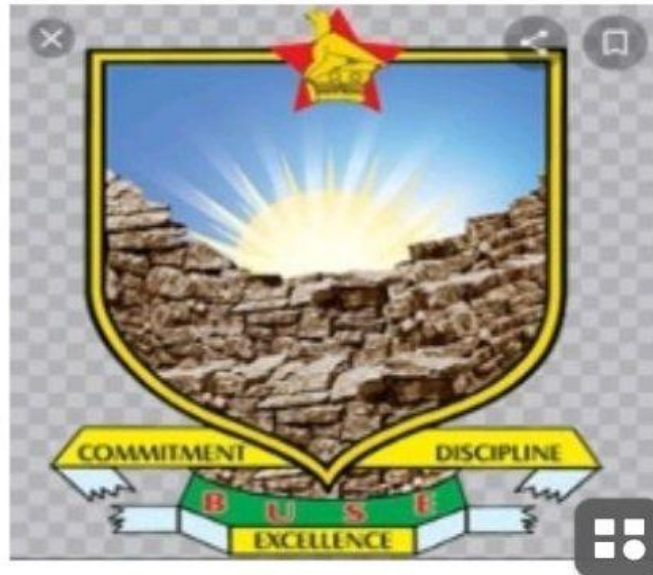


BINDURA UNIVERSITY OF SCIENCE EDUCATION



FACULTY OF SCIENCE EDUCATION

DEPARTMENT OF MATHEMATICS AND SCIENCE

**AN ANALYSIS OF ATTITUDES AND BELIEFS IN THE LEARNING OF
MATHEMATICS AT KENZIM COLLEGE IN HIGHGLEN DISTRICT**

BY

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DEDICATION FORM

This dissertation is dedicated to my loving mother and siblings without whose constant support and encouragement I would not be the person I am today.

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I wish to make a special acknowledge for the support and commitment of my supervisor Dr Mutambara whose guidance was invaluable during the course of this research. My dear friends also received my gratitude for their assistance. Last but most importantly, I would like to thank God, The Almighty, for keeping me healthy, strong and able in this endeavor of academic research.

Abstract

The aim of this study was to investigate the beliefs and attitudes that impact learning and performance in mathematics among students at Kenzim College in Highglen District. This research adopted a descriptive survey design, and the data collected was largely descriptive in nature. The data was collected using Mathematics Teachers Questionnaires (MTQ) for teachers and Mathematics Students Questionnaires (MSQ) for students. These questionnaires were administered to a sample of two teachers and twenty students, respectively, who were selected from Kenzim College in Highglen District. The data collected was coded and subjected to Statistical Package for Social Science (SPSS) analysis. The results indicated that the major problems associated with attitudes towards learning mathematics in secondary schools included a lack of confidence and interest in learning mathematics. Some respondents also mentioned a lack of interest in mathematics. However, with regards to attitudes towards mathematics as a learning area, some respondents strongly agreed that they enjoyed learning mathematics as a subject. Additionally, some students strongly disagreed that mathematics lessons were not interesting. Some students strongly agreed that they would like to continue doing mathematics after secondary school. Only a few respondents strongly disagreed that understanding mathematics was difficult, while sixty percent (60%) of the respondents strongly agreed that mathematics was a very beneficial subject in life. The following recommendations were made from the study: having a positive attitude towards learning and teaching mathematics is a necessary component in secondary school mathematics education. There is a need for teachers, parents, and other educational stakeholders to boost these positive attitudes and establish a successive connection between beliefs and attitudes in the teaching and learning, performance, and practical utility of mathematics. This connection should be established early enough in students and mathematics education curriculum. Mathematics teachers, particularly, should

know precisely how students learn mathematics, which would help them organize and plan for effective teaching and learning of any mathematical concept. The language used while students learn mathematics should be purposively pitched towards enhancing favorable attitudes towards mathematics education. Mathematics departmental counseling should be undertaken regularly to assist students with persistent negative attitudes towards learning and performance in mathematics. The unfavorable attitudes should be curtailed professionally and early enough before students completely drop mathematics. Mathematics teachers should wisely utilize available learning resources. Efforts should be made to ensure that gender does not deter learning and teaching or performance in mathematics among learners. Teachers, parents, and siblings of the students should inspire both female and male learners to equally embrace mathematics.

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CHAPTER 1: INTRODUCTION

1.1 INTRODUCTION

Chapter One introduces the reader to the focus of the study on beliefs and attitudes towards mathematics in everyday life. The chapter focuses on the background of the study, its purpose, specific research questions, significance, assumptions, and limitations. It further highlights the delimitations and defines key terms in the research project.

1.2 Background of the study

Several studies have investigated the beliefs and attitudes of students and teachers towards mathematics and its role in everyday life. A study of 570 African high school students found that many students perceive mathematics as only useful for counting, calculating, and measuring, rather than for reasoning, analyzing, and interpreting (Fishbein & Ajzen, 2022). This perception was more common among students in vocational schools compared to academic high schools. In relation to the aforementioned study, there were no significant correlations between these beliefs about the applicability of mathematics and students' actual academic performance in the subject. However, in a Zimbabwean context, failure rates in academic institutions are somehow below the national average (Chronicle, February 13, 2023), possibly due to a belief instilled in learners by their colleagues that the subject is difficult, hence a negative attitude towards it becomes a cause for concern. The study sought to investigate the beliefs and attitudes of Zimbabwean secondary school students towards the teaching and learning of mathematics. While this study focused on mathematics specifically, it suggests that understanding student attitudes is an important area of research in Zimbabwe. A study of thirty-four (34) Zimbabwean secondary school mathematics teachers found that they expressed neutral attitudes towards using

technology as a method of proof and disagreed that verbal proofs were valid for proving mathematical claims (Makuvire, Mufanechiya, & Dube, 2023). The study argued that the successful implementation of student-centered reform in mathematics teaching in Zimbabwe requires teachers and students to reflect on their attitudes towards methods of proving mathematical results.

1.3 Purpose of the study

The study investigating beliefs and attitudes towards mathematics in Zimbabwe aims to explore how students perceive the relevance of mathematics to their daily experiences and future aspirations (Niss, 1999). This research is particularly significant, given the ongoing discussions about the need for mathematics education to be more meaningful and applicable to real-world contexts, especially in a developing country such as Zimbabwe (Makuvire, Mufanechiya, & Dube, 2023). Research has shown that student perceptions of mathematics as a relevant and useful subject can significantly impact their motivation and engagement in learning mathematics (Fishbein & Ajzen, 2022). Furthermore, the application of mathematics to real-world problems can help students develop problem-solving skills, critical thinking, and creativity, which are essential for their future careers and personal lives (Kilpatrick, Swafford, & Findell, 2001). By exploring students' beliefs and attitudes towards mathematics in everyday life, this study aims to contribute to the ongoing efforts to improve mathematics education in Zimbabwe and promote a more positive and relevant learning experience for students.

1.4 Statement of the problem

The investigation into beliefs and attitudes towards mathematics in everyday life in Zimbabwe seeks to address several critical issues that affect both educational outcomes and the practical application of mathematics in daily activities. The main problem addressed by the study is the need to understand and address the beliefs and attitudes of Zimbabwean students towards mathematics in everyday life, in order to improve the relevance and effectiveness of mathematics education in the country. The research primarily focuses on the attitudes and beliefs of different groups—secondary school students, pre-service teachers, adult learners, and in-service teachers—towards mathematics education in Zimbabwe and how cultural factors influence mathematics learning. The study investigates the relevance of mathematics curricula to students' needs and how teaching approaches can be adapted to improve learning outcomes.

1.5 Research Objectives

One of the primary goals of the study is to assess urban high-density secondary school students' perceptions of Mathematics and its applications in their lives. The objectives of the study were to:

1. To examine the attitudes of secondary school pupils towards the teaching and learning of mathematics and how these attitudes influence their perception of mathematics.
2. To investigate the beliefs and attitudes of mathematics teachers in Zimbabwe and how these influence their teaching practices and students' perception of mathematics in everyday life.

3. Establish factors which influence formation of attitudes towards teaching and learning of mathematics among secondary school students.
4. To explore the potential cultural activities and games in enhancing mathematics understanding and engagement among urban learners.

1.6 Research Questions

1. What are the attitudes of secondary school pupils towards the teaching and learning of Mathematics in Zimbabwe?
2. What are the beliefs and attitudes of teachers towards mathematics in Zimbabwe?
3. What are the factors which influence attitudes towards teaching and learning in mathematics?
4. What are the challenges faced by Zimbabwean mathematics teachers in implementing the learner-centered curriculum in the classroom?

1.8 Significance of the study

The study on beliefs and attitudes towards mathematics is significant for several reasons. Firstly, it highlights the need for a mathematics curriculum that connects with students' real-life experiences and future career aspirations, addressing the disconnection between academic mathematics and practical applications in daily life and work (Niss, 1999). This is crucial, as research has shown that student' perceptions of mathematics as a relevant and useful subject can significantly impact their motivation and engagement in learning mathematics (Fishbein & Ajzen, 2022). Secondly, understanding students' attitudes can inform teaching methods and

curriculum design, potentially improving their performance in mathematics by making the subject more engaging and relevant (Kilpatrick, Swafford, & Findell, 2001). Thirdly, the findings can guide policymakers and educators in developing strategies that align educational outcomes with the needs of the workforce, enhancing students' mathematical literacy and employability (Makuvire, Mufanechiya, & Dube, 2023). Additionally, the research intends to influence educational policy by providing evidence that can guide reforms in mathematics education, emphasizing the importance of integrating students' interests and perceptions into curriculum design to enhance learning outcomes and student engagement (Venville, Wallace, Rennie, & Malone, 2004). Lastly, the study seeks to provide insights for curriculum developers and educators by highlighting the mismatch between what is taught in schools and what students find relevant, with the ultimate goal of informing the development of a mathematics curriculum that aligns more closely with students' real-life experiences and future job requirements.

1.9 Delimitations

The study will be limited to secondary schools within the Harare Metropolitan Province in Zimbabwe. The geographical scope will exclude rural areas and other provinces. Only private secondary schools will be included in the study, while public and special schools will be excluded.

The study was also delimited to teachers and learners at Kenzim College in Highglen District. This delimitation allowed for an in-depth examination of the use of mathematics in everyday life among the sampled teachers and learners, as well as the effects of beliefs and attitudes on academic achievement, motivation, and attitudes towards mathematics (Fishbein & Ajzen, 2022). The study also explored the influence of teacher attitudes and other factors affecting the teaching-learning process of mathematics at Kenzim College, such as the impact of teacher

beliefs on student motivation and engagement (Kilpatrick, Swafford, & Findell, 2001). Additionally, the experiences and perceptions of and secondary school teachers were considered to deepen the insights of the study, as research has shown that teacher attitudes and beliefs can significantly impact student learning outcomes (Makuvire, Mufanechiya, & Dube, 2023).

Methodological constraints limited the study's approach. Given the qualitative nature of the study, which employed a phenomenological approach to explore students' and teachers' beliefs and attitudes towards mathematics, the study acknowledges the potential limitations of relying on self-reported data (Creswell, 2013). The use of interviews and observations, while providing rich and detailed insights, may be subject to social desirability bias and observer effects (Merriam, 2009). Furthermore, the study's sample size and selection may limit the generalizability of the findings (Mason, 2002). Additionally, the study recognizes the potential for researcher bias and the importance of maintaining reflexivity throughout the data collection and analysis process (Denzin & Lincoln, 2011). Finally, the study notes that negative attitudes towards mathematics often form earlier than expected, with research suggesting that many students develop negative attitudes and emotions towards mathematics very early in schooling, even in primary grades (Ma & Kishor, 1997). This is concerning, as these attitudes are harder to overcome than specific skill gaps.

1.11 Definition of terms

Beliefs: Beliefs refer to "mental constructs that individual's hold to be true and that guide their thoughts, feelings, and actions" (Philipp, 2014, p. 233). In the context of mathematics education, beliefs about mathematics encompass a range of convictions, assumptions, and values that students and teachers hold about the nature of mathematics, its relevance, and its importance (Schoenfeld, 2014). These beliefs can influence students' motivation, engagement, and

achievement in mathematics, as well as teachers' instructional practices and pedagogical decisions (Lerman, 2018).

Attitudes: Attitude refers to a "person's disposition to respond favorably or unfavorably to an object, person, institution, or event" (Eagly & Chaiken, 2018, p. 23). In the context of mathematics education, attitude towards mathematics encompasses a range of emotions, beliefs, and values that students hold about mathematics, including their enjoyment, interest, and confidence in learning mathematics (Larkin & Jorgensen, 2017). A positive attitude towards mathematics is essential for students' motivation, engagement, and achievement in mathematics (Hannula, 2018).

