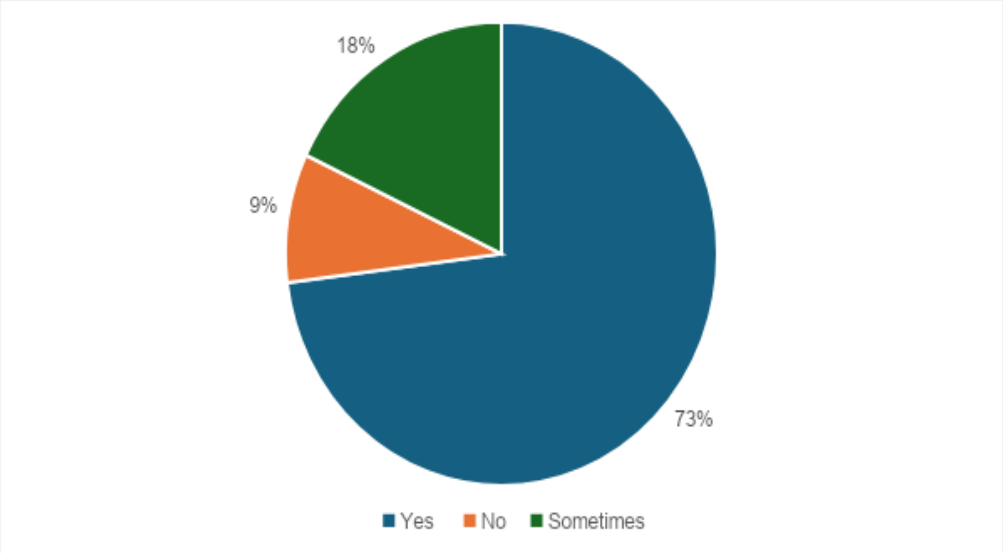

Figure 24.1: Clarity of Teachers' Instruction (Pre-Test)

Figure 24.1 represents a pie chart showing the students' perceptions of the clarity of instructions given by the teacher. From the data collected, 73% stated that clear instructions are given, 9% stated that they are not, and 18% stated that clear instructions are sometimes given.

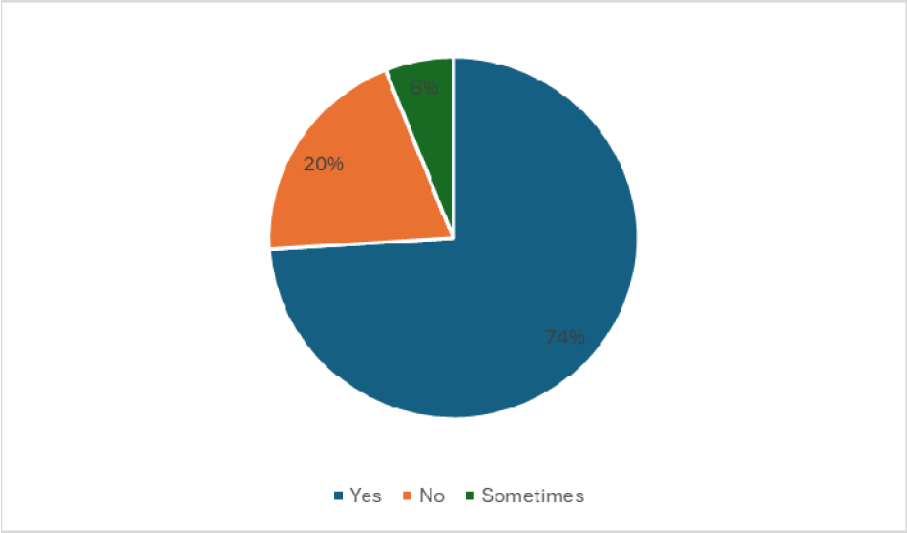

Figure 24.2: Clarity of Teachers' Instruction (Post-Test)

Figure 24.2 represents a pie chart showing the students' perceptions of the clarity of instructions given by the teacher. From the data collected, 74% stated that clear instructions are given, 20% stated that they are not, and 6% stated that clear instructions are sometimes given.

Pre-Intervention Interview

Instructional Strategies

In the interview, Ms. Johnson (pseudo name) revealed that the instructional strategies used to teach Mathematics include lectures, peer discussions, and practice problems. However, the assessment methods include Homework, Classwork, and tests, and occasionally, students may be given group projects.

Improving Performance

The methods used by Ms Johnson (pseudo name) to improve students' performance include creating differentiated lesson plans that cater to different learner needs. However, there are times when the teacher needs to get a chance to provide differentiated instructions, as the class times are not enough to provide personalised attention to all the students. Secondly, Ms. Johnson (pseudo name) reported that she has an open-door policy that encourages students to bring concerns and challenges to them whenever they do not understand a concept.

Pre -Intervention Focus Group

Teaching Style of Teacher

From the pre-intervention focus group discussion, it was discovered that some participants perceived the teacher's teaching style as dull and rough, as two participants perceived that sometimes, when the teacher comes to class, he appears very aggressive, especially if participants misbehave. Other participants perceived that the teacher's teaching style depends on the class's conduct. John Doe (pseudo name) added that the teacher's demeanouris impacted by class behaviour (calm/jovial in orderly class, rough/arrogant in disorderly class). That is, if the class is orderly, the teacher is relaxed and pleasant, while if the class is operating disorderly, the teacher is rough and arrogant because we are not paying attention. Notwithstanding, the participants added that their teacher gives notes and works on practice problems in class.