Everyday life: Everyday-life refers to the routine and mundane activities that individuals engage in on a daily basis, which can involve the use of mathematical concepts, skills, and reasoning (Niss, 2015). In the context of mathematics education, everyday-life encompasses a range of real-world contexts and situations that require mathematical thinking, problem-solving, and application, such as managing finances, cooking, and shopping (Gellert, 2017). The incorporation of everyday-life contexts into mathematics education can help students develop a deeper understanding of mathematical concepts and their relevance to real-life situations (Julie & Mudaly, 2020).

Perception: Perception refers to the process by which individuals interpret and make sense of their experiences, including their experiences with mathematics (Radford, 2015). In the context of mathematics education, perception encompasses the ways in which students and teachers view and understand mathematical concepts, their attitudes towards mathematics, and their experiences with mathematical learning and teaching (Gómez-Chacón, 2017). Perception plays a

crucial role in shaping students' motivation, engagement, and achievement in mathematics, as well as teachers' instructional practices and pedagogical decisions (Larsen & Lockhart, 2020).

Interests: Interests refer to the personal and intrinsic motivations that drive individuals to engage with and explore mathematical concepts and activities (Krapp, 2015). In the context of mathematics education, interests encompass the curiosity, enjoyment, and passion that students develop for mathematics, which can influence their motivation, engagement, and achievement in mathematics (Renninger & Hidi, 2016). Research has shown that interests play a crucial role in shaping students' learning trajectories and career choices, including their pursuit of mathematics-related fields (Schoenfeld, 2019).

Learners: Learners refer to individuals who are actively engaged in the process of acquiring knowledge, skills, and understanding of mathematical concepts and principles (Hativa, 2015). In the context of mathematics education, learners encompass students of various ages, backgrounds, and abilities who are learning mathematics in formal or informal settings, including schools, universities, and online platforms (Niss, 2015). Research has shown that learners' experiences, perceptions, and attitudes towards mathematics play a significant role in shaping their motivation, engagement, and achievement in mathematics (Julie & Mudaly, 2020).

Organisation of the Study

The study is organized into five chapters.

Chapter one covers the introduction and background of the study, followed by the purpose, problem statement, research questions, research objectives, assumptions, significance, delimitations, limitations, and definition of terms. The theoretical framework, presented in Chapter Two, encompasses theories related to the study, types of errors learners make when

solving simultaneous linear equations, causes of errors, and teaching and learning strategies to mitigate errors, as indicated in the literature review. The related literature, also covered in Chapter Two, summarizes the authors' year of publication, topic, methodology, and recommendations. Chapter Three outlines the research design, research methods, sampling, data collection methods, data analysis procedures, and validity, reliability, and research ethics. Chapter Four presents the data analysis, while Chapter Five discusses the results, conclusions, and recommendations of the study.

1.13 Chapter summary

Research on beliefs and attitudes towards mathematics in everyday life in Zimbabwe often employs qualitative methodologies, including interviews and questionnaires, to gather insights from learners. Studies indicate that factors such as cultural context, prior educational experiences, and relevance to real-life applications significantly influence learners' perceptions of mathematics. For instance, research highlights a preference for "academic" mathematics over contextualized learning based on unfamiliar scenarios, reflecting a desire for more meaningful connections to local realities and aspirations in education.

CHAPTER 2: LITERATURE REVIEW

2.1 INTRODUCTION

This chapter presents findings from the research concerning learners' attitudes towards mathematics, as well as their beliefs about mathematics, and related issues. Meanwhile, an intercultural analysis of affective issues was evident in the literature search conducted by Yangu X. (2016). However, the researcher was unable to locate any studies that specifically compared Zimbabwe.

2.2 Attitudes in mathematics education

2.2.1 Formation of Attitudes

The formation of attitudes towards mathematics is a complex process that is influenced by various factors, including prior experiences, cultural background, and social environment (Hativa, 2015). Research has shown that students' attitudes towards mathematics are shaped by their interactions with teachers, peers, and the learning environment (Julie & Mudaly, 2020). For instance, a supportive and inclusive learning environment can foster positive attitudes towards mathematics, while a negative or intimidating environment can lead to math anxiety and negative attitudes (Niss, 2015).

Furthermore, studies have highlighted the importance of teachers' attitudes and beliefs in shaping students' attitudes towards mathematics (Gómez-Chacón, 2017). Teachers who hold positive attitudes towards mathematics and believe in their students' ability to learn mathematics can create a positive learning environment that promotes students' motivation and engagement (Mwakapenda, 2017).

2.2.2 Mathematics Anxiety

Mathematics anxiety refers to a feeling of apprehension, fear, or nervousness when faced with mathematical problems or situations (Ashcraft, 2018). It is a pervasive and debilitating emotional reaction to mathematics that can interfere with an individual's ability to learn and perform mathematical tasks (Kilian, 2017). Mathematics anxiety can manifest in various ways, including avoidance behaviors, decreased motivation, and negative attitudes towards mathematics (Lee & Kim, 2016). Mathematics anxiety can have a profound impact on the formation of attitudes towards mathematics in secondary school students. Research has shown that students who experience mathematics anxiety tend to develop negative attitudes towards mathematics, which can lead to a decrease in motivation and engagement (Ashcraft, 2018). Mathematics anxiety can also lead to avoidance behaviors, where students avoid participating in mathematics-related activities or seeking help when needed (Kilian, 2017). Furthermore, studies have found that mathematics anxiety can be a major predictor of students' attitudes towards mathematics. For instance, a study by Lee and Kim (2016) found that students who experienced high levels of mathematics anxiety tended to have more negative attitudes towards mathematics compared to students who experienced low levels of mathematics anxiety. In addition, mathematics anxiety can also influence students' self-efficacy and confidence in mathematics. When students experience mathematics anxiety, they may begin to doubt their ability to learn and succeed in mathematics, leading to a decrease in self-efficacy and confidence (Macher, 2020).

2.2.3 Self-confidence

Related to mathematics anxiety is self-confidence (Fennema & Sherman, 2016). Self-confidence encompasses one's belief in their ability to excel in mathematics learning and problem-solving, as well as confidence in the presence of others. Learners who are restricted by their ability in

mathematics tend to feel more comfortable when encountering mathematical situations. Confident learners tend to learn more, have a more positive self-image, and are more attentive in pursuing mathematical ideas than learners who lack confidence. One of the strongest positive relationships with mathematics achievement among affective variables is confidence in learning mathematics (Fennema & Sherman, 2016). In a longitudinal study that followed students from form one to four, Meyer (2019) found that confidence in learning mathematics was the best affective predictor of later mathematics achievement and course taking. Stage and Kloosterman (2018) indicated that students generally have a poor conception of the nature of mathematics and their own ability to perform. A survey reported that students in the United States become less positive about mathematics as they progress through school; both confidence and enjoyment of mathematics appear to decline as students move from elementary to secondary school. As with mathematics anxiety, differences in confidence levels are often reported in gender comparisons. Meyer and Koehler (2017) found gender differences in confidence even when there were no differences in achievement. A study by the Girls and Mathematics unit at the University of London found that confidence in girls' abilities was gradually eroded from nursery school to fourth year high school, while girls who performed well in mathematics tended to be protected by their teachers, who discouraged them from taking more challenging examinations. The effect of confidence is further noted in studies related to specific learning processes. Lester, Garofalo, and Kroll (2019) examined the influence of confidence, interests, and beliefs on problem-solving behavior, particularly in form three learners. They found that groups of learners were sometimes helpless in solving mathematical problems due to a lack of confidence. Their assumption was that confidence in learning mathematics was influenced by learners' beliefs about mathematics, as well as learners' beliefs about problem-solving, which shape learners' mathematical behavior.

Diverse studies have also noted differences in confidence levels. In Asian American learners, Whang and Hancock (2014) found that self-confidence differed significantly from that of non-Asian learners. The differences reflected Asian-American learners' lower self-concept regarding their ability in mathematics and their parents' shared conception.

2.2.4 Motivation

Motivation is a complex and multifaceted construct that refers to the internal or external forces that drive individuals to pursue a particular goal or activity (Hativa, 2015). In the context of mathematics education, motivation plays a crucial role in determining students' engagement, persistence, and ultimate achievement in mathematics (Lee & Kim, 2016). Motivation can be categorized into two types: intrinsic and extrinsic. Intrinsic motivation refers to the drive to engage in an activity for its own sake, whereas extrinsic motivation refers to the drive to engage in an activity for external rewards or pressures (Deci & Ryan, 2012).

Motivation can cause the formation of attitudes in mathematics education in several ways. For instance, students who are intrinsically motivated to learn mathematics tend to develop positive attitudes towards mathematics, such as enjoyment and interest (Stipek, 2018). On the other hand, students who are extrinsically motivated to learn mathematics, such as for grades or rewards, may develop negative attitudes towards mathematics, such as anxiety and boredom (Nicholls, 2013). Furthermore, motivation can also influence students' self-efficacy and confidence in mathematics, which can in turn affect their attitudes towards mathematics. For example, students who are motivated to learn mathematics and experience success in their efforts tend to develop a sense of self-efficacy and confidence in their ability to learn mathematics, which can lead to positive attitudes towards mathematics (Bandura, 2012).

2.2.5 Relationship between attitudes and mathematics achievement

Despite the belief that positive attitudes are advantageous for learning outcomes, recent studies have failed to find a high relationship between attitudes and results. Schibeci (2014) argues that some researchers seem to take less care in assessing variables that influence attitudes reliably and validly than in the assessment of cognitive factors. Schibeci also noted that many of the reported studies have only simple bivariate correlations, ignoring the possibility that more complex and subtle relationships between attitudes and outcomes may exist. At a conceptual level, Schibeci (2014) suggests that many studies lack a theoretical framework regarding the nature of attitudes and the protocol by which they link with school learning and achievement. Some researchers in the past, for example, have suggested that poor results in mathematics produce negative attitudes. The existence of a relationship between attitudes and achievement does not always mean that improvements in one will lead to improvements in the other. As McLeod (2014) notes that neither attitude nor achievement is dependent on the other; rather, they interact with each other in complex and unpredictable ways. For instance, data from the International Mathematics Study found that Japanese learners disliked mathematics more than learners from other countries, even though their achievement was very high (McKnight et al., 2017).

2.3 Beliefs in mathematics education

2.3.1 Beliefs about mathematics

In mathematics, beliefs can be grouped into two main types which are beliefs about mathematics and the nature of mathematical tasks. They may be beliefs about individuals and others as learners of mathematics (Schoenfeld, 2015). The beliefs influence how individuals study mathematics, how they think about approaches and follow-ups to mathematical tasks and also how and when they attend to mathematics instruction. Chagwiza and Mutambara (2019) argue

that teachers' beliefs and attitudes towards mathematics play a significant impact on their teaching practices thereby ultimately student learning outcomes. According to Schoenfeld (2015), these beliefs reflect an individuals' mathematical philosophy in the sense that they reveal the background in which mathematics is done.

According to (Schoenfeld, 2015) some typical learners' beliefs about the nature of mathematics and mathematical activities include, mathematics problems have one and only one right answer. Moreover, there is more than one correct way to solve any mathematics problems, but usually depends on the rule the teacher has demonstrated to the classroom set-up. This is also mainly based on beliefs and attitudes and beliefs of learners on which method is easier, prior experiences, teacher influences and cultural background, (Chagwiza and Mutambara, 2019). Students who understand mathematics are able to tackle any assigned problem in a few minutes. This mainly is focused on what both teachers' and learners' belief and attitude about a mathematical concept.

2.7 CHAPTER SUMMARY

In summary, research studies have revealed that beliefs are important in explaining gender differences in mathematics outcomes, participation, and affective responses to mathematics. Both the educational environment and an individual's beliefs have a direct influence on what one learns in mathematics (Fennema, Walberg, & Merrett, 2016).

CHAPTER 3: RESEARCH METHODOLOGY

3.1 Introduction

Methodology is a systematic theoretical analysis of methods applied to an area of study. This chapter will presents the study paradigm, the research design, the research population and sampling, sampling technique and procedures, data collection methods, data analysis methods, data presentation and the trustworthiness of the study.

3.2 Research design

According to Saunders, Lewis and Thornhill (2012) viewed a research design as the overall strategy on the steps that one has to follow in order to give answers to the objective(s), and or sub-questions of the study. A research design includes aspects as the specific tactics and procedures that are in line with the process of collecting data as well as its analysis. This study used qualitative approach to investigate the relationship between students' attitudes and beliefs in the teaching and learning of mathematics. Qualitative data was simultaneously collected, analyzed separately for the purpose of establishing the facts since attitude is primarily measured by attitude scales that show whether those attitudes are positive or negative.