Teacher Involvement in Student Interest

The initial focus group discussion further discovered that participants feel neglected if they sit at the back of the class, leading to disinterest in the subject. Jimmy Sang (pseudo name) added, " I sit at the back of the class, and my teacher does not focus much on those of us at the back". When Jimmy mentioned this point, Milly Joe(pseudo name) responded, "It is because the boys at the back of the class continuously talk out the class and sleep; they simply do not pay attention when the teacher is explaining the concepts. Even when the teacher asks those participants to come to the board, they cannot because they do not pay attention". Most of the participants believed that the teacher did not have any involvement in their interest or lack of interest in the subject. Milly Joe (pseudo name) added that " the teacher has no role in my interest because I have been terrible at math since Primary School.

Post.

Post-Intervention Focus Group Discussion

Engaging Teaching Strategies:

The post-intervention interview with the teacher further revealed that implementing strategies based on the intervention plan, including using real-world examples to make lessons relevant, allows students to research mathematics concepts and share their findings in class. The teacher also stated that one of the significant focus areas was minimising distractions to maintain focus during class discussions and creating differentiated lesson plans catering to diverse learner needs.

Research Question 3

To what extent can the Additional strategies improve the Mathematics performance of eighth graders?

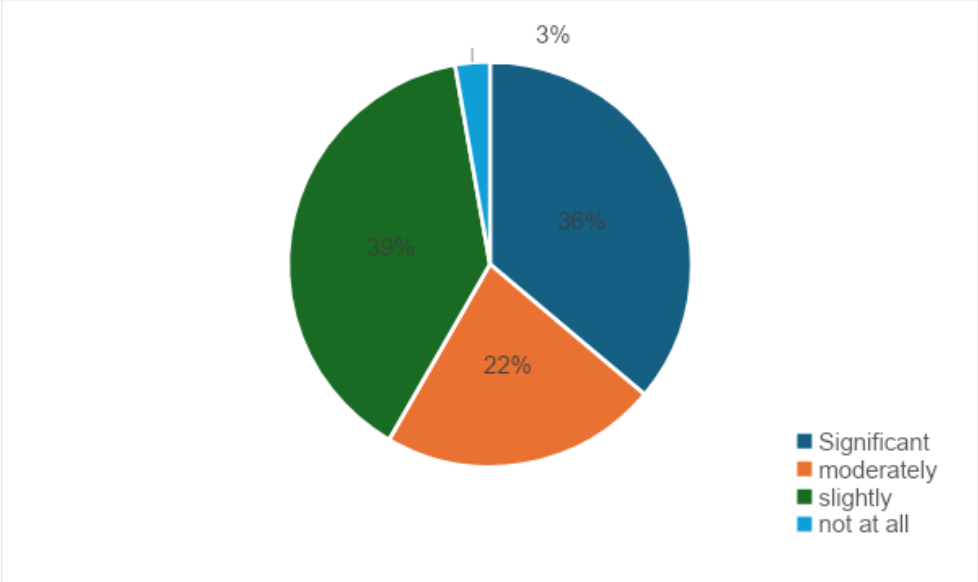

Figure 25.1: Extent to which additional strategies Moreover, resources may improve Mathematics performance (Pre-Test)

Figure 25.1 depicts a pie graph of the respondents' views on how additional resources and strategies can improve mathematics performance. Of the respondents,36% indicated that it significantly improves mathematics performance, 22 moderately, 39% slightly, and 3% said it does not.

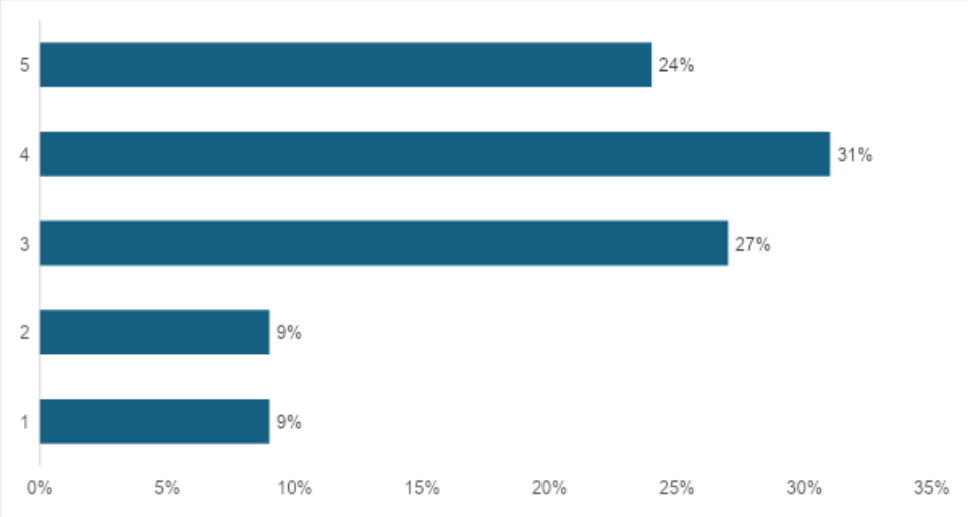

Figure 26.1: Involvement of Teacher in Students Loving Mathematics (Pre-Test)

Figure 26.1 is a bar graph depicting teachers' involvement in students' love of Mathematics on a scale of 1- 5, with five being very involved and 1 not involved. From the data collected, 9% of the respondents selected point 1, another 9% selected point 2, 27% selected point 3, 31% selected point 4, and the other 24% selected point 5.