3.2.1 Research paradigm

This study adopts an Interpretivist paradigm, which seeks to understand the complex and subjective nature of individuals' beliefs and attitudes towards mathematics in everyday life (Bragg and Herbert 2019). By embracing this paradigm, the study aims to gain a deeper understanding of how individuals make sense of mathematical concepts and how these concepts relate to their daily experiences. The Interpretivist approach recognizes that individuals' experiences and perceptions are shaped by their unique perspectives, values, and contexts.

Therefore, this study seeks to explore the meanings and interpretations that individuals assign to mathematical concepts, and how these meanings influence their attitudes towards mathematics. By adopting an Interpretivist paradigm, this study aims to provide a nuanced and contextualized understanding of individuals' beliefs and attitudes towards mathematics in everyday life.

3.2.2 Research methodology

Research methodology, according to Mugenda and Mugenda (2019), is a set of systematic technique used in research. This simply means that it is a guide to research and how it is carried out. It describes and analysis methods, shedding more light on their limitations and resources, clarify their pre-suppositions and consequences, relating their potentialities to the twilight zone at the frontiers of knowledge”. “The methodology section provides enough information to understand how the study was conducted. It includes how respondents, techniques used to collect data, and data analysis were selected and used. Such information helps researchers enhance the credibility, validity, and readability of the study” (Newman, R.S. (2018). “A methodology does not set out to provide solutions - it is, therefore, not the same thing as a method. Instead, it offers the theoretical underpinning for understanding which method, set of methods or best practices which can be applied to specific case, for example, to calculate a specific result” (Orodho, J.A (2018). Hannaway, 2017, p.11) argue that philosophical assumptions in research consist of a basic set of beliefs or assumptions that guide investigations”.

3.2.3 Research Strategy

This study employs a qualitative research approach to explore individuals' beliefs and attitudes towards mathematics in everyday life. A qualitative approach was chosen because it allows for an in-depth examination of individuals' experiences and perceptions, providing a rich and nuanced understanding of the research topic. Semi-structured interviews will be used to collect

data, as this method enables participants to share their thoughts and feelings in a detailed and contextualized manner. The interviews will be audio-recorded, transcribed verbatim and analyzed using thematic analysis, allowing for the identification of patterns and themes in the data. By using a qualitative research approach, this study aims to provide a detailed and contextualized understanding of individuals' beliefs and attitudes towards mathematics in everyday life.

3.3 Research methods

The research method used in this research is qualitative research. According to (Kele, 2014), qualitative research design is a versatile method of inquiry applicable to various academic disciplines, including educational settings. In the context of this investigation on beliefs and attitudes towards mathematics in everyday life, a qualitative approach enables the researcher to gain a deeper understanding of participants' grounded views and experiences with mathematics. By exploring the complex and nuanced aspects of human behavior and social interactions, qualitative research provides a holistic picture of how individuals perceive and interact with mathematics in their daily lives. This approach involves collecting detailed, word-based data through naturalistic observations and in-depth interviews, allowing for a rich and contextualized understanding of participants' beliefs and attitudes towards mathematics. This study is also based on a phenomenological approach. Phenomenology is a field of study that seeks to find the "essential" meaning of phenomena experienced by many people (Sparro, L. and Hurst, C., 2015). The aim of this phenomenological approach is to describe "something that is experienced, or how something is experienced. Researchers make use of a phenomenological approach, namely when carrying out a research on students and teachers of mathematics education, to evaluate, monitor, see and describe what happened and what was experienced by teachers and learners in

the process of learning mathematics. This research was carried out at Kenzim College in Highglen district. There are two sources of data used in this study, through questionnaires and interviews. Questionnaires were administered to randomly selected students to gather data on their interests, perceptions and situations they would prefer to be exposed to in learning mathematics. The questionnaire was given to sixty (60) students from Kenzim College in Highglen district in Harare.

Also, interviews with learners from a sample of sixty (60) and three (3) teachers was done so as to explore the relevance of adult numeracy education to the needs and aspirations of Zimbabwean adult mathematics learners at Kenzim college. The study collected accounts, beliefs and attitudes expressed by the learners and teachers. The researcher also makes use of in-depth interviews to gather detailed and insights onto participants' beliefs and attitudes towards mathematics. Furthermore, in analyzing the data that has been gathered in the study, researchers used data analysis techniques according to (Miles and Huberman, 2017)

3.3.1 Population and sampling

The study's target was mathematics secondary school teachers and form Three (3) learners at Kenzim College in Highglen district, Zimbabwe. The target population of this study included all Mathematics at Kenzim College within Highglen District. Highglen district had a total number of twelve public secondary schools. However, all mathematics teachers and learners at Kenzim College were targeted by this research. The target population was therefore was eighty (80) mathematics learners and four (4) teachers from Kenzim College, Highglen District in Harare Metropolitan province.

Field (2007) views a sample as a proportion of the population which is employed to establish facts regarding that population. The study used both random and convenient sampling and Kenzim College was conveniently selected to take part in this research.

Simple Random Sampling (SRS) is a probability sampling method that allows researchers to select a representative sample from a larger population (Kothari, 2004).

To select the sample, the researcher first created a list of all mathematics teachers and learners in the selected school (Creswell, 2014). Each teacher and learner would be assigned a unique number, and then a random number generator would be used to generate 3 random numbers for the teachers and 60 random numbers for the learners (Bryman, 2016). The teachers and learners corresponding to the generated random numbers were then selected for the sample. By using simple random sampling, it can ensure that every teacher and learner has an equal chance of being selected, which helps to minimize bias and ensure a representative sample (Kothari, 2004). This is particularly important in educational research, where the sample needs to be representative of the larger population in order to generalize the findings (Cohen et al., 2018). The advantages of using simple random sampling include simplicity and ease of implementation, elimination of bias in sample selection, ability to generalize findings to the larger population, increased precision and accuracy of estimates, and ability to calculate sampling error and confidence intervals (Bryman, 2016). Additionally, simple random sampling allows for the use of statistical methods to analyze the data, which can provide more robust and reliable results (Creswell, 2014).

Data collection procedures

The researcher first obtained necessary permissions from the school administration and relevant authorities (Cohen et al., 2018). A detailed research proposal outlining the research objectives, methodology, and data collection procedures was prepared and approved (Kothari, 2004). Informed consent forms were also created for teachers and students to ensure they understand the research purpose, risks, and benefits (Bryman, 2016). Once the necessary permissions and approvals are secured, the researcher scheduled a meeting with the school administration to discuss the research project and obtain their approval (Creswell, 2014). The researcher provided the necessary documentation, including the research proposal and consent forms, to the school administration (Kothari, 2004). A gate pass or permission letter was obtained from the school administration to facilitate entry into the school.

3.3.2 Data collection methods/instruments

Grey (2019) asserts that, research instruments are tools used to collect data to find solutions to problems under investigation. When investigating beliefs and attitudes towards mathematics in everyday life, researchers employ various data collection instruments. These tools help gather valuable insights into students' perceptions, emotions, and experiences with mathematics (Kele, 2014). These data collection instruments can provide valuable insights into students' beliefs and attitudes towards mathematics, ultimately informing strategies to improve mathematics education (Johnson & Christensen, 2023).

3.2.1 Observation

Observation is a valuable data collection method used in research studies, including investigations on beliefs and attitudes towards mathematics in everyday life. According to

Schofield (2018), observation involves systematically watching and recording the behavior, actions, and interactions of individuals or groups in a natural or contrived setting. In the context of mathematics education, observation can be used to examine how students interact with mathematical concepts, how they approach problem-solving, and how they engage with mathematical activities in the classroom or everyday life (Tambychik & Meerah, 2018). One of the advantages of observation is that it allows researchers to gather rich, contextualized data that can provide insights into the complexities of students' beliefs and attitudes towards mathematics (Kele, 2014). Observation can also be used to validate or triangulate data collected through other methods, such as surveys or interviews (Johnson & Christensen, 2023). Furthermore, observation can be used to identify patterns or themes in students' behavior or interactions that may not be immediately apparent through other data collection methods (Makuvire et al., 2023). However, observation also has some limitations. For example, observers may introduce bias or influence the behavior of the individuals being observed (Schofield, 2018). Additionally, observation can be time-consuming and may require significant resources (Tambychik & Meerah, 2018). Despite these limitations, observation remains a valuable tool for researchers seeking to understand the complex and nuanced nature of students' beliefs and attitudes towards mathematics in everyday life. Researchers observed form three learners as they work on mathematics problems in a natural classroom setting. This method allows for the direct observation of student behaviors, strategies, and challenges.

3.2.2 Interviews

An interview is a qualitative data collection method that involves a face-to-face conversation between a researcher and a participant, with the aim of gathering in-depth, detailed information about the participant's thoughts, feelings, and experiences (Johnson & Christensen, 2023). In the

context of an investigation on beliefs and attitudes towards mathematics in everyday life, interviews can be used to explore students' perceptions, emotions, and experiences with mathematics, as well as their attitudes and beliefs about mathematics (Kele, 2014). According to Tambychik and Meerah (2018), interviews can provide rich, contextualized data that can help researchers understand the complexities of students' beliefs and attitudes towards mathematics. One of the advantages of using interviews in research is that they allow for flexibility and spontaneity, enabling researchers to explore topics in-depth and follow up on interesting or unexpected responses (Makuvire et al., 2023). Interviews also provide an opportunity for researchers to build rapport with participants, which can help to establish trust and encourage participants to share their honest thoughts and feelings (Schofield, 2018). Additionally, interviews can be used to validate or triangulate data collected through other methods, such as surveys or observations (Johnson & Christensen, 2023). However, interviews also have some limitations. For example, they can be time-consuming and may require significant resources (Tambychik & Meerah, 2018). Additionally, interview data can be subjective and may be influenced by the researcher's own biases or assumptions (Schofield, 2018). Despite these limitations, interviews remain a valuable tool for researchers seeking to gain a deeper understanding of students' beliefs and attitudes towards mathematics in everyday life.

3.2.3 Questionnaires

A questionnaire is a widely used data collection instrument in research studies, including investigations on beliefs and attitudes towards mathematics in everyday life. According to Johnson and Christensen (2023), a questionnaire is a set of questions designed to gather information from a sample of participants. In the context of mathematics education, questionnaires can be used to collect data on students' attitudes, beliefs, and experiences with

mathematics, as well as their perceptions of mathematics teaching and learning (Kele, 2014). For example, the Mathematics Attitude Inventory (MAI) is a questionnaire designed to measure students' attitudes towards mathematics (Makuvire et al., 2023). One of the advantages of using questionnaires is that they allow researchers to collect data from a large sample of participants in a relatively short period of time (Tambychik & Meerah, 2018). Questionnaires are also cost-effective and can be easily administered online or in-person (Schofield, 2018). Additionally, questionnaires can provide quantitative data that can be analyzed using statistical methods, allowing researchers to identify patterns and trends in students' attitudes and beliefs towards mathematics (Johnson & Christensen, 2023). However, questionnaires also have some limitations. For example, respondents may provide socially desirable answers or may not fully understand the questions, which can lead to inaccurate or incomplete data (Schofield, 2018). Additionally, questionnaires may not provide the same level of depth and richness as qualitative data collection methods, such as interviews or observations (Tambychik & Meerah, 2018). Despite these limitations, questionnaires remain a valuable tool for researchers seeking to understand students' beliefs and attitudes towards mathematics in everyday life.

3.2.4 Think-Aloud Protocols

Think-aloud protocols are a data collection instrument used to gather information about an individual's thought processes, problem-solving strategies, and decision-making while performing a task (Ericsson & Simon, 1993). In the context of an investigation on beliefs and attitudes towards mathematics in everyday life, think-aloud protocols can be used to examine how students think about and approach mathematical problems, and how their beliefs and attitudes influence their problem-solving strategies (Schoenfeld, 2014). For example, researchers may ask students to solve a mathematical problem while verbalizing their thoughts, feelings, and

reasoning processes (Makuvire et al., 2023). One of the advantages of using think-aloud protocols is that they provide a unique window into an individual's cognitive processes, allowing researchers to gain a deeper understanding of how students think about and learn mathematics (Schoenfeld, 2014). Think-aloud protocols can also help researchers identify potential misconceptions or areas of difficulty that students may experience when solving mathematical problems (Tambychik & Meerah, 2018). Additionally, think-aloud protocols can be used in conjunction with other data collection methods, such as observations or interviews, to provide a more comprehensive understanding of students' beliefs and attitudes towards mathematics (Johnson & Christensen, 2023). However, think-aloud protocols also have some limitations. For example, verbalizing one's thoughts and feelings can be a challenging task, and some students may struggle to articulate their thoughts or may provide incomplete or inaccurate information (Schofield, 2018). Additionally, think-aloud protocols can be time-consuming and may require significant resources to analyze the data (Makuvire et al., 2023). Despite these limitations, think-aloud protocols remain a valuable tool for researchers seeking to understand the complex and nuanced nature of students' beliefs and attitudes towards mathematics in everyday life.

3.2.5 Tests/Assessments

Tests or assessments are a data collection instrument used to measure students' knowledge, skills, and attitudes towards mathematics (Johnson & Christensen, 2023). In the context of an investigation on beliefs and attitudes towards mathematics in everyday life, tests or assessments can be used to examine students' mathematical literacy, problem-solving skills, and critical thinking abilities (Makuvire et al., 2023). For example, researchers may administer a mathematics achievement test for Form Three learners to assess their understanding of mathematical concepts and their ability to apply them to real-world problems (Schoenfeld,

2014). One of the advantages of using tests or assessments is that they provide a standardized and objective measure of students' knowledge and skills (Schofield, 2018). Tests or assessments can also be used to identify areas where students may need additional support or instruction, allowing teachers to tailor their instruction to meet the needs of their students (Tambychik & Meerah, 2018). Additionally, tests or assessments can be used to evaluate the effectiveness of instructional programs or interventions, providing valuable information for educators and policymakers (Johnson & Christensen, 2023). However, tests or assessments also have some limitations. For example, they may not provide a complete picture of students' knowledge and skills, as they may not capture important aspects of mathematical literacy, such as problem-solving and critical thinking (Schoenfeld, 2014). Additionally, tests or assessments may be biased towards certain groups of students, such as those from diverse cultural or socioeconomic backgrounds (Schofield, 2018). Despite these limitations, tests or assessments remain a valuable tool for researchers seeking to understand students' beliefs and attitudes towards mathematics in everyday life.

3.2.6 Work Samples/Artifacts

Work samples and artifacts are a type of data collection instrument used to gather information about students' learning and performance in mathematics (Johnson & Christensen, 2023). In the context of an investigation on beliefs and attitudes towards mathematics in everyday life, work samples and artifacts can be used to examine students' mathematical thinking, problem-solving strategies, and communication skills (Makuvire et al., 2023). For example, researchers may collect students' mathematics assignments, projects, or portfolios to analyze their understanding of mathematical concepts and their ability to apply them to real-world problems (Schoenfeld, 2014). One of the advantages of using work samples and artifacts is that they provide an authentic

and contextualized representation of students' learning and performance (Schofield, 2018). Work samples and artifacts can also provide valuable insights into students' thinking and problem-solving processes, allowing researchers to identify areas of strength and weakness (Tambychik & Meerah, 2018). Additionally, work samples and artifacts can be used to evaluate the effectiveness of instructional programs or interventions, providing valuable information for educators and policymakers (Johnson & Christensen, 2023). However, work samples and artifacts also have some limitations. For example, they may be subjective and influenced by the researcher's own biases or assumptions (Schofield, 2018). Additionally, work samples and artifacts may not provide a complete picture of students' learning and performance, as they may not capture important aspects of mathematical literacy, such as communication and collaboration skills (Schoenfeld, 2014). Despite these limitations, work samples and artifacts remain a valuable tool for researchers seeking to understand students' beliefs and attitudes towards mathematics in everyday life.

3.2.3 Data analysis methods/instruments

Data analysis is a crucial step in an investigation on beliefs and attitudes towards mathematics in everyday life. According to Johnson and Christensen (2023), data analysis involves the systematic examination and interpretation of data to identify patterns, themes, and relationships. In the context of an investigation on beliefs and attitudes towards mathematics, data analysis can be used to identify trends and patterns in students' responses to surveys, interviews, or other data collection instruments (Makuvire et al., 2023). There are various methods and instructions that can be used to analyze data in an investigation on beliefs and attitudes towards mathematics. For example, quantitative data can be analyzed using statistical methods, such as descriptive

statistics, inferential statistics, and regression analysis (Schofield, 2018). Qualitative data, on the other hand, can be analyzed using thematic analysis, content analysis, or discourse analysis (Tambychik & Meerah, 2018). In terms of specific instructions, researchers may use coding schemes to categorize and analyze data (Johnson & Christensen, 2023). For example, a researcher may use a coding scheme to identify themes related to students' attitudes towards mathematics, such as "enjoyment," "anxiety," or "confidence" (Makuvire et al., 2023). Researchers may also use data visualization techniques, such as charts, graphs, or tables, to present and interpret their findings (Schofield, 2018). Overall, data analysis is a critical step in an investigation on beliefs and attitudes towards mathematics in everyday life. By using various methods and instructions, researchers can identify patterns and themes in their data and gain a deeper understanding of students' beliefs and attitudes towards mathematics.

3.4 Reliability and validity

Validity refers to the degree to which a research study accurately measures the concept being investigated. In qualitative research, validity ensures that the data collected truly reflects the concept being studied (Heale & Twycross, 2015). Also, validity is concerned with the accuracy and truthfulness of the findings (Ignacio, N.G., Blanco, Nieto and Barona, 2014).

Reliability, on the other hand, refers to the consistency and accuracy of the data collected (Muijs, 2011). In this study, the reliability of the research instrument was tested using the Cronbach alpha coefficient. To ensure validity, a pilot study was conducted, and the research instrument was also reviewed and validated by the supervisor.

3.5 Ethical issues

Ethical issues are a crucial consideration in any research study, including an investigation on beliefs and attitudes towards mathematics in everyday life. According to Johnson and Christensen (2023), researchers have a responsibility to ensure that their study is conducted in an ethical and responsible manner, with respect for the rights and dignity of all participants. In the context of an investigation on beliefs and attitudes towards mathematics, ethical issues may arise in several areas, including informed consent, confidentiality, and data protection (Makuvire et al., 2023).

One of the key ethical issues in this type of study is ensuring that participants provide informed consent. According to Schofield (2018), informed consent involves providing participants with clear and accurate information about the study, including its purpose, procedures, and potential risks and benefits. In an investigation on beliefs and attitudes towards mathematics, informed consent may involve explaining to participants that their responses will be kept confidential and anonymous, and that they are free to withdraw from the study at any time (Tambychik & Meerah, 2018).

Another important ethical issue in this type of study is maintaining confidentiality and data protection. According to Johnson and Christensen (2023), researchers have a responsibility to ensure that participants' personal information and responses are kept confidential and secure. In an investigation on beliefs and attitudes towards mathematics, this may involve using pseudonyms or codes to identify participants, and storing data in a secure and password-protected location (Makuvire et al., 2023).

Finally, researchers must also consider issues related to cultural sensitivity and respect for diversity. According to Schoenfeld (2014), researchers must be aware of the cultural and social contexts in which their study is taking place, and ensure that their methods and instruments are culturally sensitive and respectful. In an investigation on beliefs and attitudes towards mathematics, this may involve using culturally responsive survey instruments, and ensuring that participants from diverse backgrounds are represented in the study (Tambychik & Meerah, 2018).

Overall, ethical issues are a critical consideration in any research study, including an investigation on beliefs and attitudes towards mathematics in everyday life. By being aware of these issues and taking steps to address them, researchers can ensure that their study is conducted in an ethical and responsible manner.

3.6 Chapter summary

This chapter outlined the research methodology and approach used in the study. It provided a detailed explanation of the research design, highlighting its alignment with the chosen approach. Additionally, the chapter described the sampling techniques, data collection instruments, and the measures taken to ensure their reliability and validity. The subsequent chapter will present the findings of the study.

CHAPTER 4: DATA PRESENTATION, ANALYSIS, INTERPRETATION AND DISCUSSION

4.1 Introduction

In this chapter, the research presents and examines the data gathered from respondents. Mathematics beliefs and attitudes towards learning and teaching mathematics are discussed. The data for this study were gathered utilizing two methods, namely interviews and questionnaires. This chapter includes a full analysis and discussion of the findings from the interviews and questionnaires. The data in this chapter have been analysed and presented in the form of tables and graphs.

4.2.1 Attitudes affecting learning and teaching of mathematics

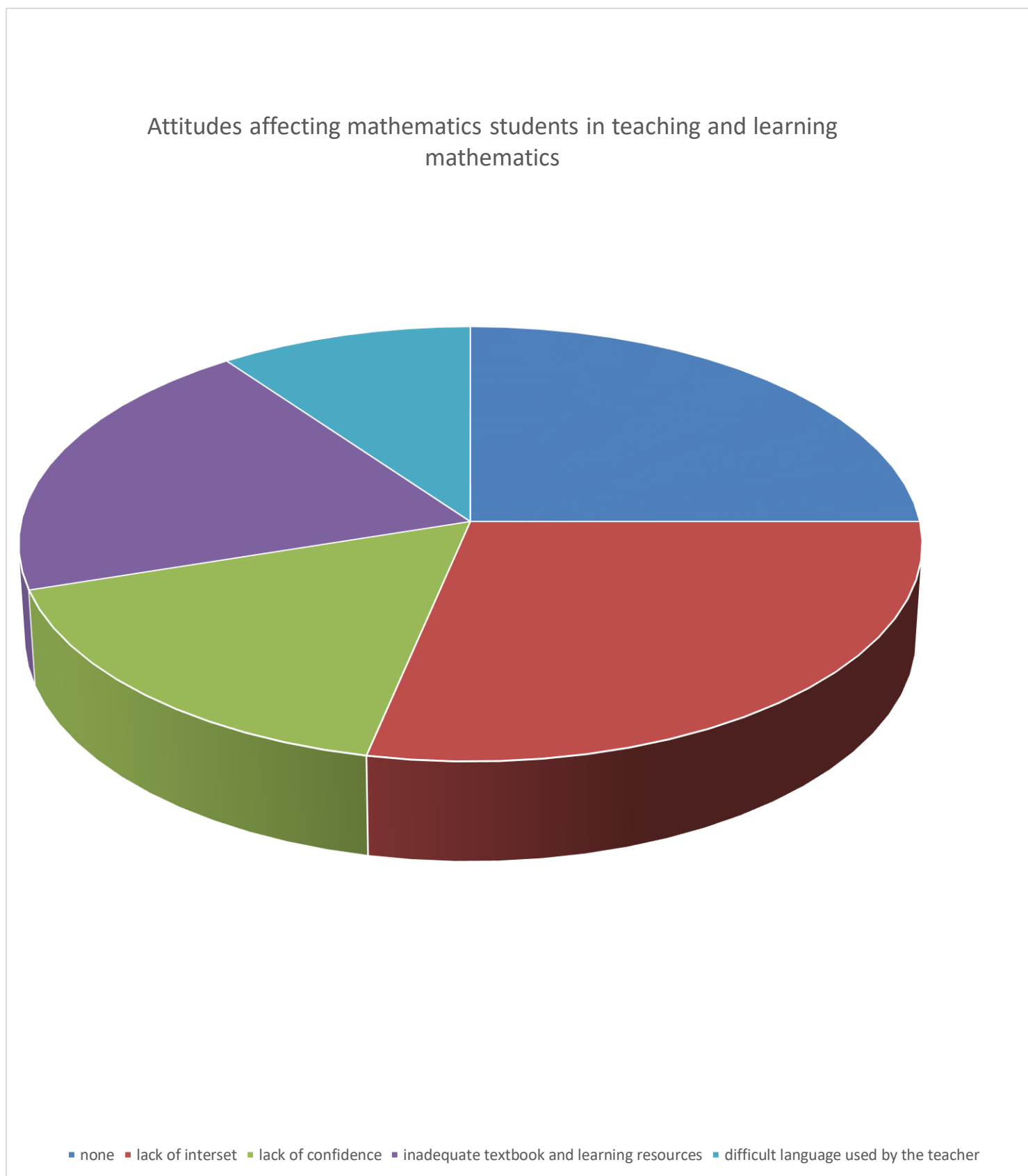
The students were asked to identify some of the problems they experienced that affect learning of mathematics and eventually affecting their performance in the subject. Their views were summarised in the table below.

Table 1: Showing responses

Responses	Number of responses	Percentage
none	15	25%
Lack of confidence	10	16.7%
Lack of interest	17	28.3%
Inadequate textbook and learning resource	12	20%
Difficult language used by the teacher	6	10%

The researcher discovered that students' attitudes play a significant role in their learning and teaching of mathematics. When asked about the challenges they face in learning mathematics, 25% of the students reported lacking confidence in their ability to learn and perform well in mathematics. Additionally, 30% of the students expressed a lack of interest in mathematics, which hindered their motivation to learn. Some students (20%) also mentioned that the lack of teaching facilities, address the diverse needs of students.