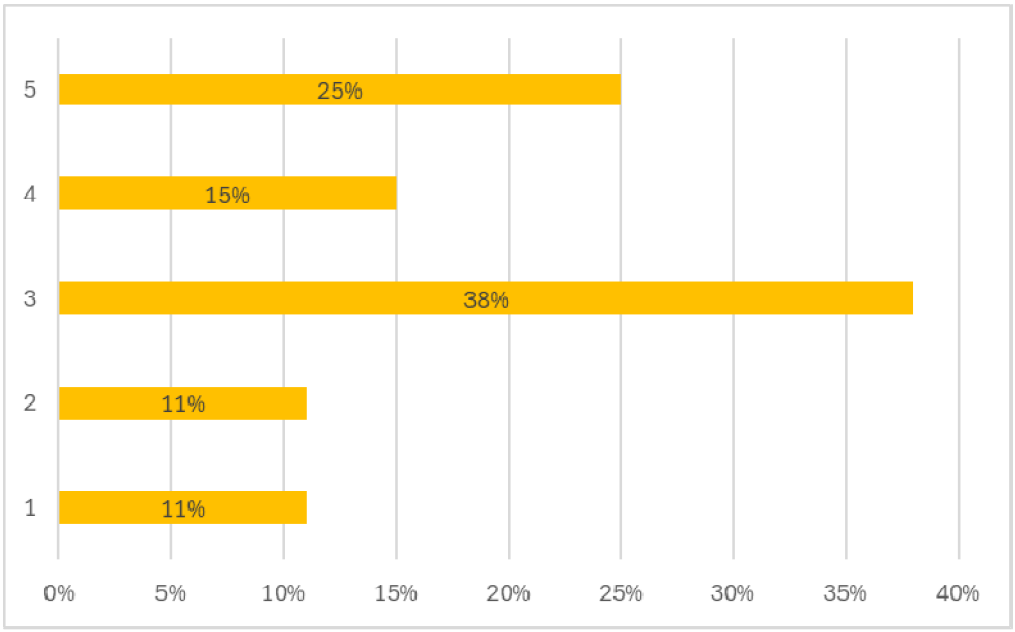

Figure 26.2: Involvement of Teacher in StudentsLoving Mathematics (Post-Test)

Figure 26.2 is a bar graph depicting teachers' involvement in students' love of Mathematics on a scale of 1- 5, with five being very involved and 1 not involved. From the data collected, 11% of the respondents selected point 1, another 11% selected point 2, 38% selected point 3, 15% selected point 4, and the other 25% selected point 5.

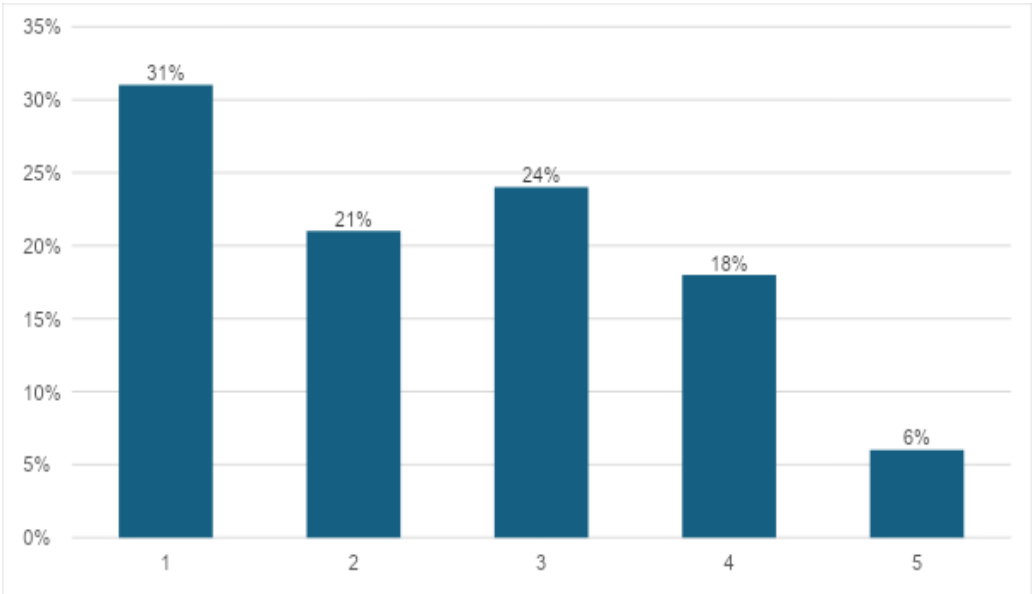

Figure 27.1: Involvement of teacher in students hating Mathematics (Pre-Test).

Figure 27.1 is a bar graph depicting teachers' involvement in students' hating Mathematics on a scale of 1- 5, with five being very involved and 1 not involved. From the data collected, 31% of the respondents selected point 1, 21% selected point 2, 24% selected point 3, 18% selected point 4,and the other 6% of the respondents selected point 5.