Figure 1 : Showing attitudes towards of students in learning and teaching mathematics



The researcher discovered that students' attitudes play a significant role in their learning and

teaching of mathematics. When asked about the challenges they face in learning mathematics, 16.7% of the students reported lacking confidence in their ability to learn and perform well in mathematics. Additionally, 28.3% of the students expressed a lack of interest in mathematics, which hindered their motivation to learn. Some students (20%) also mentioned that the lack of teaching facilities, address the diverse needs of students such as textbooks and learning resources, made it difficult for them to engage with the subject. Furthermore, 10% of the students found the language used by their teachers to be difficult to understand, which created a barrier to their learning. However, 25% of the students reported that they experienced no problems learning mathematics, highlighting the need for tailored support to the researcher discovered that students' attitudes play a significant role in their learning and teaching of mathematics. Newman (2017) found a significant relationship between confidence in learning mathematics and mathematics achievement, with correlations ranging from 0.3 to 0.4. Students who believed in their cognitive abilities were more likely to seek help when needed. On the other hand, students who doubted their abilities felt anxious about asking for help and tended to avoid seeking it. Interestingly, students with high confidence in mathematics attributed their need for help to factors other than lack of ability, and therefore, were more inclined to ask for help when necessary.

4.2.2 Factors influence attitudes toward learning and teaching mathematics

To gather data for this investigation, qualitative methods was employed whereby questionnaires were administered to a sample population, such as students, teachers, or working professionals, to gauge their attitudes and beliefs towards mathematics. Also interviews were conducted or focus group discussions with participants to gather more in-depth and nuanced information. Additionally, the researcher observe how people interact with mathematical concepts in their

daily lives, such as how they use math to manage finances or measure ingredients while cooking. Finally the researcher analyzed existing literature, such as research articles, books, and online forums, to gain a broader understanding of attitudes and beliefs towards mathematics.

Teacher workload

The researcher discovered that teacher workload can significantly impact teachers' attitudes towards teaching mathematics, which in turn can influence students' attitudes towards learning mathematics. When teachers are overwhelmed with a heavy workload, they may experience burnout and demotivation, causing them to feel disconnected from their teaching practice (Kerry, 2002). This can negatively impact their attitude towards teaching mathematics, leading to a lack of enthusiasm and passion in the classroom. Furthermore, teacher workload can also reduce job satisfaction, leading to a decrease in teachers' motivation and commitment to teaching mathematics (Hativa, 2013). When teachers are not satisfied with their job, they may not be as effective in creating a positive learning environment for their students. A heavy workload can also stifle teachers' creativity and innovation in the classroom, leading to a lack of engaging and interactive mathematics lessons (Brown, 2009). In addition, teacher workload can negatively impact teacher-student relationships, which are critical for building positive attitudes towards learning mathematics (Ma & Kishor, 2017). When teachers are stressed and overwhelmed, they may not be able to establish positive relationships with their students, leading to a lack of trust and respect in the classroom. Finally, teacher workload can limit teachers' ability to provide adequate support for students who are struggling with mathematics (Kyriacou, 2009).

TEACHING METHODS

Teaching methods can play a significant role in shaping attitudes towards teaching and learning of mathematics. When teachers employ traditional, didactic methods that focus on rote memorization and drill-and-practice exercises, students may become disengaged and disconnected from the learning process (Brown, 2009). This can lead to a negative attitude towards mathematics, as students may view the subject as dry, irrelevant, and uninteresting. On the other hand, when teachers use more innovative and interactive methods, such as problem-based learning, collaborative group work, and technology-enhanced instruction, students may become more engaged and motivated to learn mathematics (Hativa, 2013). This can foster a positive attitude towards mathematics, as students may view the subject as challenging, yet rewarding and relevant to their lives. Moreover, teaching methods can also impact teachers' attitudes towards teaching mathematics. When teachers are forced to use methods that are not aligned with their own teaching style or philosophy, they may become frustrated and demotivated (Kerry, 2002). This can lead to a negative attitude towards teaching mathematics, as teachers may feel that they are not able to effectively teach the subject. On the other hand, when teachers are given the autonomy to design and implement their own teaching methods, they may become more engaged and motivated to teach mathematics (Ma & Kishor, 2017). This can foster a positive attitude towards teaching mathematics, as teachers may feel that they are able to make a meaningful impact on their students' learning. In addition, teaching methods can also influence the way students perceive mathematics. When teachers use methods that emphasize procedural fluency over conceptual understanding, students may view mathematics as a set of rules and procedures to be memorized, rather than a rich and complex subject that requires critical thinking and problem-solving (Kyriacou, 2009). This can lead to a negative attitude towards mathematics,

as students may feel that the subject is too rigid and inflexible. On the other hand, when teachers use methods that emphasize conceptual understanding and critical thinking, students may view mathematics as a dynamic and creative subject that requires exploration and discovery (Brown, 2009). This can foster a positive attitude towards mathematics, as students may feel that the subject is challenging, yet rewarding and relevant to their lives.

High level of anxiety in learners

The researcher discovered that high levels of anxiety in learners have a detrimental impact on their learning. The study's findings were consistent with previous research, which linked mathematics anxiety to low self-confidence, fear of failure, and negative attitudes towards mathematics learning. A study by Ma's (2018) analyzed the relationship between mathematics anxiety and achievement in 26 learners at the primary and secondary school levels. The results revealed a significant correlation between the two variables, indicating that lower mathematics anxiety is associated with higher mathematics achievement.

Learners' little interest in mathematics

The lack of relevance to real-life situations and future careers contributed to learners' disinterest in mathematics. Additionally, the scarcity of mathematics reference books and textbooks exacerbated the issue. Some learners were also dissatisfied with the teaching methods employed by certain mathematics teachers. Specifically, they felt that complex topics were not thoroughly covered, and the application of mathematical concepts to everyday life and future careers was not adequately emphasized.

4.2.3 Learners' attitudes towards teaching, performance and learning of mathematics

The research further sought to investigate the opinions of learners towards their performance in mathematics, as well as their attitudes towards the subject. This was achieved by administering a questionnaire to the respondents, which included a five-point Likert scale (Likert, 1932). The scale consisted of five categories: strongly agree, agree undecided, disagree, and strongly disagree. This scale allowed respondents to express their level of agreement or disagreement with various statements related to mathematics performance and learning.

By analysing the respondents' answers, the study aimed to detect the kind of attitudes learners had formed towards mathematics. Research has shown that learners' attitudes towards mathematics can significantly impact their motivation and performance in the subject (Ma & Kishor, 2017). Therefore, understanding learners' attitudes is crucial in identifying potential barriers to learning and developing effective strategies to improve mathematics education.

4.3 Methods of teaching employed by teachers to mitigate negative attitudes and beliefs in towards mathematics.

Teaching method	Number of respondents	Percentage
Traditional method	0	0%
Experiential method	1	33%
Problem solving	2	67%

The table indicates that one (1) teacher representing 33% of the sample. Kenzim College has a total of four (4) teachers. Of these three (3) sampled teachers, two (2) teachers responded that they provide knowledge using problem solving skills which is sixty-seven (67%). According to the Secondary Syllabus, knowledge can be given to learners for them to acquire problem solving skills.

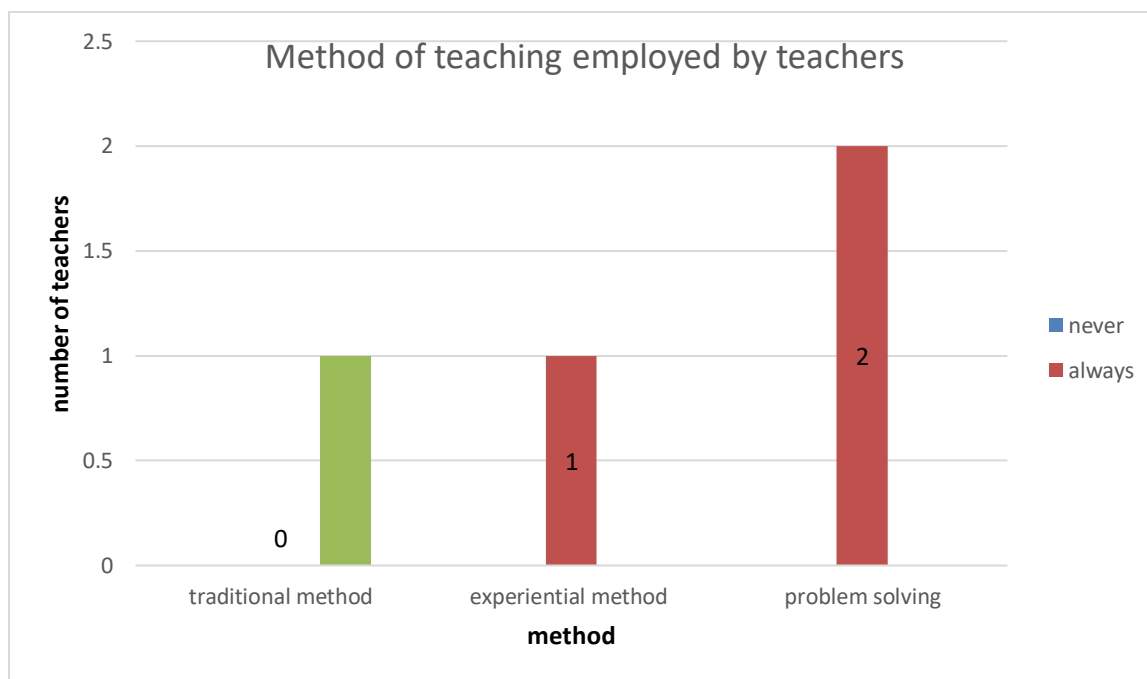


Figure 2: Methods in teaching to enhance learning of mathematics

According to the study, 67% of teachers frequently employed problem-solving methods, while 33% used experiential methods, and 0% adopted traditional methods. The data suggests that learners tend to show a greater affinity for mathematics when problem-solving approaches are used, compared to other teaching methods. Notably, teachers who used experiential and traditional methods, and 0% who used small groups and discussions, reported that students were

less enthusiastic about these approaches due to their non-participatory nature. In contrast, teachers who fostered a supportive classroom environment, encouraging students to ask questions and apply mathematical concepts to real-life situations, observed increased student cooperation and engagement, particularly during problem-solving sessions.

4.3 Methods used by mathematics teachers to motivate students

Teachers of mathematics in the study area used several methods to motivate students in the learning mathematics as indicated in the following figures.

Table 1

Method	strongly agree	Agree	partially agree	Disagree
Real-world application	1	2	0	0

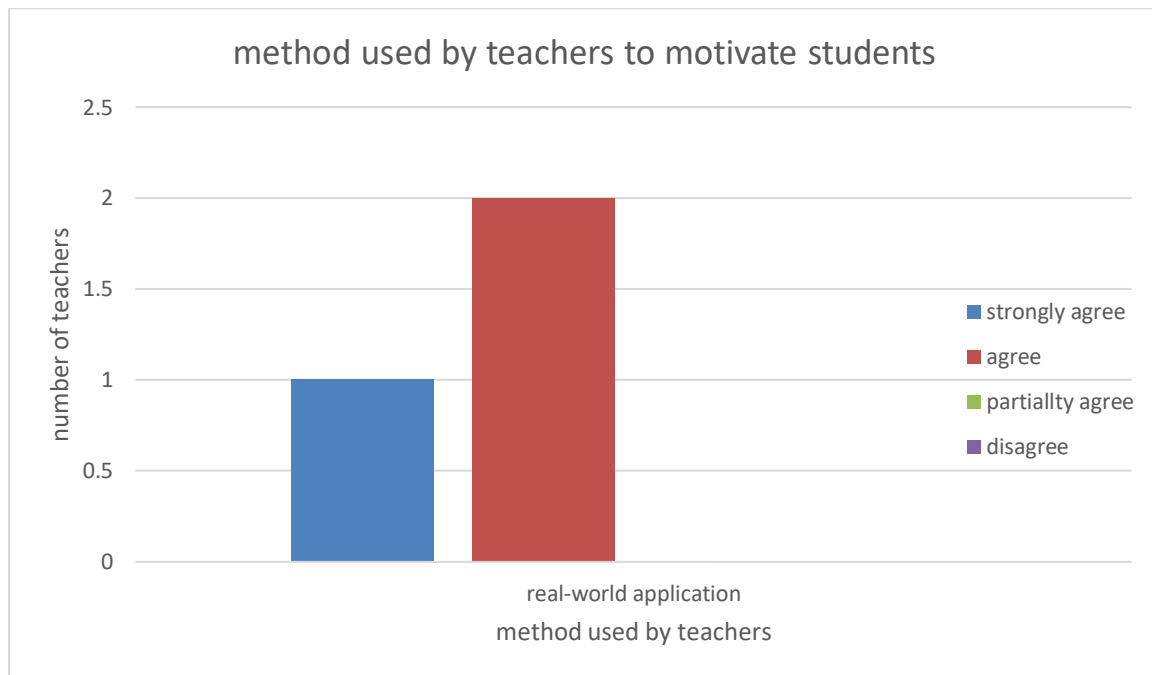


Figure 3: Methods used by mathematics teachers to motivate students.