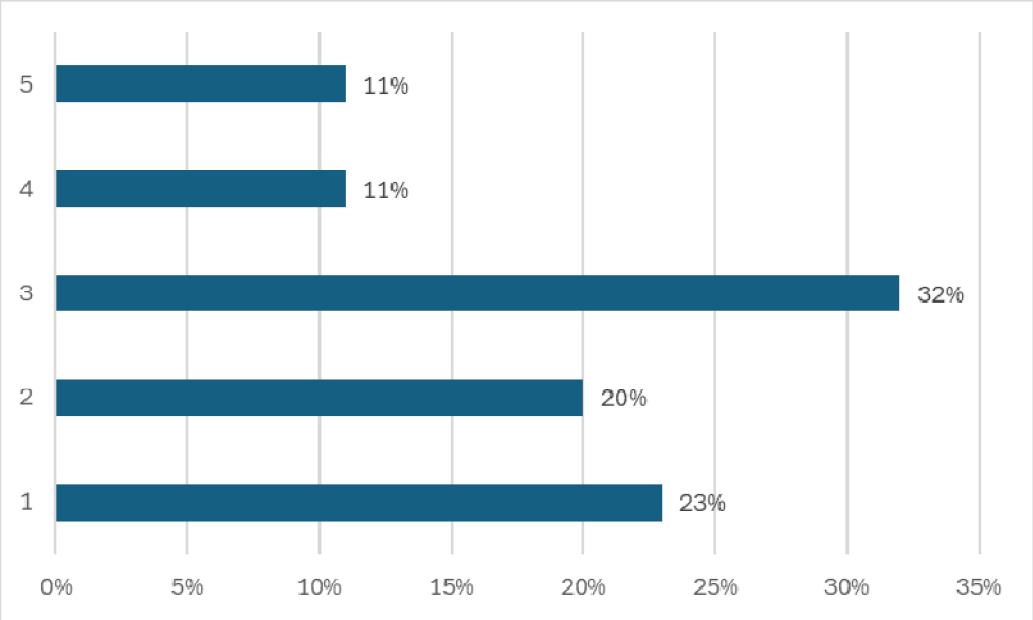

Figure 27.2: Involvement of teacher in students hating Mathematics (Post-Test)

Figure 27.1 is a bar graph depicting teachers' involvement in students' hating Mathematics on a scale of 1- 5, with five being very involved and 1 not involved. From the data collected, 23% of the respondents selected point 1, 20% selected point 2, 32% selected point 3, 11% selected point 4, while the other 11% of the respondents also selected point 5.

Pre-Intervention Focus Group Discussion

Additional Resources and Strategies

From the focus group discussion, students believed that additional resources and strategies could improve their performance in mathematics significantly as these will help them be more focused in class and study more. Some of the additional strategies and resources recommended by participants that could be used to improve their performance in mathematics are firstly on the side of the participants. Participants believed they needed to do more by focusing more in class and making it habitual to study in their free time. All participants thought the level of notes given in class was sufficient for them to perform well on the assignments. However, a participant, Milly Joe (pseudo name), stated that " the teachers' teaching methods need to be adjusted because sometimes, classes get boring, and as participants' our brains easily retain information when it is received in a fun way such as through songs, poems or jingles". After this, several participants agreed they would like more fun lessons. Jimmy Sang (pseudo name) recommended that the teacher should sometimes bring the class outside under a tree to learn.

Post-Intervention Focus Group Discussion

Engaging Teaching Style

Participants stated that their teacher's strategies are lectures, which clearly explain the concepts. Mary Jane (Pseudo Name) said, "The teacher also uses a lot of practical and real-world examples to help us better understand concepts that we might have a challenge with". The discussion also

revealed that the teacher allows students to use their smart devices to research particular concepts in mathematics and share them with the rest of the class. The teacher also introduces the concepts using songs, poems, projects, jingles, and Mathematics Games.

The teacher's approach is now praised for being clear, concise, and fun. Participants appreciate using songs, poems, projects, games, and real-world examples to make learning enjoyable. Mary Jane (Psuedo Name) stated that the teacher "explains the concepts fully clearly and concisely". Jimmy Doe (Psuedo Name), one of the participants, commented that "the teacher is no longer stopping the class discussions to talk to anyone that is disrupting the class. Instead, he just sends them to stand at the back of the class until he is finished". The teacher's strategy of addressing disruptive behaviour by redirecting students without interrupting the lesson flow is positive.

Teacher's Role in Math Interest

Most participants believed the teacher was highly involved in their loving or hating mathematics. Mary Jane (Pseudo Name) stated, "I am now interested in the subject based on the teacher's strategies to deliver the lessons". After this was said, another participant stated, "I was interested before, then you went on a topic that I did not understand, and it caused me to lose interest, but now I am interested again".