The research findings revealed that one of the three teachers strongly agreed that incorporating real-world applications into mathematics instruction can be a powerful motivator for students and it was also supported by the other two (2) teachers who agreed that this enhance positive attitude towards mathematics. This finding is consistent with previous research, which has shown that connecting mathematical concepts to real-life scenarios can increase student engagement, motivation, and understanding (Blum & Niss, 1991; Niss, 1999).

Real-world applications have several advantages as a motivator for students to learn and perform better in mathematics. For instance, they make mathematics more relevant and authentic, helping students see the value and purpose of mathematical concepts (Ma & Kishor, 2017). Additionally, using real-world examples can increase student engagement and participation, as students are more likely to be interested in problems that have a direct impact on their lives (Hiebert et al., 1996). Furthermore, real-world applications can help students develop a deeper understanding of mathematical concepts, as they see how these concepts are used to solve real-world problems (Niss, 1999). They can also help students develop problem-solving skills, as they learn to apply mathematical concepts to complex, real-world problems (Blum & Niss, 1991). By incorporating real-world applications into mathematics instruction, teachers can create a more engaging, relevant, and motivating learning environment for their students. Overall, the use of real-world applications in mathematics instruction has the potential to enhance student motivation, engagement, and understanding. As such, it is an approach that mathematics teachers may find useful in promoting student learning and achievement in mathematics.

Method	Strongly agree	Agree	Partially agree	Disagree
Celebrating success	2	0	1	0

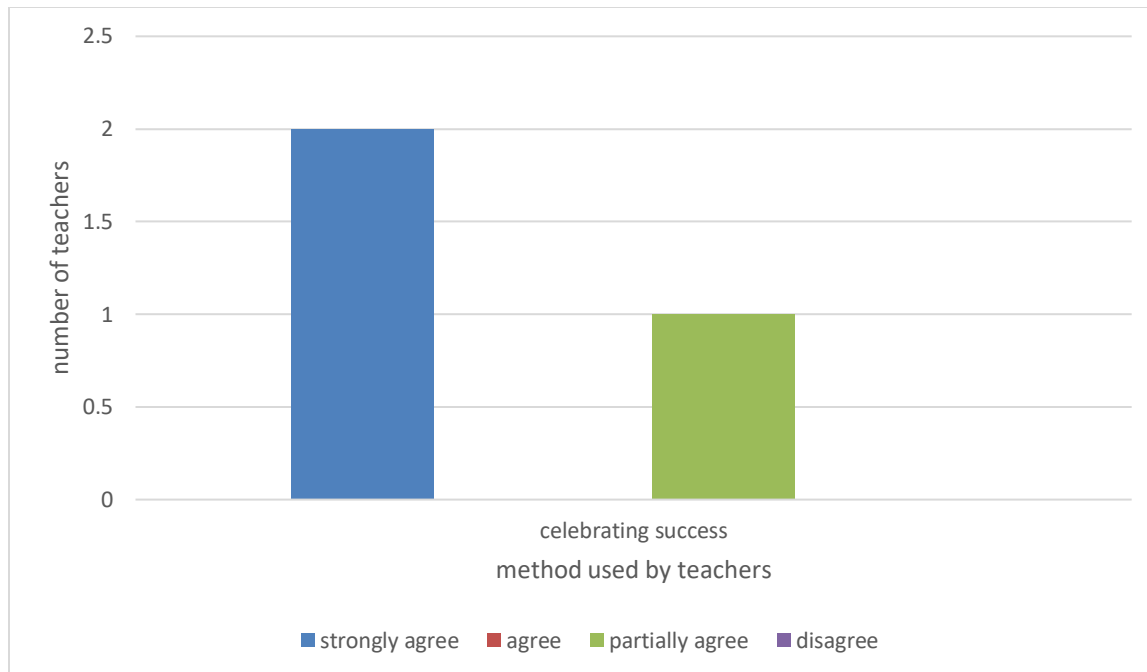


Figure 4: Method used by teachers to motivate students.

The research findings revealed that two (2) of the teachers strongly agreed that celebrating success can be a method that motivates students to love mathematics, while one (1) of the teachers partially agreed that acknowledging and celebrating students' achievements in mathematics can have a positive impact on their attitudes and motivation towards the subject. This finding is consistent with previous research, which has shown that recognition and celebration of students' success can enhance their motivation, self-esteem, and overall attitude towards mathematics (Hattie & Timperley, 2007; Black & Wiliam, 1998). Celebrating success can have several advantages in mathematics education. For instance, recognizing and celebrating students' achievements can help to build their confidence and motivation, leading to increased engagement and participation in mathematics lessons (Hattie & Timperley, 2007). Additionally, celebrating success can help to promote a growth mind-set, where students believe that their abilities and intelligence can be developed through hard work, dedication, and persistence

(Dweck, 2006). Furthermore, celebrating success can help to create a positive learning environment, where students feel supported, encouraged, and motivated to learn (Boaler, 2016). Overall, the findings suggest that celebrating success can be a valuable strategy for motivating students to love mathematics and promoting a positive attitude towards the subject. By acknowledging and celebrating students' achievements, teachers can help to create a positive and supportive learning environment that fosters engagement, motivation, and a love of mathematics.

Table 3

Method	Strongly Agree	Agree	Partially Agree	Disagree
Reward system	2	1	0	0

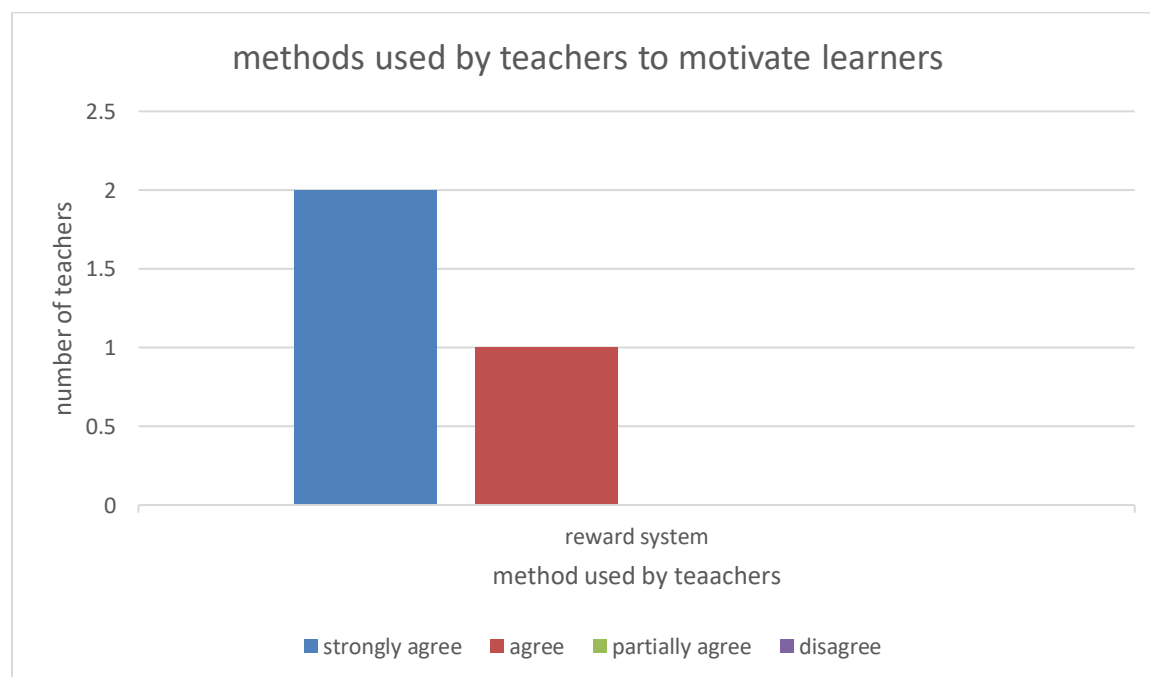


Figure5: Methods used by teachers to motivate students.

The findings above revealed that two of the teachers strongly agreed that reward systems can be an effective motivator for students in the teaching and learning of mathematics, while one teacher agreed with the same sentiment. This finding is consistent with previous research, which has shown that reward systems can have a positive impact on student motivation, engagement, and achievement in mathematics (Hattie & Timperley, 2007; Deci et al., 1999). The use of reward systems in mathematics education has several advantages. For instance, rewards can provide students with a sense of accomplishment and pride in their work, which can enhance their motivation and self-esteem (Henderlong & Lepper, 2002). Additionally, reward systems can help to create a positive learning environment, where students feel encouraged and supported to take risks and explore mathematical concepts (Boaler, 2016). Furthermore, reward systems can be used to promote a growth mind-set in students, where they believe that their abilities and intelligence can be developed through hard work, dedication, and persistence (Dweck, 2006). By recognizing and rewarding students' efforts and progress, rather than just their grades or achievement, teachers can help to foster a growth mind-set and promote a love of learning in mathematics.

Moreover, reward systems can be tailored to meet the diverse needs and interests of students, which can help to increase their engagement and motivation in mathematics (Kohn, 1993). For example, teachers can use rewards such as stickers, stars, or points to motivate students, or they can offer more intrinsic rewards such as special privileges or activities. Overall, the findings of this study suggest that reward systems can be a valuable tool for motivating students in the

teaching and learning of mathematics. By using rewards in a way that promotes a growth mind-set and recognizes students' efforts and progress, teachers can help to create a positive and supportive learning environment that fosters engagement, motivation, and a love of mathematics.

Table 4

Method	Strongly Agree	Agree	Partially Agree	Disagree
Technology integration	0	1	2	0

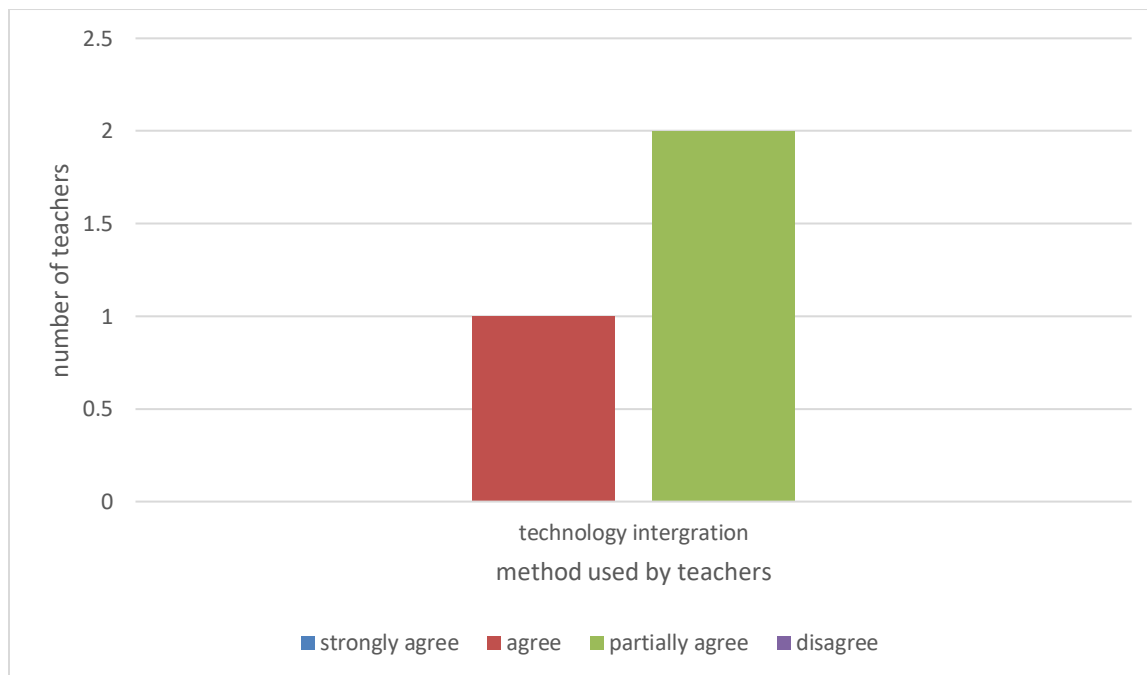


Figure 6: Methods used by teachers to motivate students.

The findings revealed that teachers hold varying views on the motivational impact of technology integration in mathematics education. One teacher unequivocally agreed that incorporating

technology into mathematics lessons can motivate learners, suggesting a strong conviction in the potential of technology to enhance student engagement and enthusiasm. In contrast, the other two teachers expressed a more nuanced view, partially agreeing that technology integration can motivate learners. This ambivalence may indicate that while these teachers acknowledge the potential benefits of technology integration, they also recognize limitations or challenges that may hinder its effectiveness. For instance, they may be concerned about issues such as unequal access to technology, inadequate technical support, or the need for additional training to effectively integrate technology into their teaching practices.