Intervention Strategies Used by Teacher

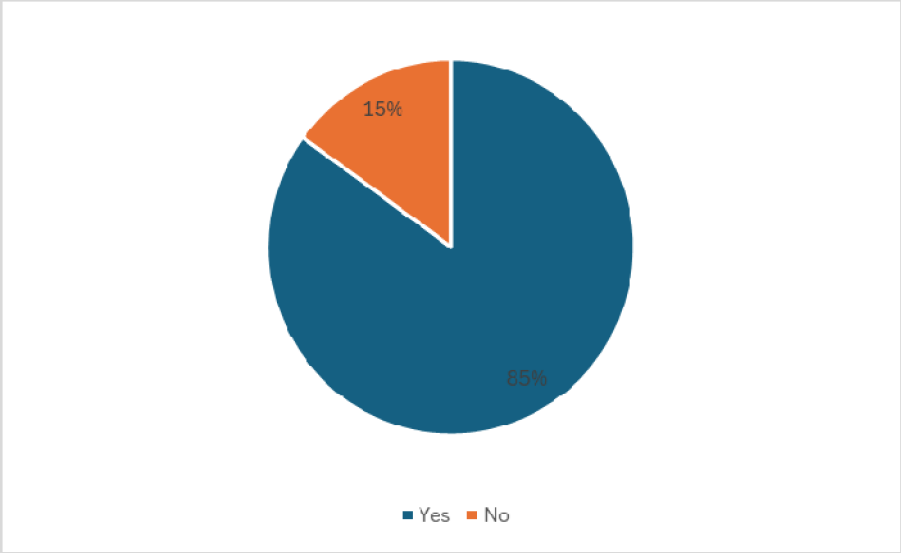

Figure 28.1: Students Perception of the Teacher Developing New Teaching Strategies

Figure 28:1 is a pie chart depicting students' perceptions of the teacher's development of new teaching strategies. Of the respondents, 85% indicated that the teacher developed new teaching strategies, while the other 15% believed that the teacher did not develop any new teaching strategies.

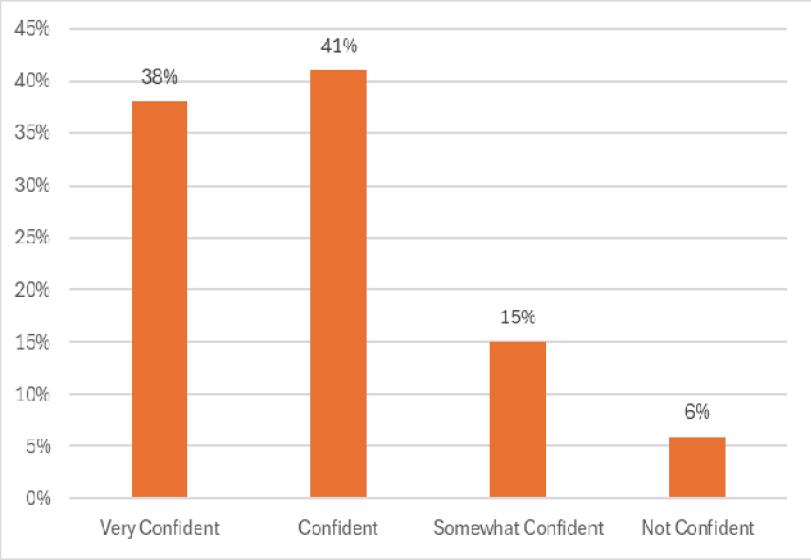

Figure 29.1: Students' Confidence to Excel in Upcoming End Examinations

Figure 29.1 is a bar graph representing respondents' confidencein their ability to excel in their upcoming examinations. Of the respondents, 38% indicated that they are confident that they will excel in their upcoming examinations, 41% are confident, 15% are somewhat confident, and the other 6% are not confident.

Table 5: Adjustments to teachers' teaching strategy

The teacher Adjusted the teaching strategy by:
Giving more examples
Making the classes more fun and more understandable
Creating a fun classroom environment
Calling on students to answer a question to ensure understanding
Sending additional videos explaining taught concepts.
Teaching slowly and giving examples

Table 5 presents students' responses when asked how the teacher has adjusted his/her teaching strategy. The typical responses received were that the teacher created a fun classroom environment for learning, spent more time teaching concepts, and gave more examples.

Analysis of Grades

Table Six (6) presents the detailed scores of the participants in this study. The scores are for the pre-intervention and the post-intervention assessment, with the final scores for the post-intervention evaluation. The average score of the students before the intervention was 46.12%±19.96%, which increased to 70.27%±17.56% and 81.05%±9.82%. The results of the 38 participants in this study revealed that 35 improved performance after the intervention, with a 75.74%±9.82% increase in overall performance. One participant's score improved by 611.21% after the intervention strategies employed in the research (from 11.6% to 82.5%). The findings of the sampled participants revealed that 34.21% saw an improvement in performance over 100%, with 21.05% seeing an improvement of over 200%.

Table 6: Pre-and-Post Test Assessment of Participants in Study, n=38

	Post-Intervention Assessment			% Change
Pre-Test Scores	Post-Test Scores	Presentation	Final	
38.6	70	80	75	94.30
63.5	60	80	70	10.24
26.2	70	100	85	224.43
38.4	40	100	70	82.29
28.2	100	95	97.5	245.74
53.3	40	100	70	31.33
11.6	70	95	82.5	611.21
55.8	100	80	90	61.29
44.5	70	95	82.5	85.39
51.4	70	95	82.5	60.51
24.5	100	-	100	308.16
83	90	95	92.5	11.45
60.5	60	100	80	32.23
55	80	95	87.5	59.09
74.8	60	-	60	-19.79
72.7	90	100	95	30.67
81.2	60	100	80	-1.48
36.1	70	100	85	135.46
56.2	60	80	70	24.56
51.8	80	90	85	64.09
32.2	70	90	80	148.45
46.6	100	90	95	103.86
77.2	70	100	85	10.10
65.3	30	100	65	-0.46
48.8	80	90	85	74.18
44.4	80	90	85	91.44
57.4	80	90	85	48.08
21	60	90	75	257.14
18.8	60	90	75	298.94
21.1	60	100	80	279.15
28.5	-	90	90	215.79
30.7	60	80	70	128.01
47.2	40	80	60	27.12
50.9	90	90	90	76.82
40.6	50	90	70	72.41
28.3	80	90	85	200.35
66.2	70	90	80	20.85
66.2	80	90	85	28.40
46.12 **19.96**	**70.27** **17.56**	**91.94** **6.79**	**81.05** **9.82**	**75.74** **9.82**