Table 5

Method	Strongly Agree	Agree	Partially Agree	Disagree
Games and puzzles	1	1	0	1

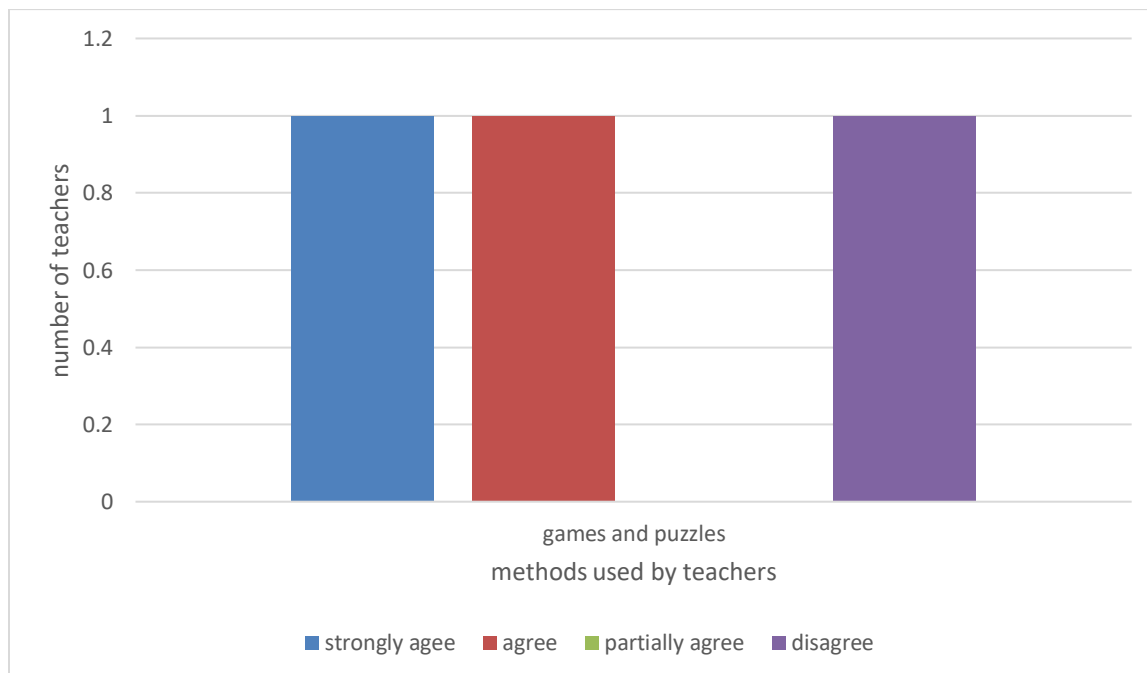


Figure 7: Methods used by teachers to motivate students.

In a study examining the beliefs and attitudes of teachers towards mathematics in everyday life, a survey of three teachers revealed varying opinions on the effectiveness of games and puzzles in motivating students to learn mathematics. One teacher strongly agreed that incorporating games and puzzles into mathematics lessons can motivate students and make learning more engaging. This teacher likely believes that interactive and hands-on approaches can help students develop a positive attitude towards mathematics and increase their enthusiasm for learning. On the other hand, another teacher simply agreed with the statement, indicating a more neutral or lukewarm attitude towards the use of games and puzzles in mathematics education. This teacher may acknowledge the potential benefits of using games and puzzles, but may not be entirely convinced of their effectiveness or may not prioritize their use in the classroom. In contrast, the third teacher disagreed with the statement, suggesting that they do not believe games and puzzles are an effective way to motivate students to learn mathematics. This teacher may hold a more traditional view of mathematics education, emphasizing the importance of rote memorization and procedural fluency over interactive and engaging approaches. These findings highlight the diversity of beliefs and attitudes among teachers towards mathematics in everyday life, and suggest that teachers' opinions on the use of games and puzzles in mathematics education are influenced by their individual perspectives and experiences. This study's results can inform the development of mathematics education programs and policies that take into account the varying beliefs and attitudes of teachers.

4.4 Discussion / interpretation of the findings

4.4.1 Challenges related with attitudes towards teaching and learning of mathematics among secondary schools

The major opinion towards teaching, learning and performance in mathematics in the area of study was a teacher centred instruction used by the teacher. This was evidenced by (45%) of students who said their attitudes was as a result of the methods used by the teacher. Teacher centered instruction can significantly influence attitudes towards teaching and learning of mathematics in several ways that are limited student participation, lecture based approach, emphasis on rote memorisation to mention but a few. This in turn results in lack of confidence and self-esteem among learners as confirmed by approximately (16.7%) of teacher respondents. It was also noted that a noticeable 20% of the learner's responses are still believed that the understanding of mathematics was difficult. Conversely, majority (80%) of student respondents strongly agreed or agreed that mathematics was an important learning area in life. (60%) among them also agreed that of the subjects taught, mathematics was their best. The learners poor performance in the subject was ascribed to the fact that some topics they fail to be apply them to daily life problems and learning of such topics were greatly hampered resulting in another serious cycle of poor performance in the subject.

A considerable (53%) of the student respondents strongly disagreed that being a girl or a boy interfered with their learning and understanding of mathematics. It was also clear that influence of the teachers, parents, siblings and peers on the pupils affect the learning of mathematics thereby goes further to play a part in the total development of the students attitudes and beliefs

towards learning, teaching and performance of mathematics. Education is a process of people enlightenment and empowerment in-order to achieve a better quality of life. That need to improve quality in mathematics education is a great necessity bearing in mind the dismal performance in this subject at Kenzim College in Highglen district and Zimbabwe as a whole. In achieving this goal, positive attitudes towards maths have to be enhanced and students motivated to like mathematics as a subject. Mathematics education is very important to the whole developmental process of the country since facilitators as well as learners agree that the subject is multi-disciplinary and can be applied everywhere. Those negative attitudes of students towards learning and performance in mathematics was as a result of existing learning approaches that demotivates learners and discouraged their participation, as well as unfounded beliefs that mathematics was a difficult subject.

Teachers, fellow students, siblings and parents also contributed to the formation of attitudes. If the prior mentioned had negative attitudes themselves, the study found out that they as a result enforce the same on the learners. Hence this led to poor performance in the subject which degenerated even into more desperation. Due to its role in the everyday- life of the nation, there is need for teachers and all educational stakeholders to enhance positive attitudes towards mathematics as a subject hence improve quality teaching of the subject. The findings must enlighten teachers, parents, students and all education stake-holders to ensure they enhance positive attitudes towards the teaching and learning, and performance of mathematics among students. This is so because a connection between attitudes, learning and teaching, and performance in mathematics was identified in the study. Additionally, learning experiences provided in the classrooms set up should include such activities which provide opportunities for learners to participate, bring out analogy, to draw inferences, arrive at generalizations and so on.

Schools management should prioritize taking steps to develop positive attitudes of students. In summary it is also important that schools management, government, parents and well-wishers to take active interest in the development of positive attitudes towards the teaching and learning, as well as performance of mathematics among students in secondary schools.

4.4.2 Factors influencing attitudes towards teaching and learning and of mathematics

The heavy teaching workload had the potential to impact the quality of teaching, as overworked teachers may not have sufficient time to plan lessons, attend classes, or provide timely feedback on students' work. This can lead to the use of ineffective teaching methods, which can foster negative attitudes towards mathematics, causing students to perceive the subject as difficult.

Half of the teachers reported that they only moderately enjoyed teaching mathematics, indicating that it was challenging for them to positively influence students' attitudes towards the subject. Only a few teachers demonstrated the practical applications of mathematics, resulting in students viewing the subject as merely a routine to pass exams.

Despite employing various teaching approaches, teachers reported limited success in enhancing mathematics learning. This was attributed to students' desperation, particularly when they consistently performed poorly in mathematics exams. Some students worked in groups and received individual attention from teachers, but many still expressed anxiety about learning mathematics and performing well on exams.

Interestingly, a high level of anxiety among students can be both positive and negative. On one hand, it indicates that students are serious about the subject. On the other hand, excessive anxiety can hinder learning. These findings are consistent with previous research, which has linked

mathematics anxiety to low self-confidence, fear of failure, and negative attitudes towards mathematics.

A study by Ma's (2019) analyzed 26 studies on the relationship between mathematics anxiety and achievement, revealing a significant correlation between the two. Specifically, lower mathematics anxiety was associated with higher mathematics achievement. Some students reported being motivated to study mathematics by friends and relatives, which can influence their performance and attitudes towards the subject. However, many students expressed little interest in mathematics, citing its limited practical application to real-life situations and future careers. The lack of mathematics resources, such as textbooks, was also a significant factor contributing to students' disinterest.

Some students were dissatisfied with the way mathematics was taught, particularly when difficult topics were not thoroughly covered or applied to real-life situations. To address this, it is essential to emphasize the practical applications of mathematics, making it a valuable tool for everyday life. While some students recognized the importance of mathematics, many struggled to see its relevance to their future lives. Despite this, many mathematical concepts can be taught by illustrating their practical applications, making the subject more engaging and meaningful.

CHAPTER SUMMARY

The investigation revealed that students' attitudes towards mathematics were influenced by various factors, including teaching methods, teacher attitudes, and the perceived relevance of mathematics to everyday life. The study found that teacher-centered instruction was the dominant teaching approach, which led to limited student participation and a lack of confidence in mathematics. Furthermore, students' anxiety towards mathematics was found to be a

significant obstacle to their learning, with many students expressing fear of failure and low self-confidence. The study also revealed those students' perceptions of mathematics as a difficult and abstract subject contributed to their negative attitudes. Many students struggled to see the relevance of mathematics to their everyday lives, and the lack of practical applications in mathematics lessons further reinforced this perception. However, the study also found that students who were motivated by friends and relatives to study mathematics, and those who received individual attention from teachers, tended to have more positive attitudes towards the subject. The findings of this study are consistent with previous research, which has linked mathematics anxiety to low self-confidence, fear of failure, and negative attitudes towards mathematics. The study highlights the need for teachers to adopt more student-centered and interactive teaching approaches, and to emphasize the practical applications of mathematics in everyday life. By doing so, teachers can help to promote more positive attitudes towards mathematics and improve students' learning outcomes.

CHAPTER 5

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The chapter is a conclusion of the investigation or study, summary as well as recommendations which can be made to aid in the improvement of students' attitudes and beliefs towards the teaching and learning of mathematics and therefore reduce the negative effects of those attitudes on learning of mathematics among learners in secondary school particularly Kenzim college in Highglen district ad Zimbabwe in general.

5.2 Summary of the study

The objectives of this study were to determine the attitudes formed by learners towards the learning and teaching of mathematics and to find out whether such attitudes may contribute to poor teaching and learning of mathematics, consequently leading to poor performance in the learning area in secondary schools at Kenzim College in Highglen district. The study also aimed to determine the contributing variables or factors that influence attitudes towards the learning and teaching of mathematics among secondary school students. The investigation employed a descriptive survey design, and the data collected was largely explanatory in nature.

Results revealed that the main problems in learning mathematics in secondary schools in Highglen district included a lack of confidence in the ability to learn and achieve well in mathematics, as reported by 35% of the respondents. A lack of enthusiasm or passion for mathematics was also mentioned by 28% of the respondents. Regarding attitudes towards mathematics as a learning area, up to 56% of the respondents strongly agreed that they were interested in learning mathematics. Additionally, 60% strongly disagreed that mathematics

lessons were not interesting, and this percentage of students failed to perform well in mathematics, as indicated by teacher respondents.

Out of those who had a strong interest in mathematics, 39% of the respondents strongly agreed that they would like to continue doing mathematics even after secondary school. Only 25% of the respondents strongly disagreed that grasping mathematics concepts was difficult, while up to 69% of the respondents strongly agreed that mathematics was a very important learning area in life. Up to 55% of the respondents strongly disagreed that they were given a lot of extraneous mathematics homework, while only 45% of the respondents believed that they were fully exposed to and provided with mathematics textbooks and other learning resources.

Regarding attitudes towards mathematics teachers, up to 79% of the respondents either agreed or strongly agreed that it was the teacher who could make mathematics learning easier for them. Thirty-two percent of the teachers or facilitators reported that they had been teaching mathematics for 13 to 15 years, while 35% said that they had taught mathematics for less than 4 years. About 15% of the respondents pointed out that they had been teaching mathematics for 5 to 10 years, while the remaining percentage had been teaching for 15 years and above. Facilitators with many years of experience in teaching understood the subject matter well, as well as teaching approaches that may enhance positive attitudes towards the learning of mathematics.