Table 7 presents the paired samples test of 1) the pre-and-posttest assessment, 2) the pre-and-final test assessment of the sampled participants, and 3) the pre-and-project assessment of the sampled participants. The paired samples test revealed a statistical difference between the pre-test and post-test assessments of the sampled participants ($t = -5.39$, p-value < 0.001), and this

was observed for the pre-test and the final assessment scores (t = -9.549, *p*-value < 0.001). As well as the pre-test and project assessments (t = -17.285, *p*-value < 0.001). The differences in the mean score were 22.427%, 33.718% and 44.73% for pre-and-post-test assessment, pre-and-final assessment, and pre-and-project assessment of the sampled participants, respectively. The mean difference between the pre-and-post post-test assessments (22.427%) represents a 52.36% rise in performance after the intervention, and the mean difference of 33.718% between the pre-test and the final assessment denotes a 75.73% increase in performance among the sampled students. The mean difference of 44.730 between the pre-test and the project assessment is a 99.35% increase in performance using a project to assess the participants' performance in mathematics.

Table 7: Paired Samples Test of Pre-and-Post Test Assessment and Pre-and-Final Assessment

		Paired Differences					t	df	Significance	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				One-Sided p	Two-Sided p
					Lower	Upper				
Pair 1	PRE - POST	-22.427	25.696	4.224	-30.994	-13.860	-5.309	36	<0.001	<0.001
Pair 2	PRE - FINAL	-33.718	21.768	3.531	-40.873	-26.563	-9.549	37	<0.001	<0.001
Pair 3	PRE-PROJECT	-44.730	18.793	3.133	-51.093	-38.381	-17.285	35	<0.001	<0.001

Discussion, Conclusion, and Recommendations

Research Question 1: What is the current performance of eighth graders in Mathematics?

Many factors influence mathematics performance. The literature review has identified many factors affecting academic performance, and the current study concurs with the literature. The literature indicated that students' performance in mathematics is influenced by factors such as instructional supervision, psychosocial and socioeconomic variables, and personal characteristics such as cognitive abilities, learning styles, motivation, and self-efficacy (Isaac, 2013). The factors discussed in this chapter are based on the literature and the current findings.

The current study, using mixed-method research, found that students' academic performance is influenced by socioeconomic background. This study found that having a quiet place at home to study influences students' overall grades and performance, in keeping with findings from the literature. A study found that socioeconomic factors influence school achievement significantly, persuasively, and persistently (Letsoalo, 2018). The reality is that a conducive milieu is essential in providing an atmosphere to work, and other social amenities can enhance the students' learning experience. This reality is why the literature and the current findings highlight the importance of the home environment to the learning process, which can expand to the classroom (Letsoalo, 2018). Students from low socioeconomic families have lower education participation and lower retention rates, or they leave school systems earlier than student families of a higher

socioeconomic status, which supports the importance of socioeconomic background on the learning process of students.

Students who perceived difficulty in mathematics using a scale of 1-10, with 0 being not difficult at all, five being moderately tricky, and 10 being extremely difficult, rate the difficulty experienced in mathematics to obtain students' data. The current study found that students indicated the subject to be moderately complex in both the post and pre-test, with a higher scale percentage after the post-test, indicating improvement. In the previous test, the results showed that 3% of the student population had difficulty. However, there was a change in the post-test in that they no longer found the subject area difficult, which shows an improvement in students' performance. The literature penned this phenomenon by stating that chief among these strategies is implementing an innovative teaching model (Talanquer et al., 2003) in which the teacher employed this practice, resulting in how students perceived the subject.

The researchers found that anxiety experienced doing Mathematics tests or class work was a contributing factor to performance in the subject area tested (West, 2022); however, the results showed in the pre-test that students were experiencing anxiety at a percentage of 73% in the pre-test and not experiencing less anxiety at 53% after the post-test intervention. Supporting findings with a focus group, students feel comfortable attending class and participating due to the teacher's clear explanations and engaging teaching style, which assists with reducing student anxiety in the subject area. The literature review showed that instructional factors affect students' learning (Schunk&DiBenedetto, 2021). How information is presented has much to do with how well these students understand the materials. Instructional factors contribute significantly to how students perceive the subject and their level of motivation toward the subject (Sztajn, 2003). The current study concurs with instructional factors positively influencing students' performance.

The current study found that students who spent more time on mathematics homework outside of class hours were significantly low on both tests and even lower after the post-test. It can be deduced from the current findings that when students spend more time outside class on subject areas, they will have improved grades from hours put into practice using assignments, which is in keeping with the literature (Schunk&DiBenedetto, 2021). Studies have shown that personal factors such as cognitive abilities, learning styles, motivation, and self-efficacy are essential (Schunk&DiBenedetto, 2021) and can improve performance. Therefore, Issac's perspective offers insights into the current relationship between students engaging in homework and improving their mathematics performance.