Regarding how much teachers appreciated teaching mathematics, the majority (52%) stated that they were interested in teaching the subject moderately, while the remaining percentage reported that they were interested in teaching the subject moderately. This study aimed to understand facilitators' attitudes towards mathematics as a learning area. Up to 80% of the respondents

revealed that the learning area was interesting, while 12% thought that it was very interesting. Teachers also thought that the most important method was to organize symposia to create interest in mathematics, according to the respondents. Only up to 16% of the respondents told students the significance of mathematics, particularly in relation to other learning areas and day-to-day life.

A small percentage of teachers made an effort to change their teaching method by examining the accuracy, correctness, and depth of the content, as well as concluding the content and providing follow-up activities. According to 67% of the respondents, the traditional method was never used to enhance the learning of mathematics, but it was sometimes used by 33% of the respondents. Mathematics teachers in the area of study used several methods to motivate their students in learning mathematics. About 67% always supported students with positive comments to help them improve their attitudes towards learning the subject. Up to 73% said they often used teaching aids to enhance learners' understanding of the concept being taught. In addition to that, changing teaching methods was always adopted by a significant percentage of the respondents.

5.3 Conclusions

The findings from this study suggest that secondary students recognize the significance of mathematics and are willing to learn and master it. However, their attitudes, which are influenced by previous experiences with the subject, teachers, parents, and peers, affect their learning. Additionally, school teachers must be aware that there are certain areas of students' learning in mathematics that need improvement. Specifically, students should be exposed to more opportunities to work on complex and irregular mathematics problems to broaden their thinking skills and appreciate the intrinsic nature of mathematics. This will require teachers to go beyond expectations in leading students in that area of learning. The learning area should not be

limited to idealized teaching and focused solely on passing examinations. Instead, mathematics should be illustrated in a more practical way, allowing learners to automatically associate mathematics understanding with their everyday environment. By doing so, learners' involvement and visibility will result in a better philosophy of mathematics and mathematics learning, leading to more positive attitudes towards the subject and promoting their learning capacity. Consequently, they will perform better in mathematics examinations. Since the study identified the relationship between attitudes, learning, teaching, performance, and hands-on application of mathematics in everyday life, the following recommendations are suggested.

5.4 Recommendations

5.4.1 The following recommendations are made from the study.

1. Positive attitudes towards teaching and learning of mathematics are basic components in secondary school mathematics education. Teachers, parents, and any other education stakeholders need to boost these positive attitudes.
2. There is a sequential connection between attitudes, teaching and learning, performance and practical utility of mathematics. This connection should be instituted early enough in students' mathematics education.
3. The detrimental attitudes should be reduced in a professional manner and early enough before learners completely give up in learning and/or teaching of mathematics.
4. Mathematics facilitators should wisely make use of available learning resources in-order to cultivate positive attitudes, support neutral attitudes, if any, and neutralize any negative attitudes towards the learning and teaching of mathematics.
5. Attempts should be made to make sure that gender does not restrict the teaching and learning of mathematics among learners. Facilitators, parents, guardians and siblings of the students have

to encourage both the female and male students to equally embrace mathematics as an interesting subject.

5.4.2 Recommendations for Further Research

Further research is recommended in the following areas.

- i) This study was carried out in only one district. The same studies could be performed in other parts of the country, that is, Zimbabwe in order to gather enough information on the subject to be capable to generalize.
- ii) This study only concentrated on learners' attitudes towards learning and teaching in mathematics. I think it would be also interesting to recognize the attitudes held by teachers towards teaching and performing in mathematics, and if this also affects learners attitude towards the teaching and learning of the subject.

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APPENDICES

APPENDIX A: Mathematics Teachers' Questionnaire (MTQ)

Dear Respondent,

Im conducting a study on the learners' attitudes and beliefs towards teaching and learning of mathematics. Can you please read the questions below and kindly give the relevant response by either ticking in the bracket [☐] or by providing further information in the spaces provided. This investigation is purely for academic purposes and all the given information shall be treated confidential.

Section A: Personal background information:

(1) Gender: Male [☐] Female: [☐]

(2) Can you please indicate your professional qualification?

Graduate teacher [☐] Diplomat [☐] Untrained teacher [☐]

Others (specify) -----

Section B: Teaching information:

(1) How many mathematics periods do you teach per week? -----

(2) How many years do you have in teaching field?

(a) Less than a year [☐]

(b) 1 – 4 years [☐]

(c) 5 – 9 years [☐]

(d) 10– 14 years [☐]

(e) more than 15 years [☐]

(3) How many years have you been in the current station?

(a) Less than a year []

(b) 1 – 4 years []

(c) 5 – 10 years []

(d) 11 – 15 years []

(e) More than 15 years []

(4) Do you enjoy teaching mathematics?

(a) Very much []

(b) Moderately []

(c) Very little []

(d) Not at all []

Section C: Information on mathematics:

1. Do your learners credit a lot of value to mathematics as a learning area?

(a) Yes []

(b) No []

Why? -----

2. What are your thoughts on mathematics as a learning area?

a) Dull []

(b) Tedious []

(c) Interesting []

(d) Very

Interesting []

e) Other (Specify).....

(3) What are the general attitudes of your students towards the learning of mathematics?

(a) Very positive []

(b) Positive []

(c) Negative []

(d) Very negative []

(4) Is the content of the current mathematics syllabus relevant to the needs of the society?

(a) Not relevant []

(b) Somehow relevant []

(c) Relevant []

(d) Very relevant []

(5) Do you have any problems regarding the mathematics syllabus?

(a) Yes []

(b) No []

Specify them: -----

(6) What exactly do you think your students like most about mathematics?

(a) The teaching []

(b) The teacher []

(c) The subject content []

(d) any other (specify) []

(7) What exactly do students like most in mathematics as a learning area -----

(8) What reason(s) could you credit to your answer in question 7 above?

(9) How can the students be motivated to like mathematics?

(10) Suppose you realize that your learners are not interested or do not like learning Mathematics, what can you do?

(a) Tell them the importance of mathematics [] (b) Change teaching method [] (c) Organize internal (or external) symposia []

(d) Take them outside classroom and demonstrate relevance of mathematics in real life []

(e) Punish them []

(f) Nothing []

(h) Other (specify)

Section D: Methods of teaching mathematics:

The following are different approaches used in the teaching of mathematics that may enhance learning of mathematics. You are required to show by indicating against each approach or method how frequent you use it. The rating of the method preferred is as follows:

1 – Never (N.) 2 – Sometimes (S) 5 – Always (A).

TEACHING METHODS	N	S	O
Traditional method			
Small-group discussion			
Experiential method			
Problem- solving			
Project method			

Any other, can you please specify how frequent: -----

Which of the above approaches or methods do you think they enhance the learning of mathematics and give reasons?

.....

Section E: Methods or approaches used by Mathematics Teachers to Motivate Students

1. The following are motivational techniques that can be used to enhance the learning of mathematics among students or learners. Can you please show by indicating against each method that you strongly Disagree (D), Unsure (U), Agree (A) or Strongly Agree (SA).

Rating scale is as follows SD=1, D = 2, U = 3, A = 4, SA =5

TECHNIQUES OF MOTIVATION	AGREE	STRONGLY AGREE	DISAGREE	STRONGLY DISAGREE
REAL-WORLD APPLICATION				
GAMES AND PUZZLES				
REWARD SYSTEMS				
TECHNOLOGY INTERGRATION				
CELEBRATING SUCCESS				

Any other, specify how frequent -----

2. Give any suggestions (if any) that you think of would improve the learning of mathematics among learners.-----

Thank you

APPENDIX B: Mathematics Students' Questionnaire (MSQ)

Dear Student,

The aim of this questionnaire is to find out learners' attitudes and beliefs towards the learning of mathematics.

Instructions

1. You may not write your name anywhere else in this questionnaire.
2. The information you give regarding your feelings towards the learning of mathematics will be confidential. Can you please respond to the items or questions below as honestly as is possible.
3. Can you please put a [√] in the brackets which corresponds to your answer.

Section A: General information about the student and school

1. Type of school: Boys [] Girls [] Mixed []
2. Gender: Male []. Female []
3. Which of the following problems do you think affects you the most especially when learning Mathematics?
 - (i) Lack of passion or interest in mathematics []
 - (ii) Shortage of mathematics textbooks as well as learning resources[]
 - (iii) The language used by the facilitator or teacher is very difficult to understand []
 - (iv) Lack of confidence []

Any other, specify -----

What are possible solutions to your problem(s) -----

Section B: Your feelings towards the learning and teaching of mathematics

- (1) Instructions: This section contains statements that you are required to decide carefully whether you strongly agree (SA), Agree (A), Unsure (U), Disagree (D), or Strongly Disagree (SD). Can you please put a tick [✓] against each statement depending on your feelings. In cases of mistakes being made, cross by putting (X) through the tick [✓] and then tick in the appropriate box in the table below.

STUDENT FEELINGS	SA	A	U	D	SD
Embarrassment					
Anxiety					
Apprehension					
Disengagement					
Curiosity					
Frustration					
Boredom					
Pride					
Confidence					
Elation					

3. According to you what can make learning of mathematics fascinating or interesting and easier to understand?

- (2) What other comment(s) do you have in regard to mathematics learning?

Thank you

APPENDIX C: INTERVIEW GUIDE FOR STUDENTS

Introduction:

Hello, thank you for agreeing to participate in this interview. My name is CHIKUNDA RUMBIDZAI, and I am conducting a study on beliefs and attitudes towards mathematics in everyday life. This interview will take approximately 30 minutes, and all responses will be kept confidential.

Section A: BACKGROUND INFORMATION

1. Can you tell me a little bit about yourself, such as your age, grade level, and interests?
2. How would you describe your experience with mathematics in school so far?

Section B: BELIEFS AND ATTITUDES TOWARDS MATHEMATICS

1. What comes to mind when you think of mathematics? Do you associate it with anything positive or negative?
2. Do you think mathematics is important in everyday life? Why or why not?
3. Have you ever had a particularly positive or negative experience with mathematics? Can you tell me about it?
4. Do you think you are good at mathematics? Why or why not?

Section C: TEACHING AND LEARNING MATHEMATICS

1. What do you think makes a good mathematics teacher?
2. How do you prefer to learn mathematics? (e.g., through examples, practice problems, group work)
3. Have you ever felt anxious or stressed when learning mathematics? If so, what triggered these feelings?
4. Do you think mathematics is taught in a way that is relevant to your everyday life? Why or why not?

Section D: FUTURE ASPIRATIONS AND MATHEMATICS

1. What are your future career aspirations? Do you think mathematics will be relevant to your future career?
2. Do you think mathematics will be useful to you in your everyday life after you finish school? Why or why not?

CONCLUSION

Thank you for taking the time to participate in this interview. Your responses will be invaluable in helping me understand beliefs and attitudes towards mathematics in everyday life. Is there anything else you would like to add or any questions you have for me?

APPENDIX C: INTERVIEW GUIDE FOR TEACHERS

Introduction

Hello, thank you for agreeing to participate in this interview. My name is CHIKUNDA RUMBIDZAI, and I am conducting a study on beliefs and attitudes towards mathematics in everyday life. This interview will take approximately 20 minutes, and all responses will be kept confidential.

SECTION A: BACKGROUND INFORMATION AND EXPERIENCE

1. Can you tell me a little bit about your teaching experience and background in mathematics education?
2. How long have you been teaching mathematics, and what levels have you taught?
3. What inspired you to become a mathematics teacher?

SECTION B: BELIEFS AND ATTITUDES TOWARDS MATHEMATICS

1. What are your personal beliefs about the importance of mathematics in everyday life?
2. How do you think your own attitudes towards mathematics influence your teaching practices?
3. Do you think mathematics is a difficult subject for students to learn? Why or why not?

SECTION C: TEACHING PRACTICES AND STRATEGIES

1. Can you describe your typical approach to teaching mathematics? (e.g., teacher-centered, student-centered, project-based)
2. How do you assess student understanding and progress in mathematics?
3. What strategies do you use to support students who struggle with mathematics?

SECTION D: CHALLENGES AND BARRIERS

1. What do you think are the biggest challenges facing students in learning mathematics?
2. How do you address students' anxiety or fear of mathematics in your teaching practices?
3. Are there any systemic or institutional barriers that you think hinder students' ability to learn mathematics effectively?

SECTION E: FUTURE DIRECTIONS AND RECOMMENDATIONS

1. What do you think are the most important skills or knowledge that students should gain from mathematics education?
2. How do you think mathematics education could be improved or reformed to better meet the needs of students?
3. Are there any recommendations you would make to policymakers, educators, or parents to support mathematics education?

CONCLUSION

Thank you for taking the time to participate in this interview. Your insights and experiences will be invaluable in helping me understand beliefs and attitudes towards mathematics in everyday life. Is there anything else you would like to add or any questions you have for me?