Motivation is an internal process that drives a need, but it is a condition inside us that desires a change, either in the self or the environment (Candidate, 2024). The current research found that very motivated students perform better than those who are not. This was proven both by the pre- and post-tests done by the students. The study also discovered that the teacher also had a role to play in this part during the post-test interview with the teacher. We found that previously disengaged students had begun completing classwork and proactively sought information about upcoming topics after the teacher had chatted about the strategies they used to teach. The literature review said that "how information is presented has much to do with how well these students understand the materials. Instructional factors contribute significantly to how students

perceive the subject and their level of motivation toward the subject (Sztajn, 2003). Therefore, if students are motivated, they will perform better, and delivery methods play a crucial role in students being motivated to perform.

This study found that relevance plays a critical role in the current performance of eighth graders in Mathematics. The sampled participants believe that if the material or subject is relevant to their everyday lives, they invest more time into wanting to learn the subject as they deem it beneficial to their everyday lives. This was observed to be true both in the pre-and post-test conducted, with a significantly low percentage indicating that relevance is reality relevant. This forms part of the student's socioeconomic background, as Isaac (2013) highlighted.

Based on studies from data obtained, it was observed that students with access to mathematics resources perform better than those without access, as illustrated in Figures 14.1 and 14.2. The literature review noted that learning through media may be used to build understanding and mastery of learning objects, such as utilising Information Communication Technology resources such as Google Classroom platforms and YouTube videos (Etcuban et al., 2019). Mathematics teachers can use YouTube videos to provide various explanations and perspectives to students. Similarly, the Google Classroom platform may be utilised by educators to record and upload videos and other instructions that were given in class (Nuryatin et al., 2023).

Research Question 2: What factors prevent grade eighth (8) students in a TVET high school in western Jamaica from achieving the minimum average of sixty per cent (60%) in mathematics?

Based on the literature that has been reviewed, Isaac (2013) opined that the factors that affect students' performance in mathematics might be individual, instructional supervision, or psychosocial and socioeconomic variables. Similarly, this research discovered that in addition to those factors, students' mathematics performance is also affected by disruptions in the classroom, as the data suggested when students are in class. Some disruptions cause the teacher to pause the discussion of concepts; students tend to forget and lose interest in the class as their attention spans are very short.

Another main factor initially discovered from this research, which agrees with self-efficacy as postulated by (Schunk, 2012), is students' confidence and interest in the subject. The pre-intervention data suggests that, on average, 71% of students at this level are interested in mathematics, and 54% perceive mathematics as a complex subject. That said, if students are interested in a particular topic, they will try their best to perform competently, and if they are confident in their abilities, they will.

Some additional factors were said to affect students' performance, such as access to quiet places to study math at home and the time students spend working on math problems outside of class. From the data collected, it was highlighted that 63% of the respondents only had a quiet place to study mathematics sometimes, which presents a real challenge when it comes to students grasping the concepts of a subject that is perceived by 54% of students at this level based on this research. In addition, the data collected depicts that, on average, 72% of students at this level spend up to 30 minutes on mathematics homework outside of class. Therefore, this data shows that students must spend more time practising mathematics outside class hours.

Mathematics anxiety is another factor affecting students' mathematics performance (Ashcraft & Krause, 2007; Lyons &Beilock, 2012; Luttenberger et al., 2018; Richardson &Suinn, 1972). According to Lyons &Beilock (2012), "Math can be difficult. For some, even the mere prospect of doing math is harrowing. Those with high levels of mathematics anxiety (HMAs) report feelings of tension, apprehension, and fear of math" (p. 1), which explains the low degree of performance of many students in Jamaica relating to the discipline of mathematics. The literature has objective provided evidence that mathematics anxiety is a factor that affects students' performance in mathematics; the current study highlighted that 73% of the respondents indicated that they experience some math anxiety when. The rate of mathematics anxiety may seem extremely high in Jamaica, but the rate is lower than that in the United States. Luttenberger*et al*. (2018) noted, "Math anxiety is a widespread, worldwide problem affecting all age groups. Approximately 93% of adult US-Americans indicate that they experience some level of math anxiety" (p. 311). The high rate of mathematics anxiety among the current sampled participants undoubtedly explains the students' underperformance before the current intervention.

Mathematics anxiety was further identified based on the data collected as one of the factors influencing an understanding of concepts in mathematics, which accounts for the fear and failure of the students to grasp some of the problematic concepts in algebra, geometry, trigonometry, and statistics. From the data collected, it is therefore safe to say that factors contributing to mathematics anxiety may be individual, instructional or psychosocial, as Isaac (2013) and Schunk (2012, 2019) opined. However, the challenges associated with these factors can be addressed with the right medicine (games, projects, etc.) to allow students to perform competently in mathematics.

Research Question 3: What instructional strategies do the teachers use to teach mathematics to eighth graders?

In the pre-intervention, most respondents stated that the teacher uses real-world examples to explain mathematics concepts. Of the respondents, 74% indicated that the teacher does this always or frequently. An additional 15% reported occasional use of real-world examples. The remaining 26% of respondents indicated that the teacher rarely or never uses real-world examples to explain mathematical concepts. Specifically, 18% said the teacher rarely uses them, and 9% reported never using real-world examples.

The findings indicate that the teacher's focus on connecting mathematical concepts to real-world applications aligns with current educational best practices. This research suggests that this approach fosters a deeper understanding of and appreciation of math among students (Boylan, 2016). This connection is beneficial to increased relevance. When students see how math applies to their everyday lives and interests, they perceive it as more relevant and meaningful (National Council of Teachers of Mathematics, 2000). This combats the notion of math being an abstract set of rules and fosters engagement. This also helps to enhance understanding. Real-world applications provide a concrete context for abstract concepts. By working through problems situated in familiar scenarios, students can grasp underlying mathematical principles more effectively (Boaler, 2016). This matter also helps improve problem-solving skills. Real-world math problems often necessitate critical thinking and creative approaches. By grappling with

these applications, students develop valuable problem-solving skills that extend beyond the classroom (Mason et al., 2010), and finally, it helps boost confidence. Successfully applying math to solve real-world problems can significantly increase student confidence in their mathematical abilities. This newfound confidence can motivate them to tackle more challenging issues (OECD, 2019).

Research Question 4: What strategies are there to improve the performance of grade eight students in Mathematics?

Based on a literature review, several strategies may be used to improve the mathematics performance of grade 8 students. Among these strategies is implementing an innovative teaching model (Talanquer et al., 20). Creative teaching in mathematics has three advantages: (1) teaching by problem-solving, (2) teaching by experience, and (3) teaching by individual and teamwork. Implementing these strategies in the classroom will allow students to build knowledge and skills that are more significant than those that would have been built if the students had worked individually. Another strategy that may be used to improve students' mathematics performance is for the teacher to focus on students completely understanding the concepts being taught rather than just covering the objectives (Tien et al., 2004). As mentioned in the literature review, the teacher can use songs, poems or jingles as a fun way of delivering the lesson, which will help the students retain the information. Also, information communication technology resources such as Google Classroom platforms and YouTube videos should be incorporated and utilised for those who need reinforcement.

The current study found that students' perceptions of teachers using innovative teaching strategies account for improved mathematics performance. This study found that 85% indicated that the teacher had developed new skills. In comparison, 15% believed the teacher needed to create new teaching strategies. However, the findings showed that the teachers adjusted the teaching methods, as illustrated in Table 5. The lessons were delivered in a fun classroom environment, and the teacher spent more time explaining concepts and giving examples, which has caused a significant improvement in students' performance. The findings of the sampled participants revealed that 34.21% saw an improvement in performance over 100%, with 21.05% seeing an improvement of over 200%. The assessment of the study showed the exponential rise in student performance, which is associated with a fun milieu instead of the lecture method customarily employed by many mathematics teachers.

Research Question 5: To what extent can the additional strategies improve the Mathematics performance of eighth graders?

Transitioning to and succeeding in high school mathematics requires a firm eighth-grade foundation. At the top of the curriculum are powerful strategies that can assist students in boosting their performance and unlocking their full potential. While it may be difficult to quantify the exact improvement in their mathematics performance, the literature review suggests that implementing the strategies highlighted in this study can significantly benefit their performance (Brew *et al*., 2021; Snyder, 2019). Those strategies promote more profound understanding and engagement from passively receiving information through problem-solving,

real-world examples, group work, and introducing concepts using songs, poems, projects, and mathematics games. The current study employed additional strategies in teaching mathematics, including group work, projects, songs, rhymes, poems, and games. Those issues foster a stronger foundation in the core concepts and make learning mathematics more attractive, leading to better overall achievement by providing internal motivation in the subject area.

The current findings from the focus group discussion supported the literature review on utilising additional strategies to improve student's performance in mathematics. The participants indicated that the extra resources and strategies improved their mathematics performance, helping them to focus in class and study more. As the literature stated, understanding learning styles and strategies aids in improving academic performance, which provides insights into their action research success (Cardino*et al*., 2020; Stewart &Felicetti, 1992; Zakariya, 2022).). This was also evident in the student post-intervention survey responses and focus group discussion. Students were also more confident in their mathematics performance and expectations in the upcoming end-of-year examination, with 94% being very confident or somewhat confident.

The literature has identified multiple factors influencing student academic achievement, making it difficult to state the exact value of each determinant (Al-Tameemi*et al*., 2023; Baranek, 1996; Cao et al., 2024; Ozcan, 2021; York *et al*., 2019). Cao *et al*. (2024) utilised the structural equation model to quantitatively establish many factors influencing academic performance (i.e., stress, self-efficacy, and background factors). However, the current study provides valuable insight into which participants' scores were measured before and after implementing the additional strategies and resources. The overall performance increase of 75.74% ± 9.82% is promising and supports the potential effectiveness of these strategies in boasting mathematics performance among eighth graders in a TVET secondary school in Jamaica.

Conclusion

Incorporating additional strategies like active learning, metacognitive instruction, formative assessment, and technology integration can significantly improve the mathematics performance of eighth graders. While the extent of improvement depends on various factors, research supports their effectiveness. By creating a dynamic and engaging learning environment, educators can empower students to develop a deeper understanding of mathematical concepts and prepare them for success in high school and beyond.

Recommendations

Based on the data collected and analysed, the following are recommendations set out by the researchers. Firstly, use more creative strategies to deliver math concepts to students, such as songs, poems, and jingles. Secondly, differentiated lesson plans that cater to the different learner needs to teach students mathematics should be used. This will allow students to be active participants and prevent them from becoming bored or losing interest in class. Thirdly, do not allow disruptors to interrupt explanations. Fourthly, teachers should develop and maintain a strategy to address disruptive students in class without interrupting the explanation of concepts. Finally, teachers should attempt to profile the students in their class and how to deal with them.

This point is suggested from the data collected: students who experienced anxiety were scared of the teacher calling them to the board.

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