

An Investigation into Learners' Perceptions towards Mathematics. A Case Study Ofkatombora in Kazungula District

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Abstract

This study This study investigated learners' perceptions towards mathematics at Katombora Secondary School in Kazungula District. The study focused on identifying students' perceptions towards mathematics, factors affecting mathematics learning, and strategies for improving students' attitudes towards the subject. Both qualitative and quantitative research methods were used, and data were collected through interviews, questionnaires, observations, and document analysis from 54 respondents, including pupils, parents, and mathematics teachers. The findings revealed that many students perceive mathematics as difficult, boring, and abstract, which results in fear, anxiety, low confidence, and poor academic performance. Negative teacher behaviours and lack of encouragement were also found to affect learners' participation in mathematics lessons. However, the study established that positive teaching practices and the use of technology in mathematics education can improve students' interest, engagement, and performance in the subject.

Keywords: Mathematics perception, Mathematics learning, Students' attitudes, Mathematics anxiety, Academic performance, Teaching practices, Technology in education, Secondary school learners, Kazungula District, Mathematics education.

1. INTRODUCTION

Background to the Study

Mathematics is acknowledged worldwide as the most significant subject in most fields of human activities. Mathematics is generally, considered a vital and useful subject in general education. Although it is an imperative subject it is not widely held by students since it is not the same as other subjects. All facets of human existence make extensive use of the mathematical ability one develops through education. Mathematics has a significant impact on how people navigate the various facets of private, social, and civic life (Anthony & Walshaw, 2009). Nearly on par with the significance of educations a whole is the value of mathematics in science, technical pursuits, trade, economics, education, and even the humanities (Tella, 2017; White, 2019). This explains why all students who complete basic and secondary school in the majority of nations are required to study the topic.

Perception may be defined from physical, psychological and physiological perspectives. But for the purpose of this study, it shall be limited to its scope as postulated by Allport (1996), which is the way we judge or evaluate others. That is the way individuals evaluate people with whom they are familiar in everyday life. Eggen and Kauchak (2001) gave cognitive dimension of perception; they see perception as the process by which people attach meaning to experiences. They explained that after people attend to certain stimuli in their sensory memories, processing continues with perception. Perception is critical because it influences the information that enters working memory.

Perceptions and beliefs about mathematics originate from past experiences; comprising both cognitive and affective dimensions Aguilar, Rosas and Juan Zavaleta (2012). From a cognitive point of view it relates to a person's knowledge, beliefs, and other cognitive representations while from an affective domain it refers to a person's attitudes, feelings and emotions about mathematics. The term is also understood broadly to include all visual, verbal representations, metaphorical images and associations, beliefs, attitudes and feelings related to mathematics and mathematics learning experiences.

It is widely claimed that, negative perceptions and myths of mathematics are widespread among the students, especially in the developed countries (Gadanidis, 2012). Sam (2002) claimed that many students are scared of mathematics and feel powerless in the presence of mathematical ideas. They regarded Mathematics as "difficult, cold, abstract, and in many cultures, largely masculine" (Ernest, 1996, p.802). Buxton, cited by Sam (2002) viewed mathematics as "fixed, immutable, external, intractable and uncreative" or "a timed-test"(p.115). Even scientists and engineers whose jobs are related to mathematics "often harbour an image of mathematics as a well-stocked warehouse from which to select ready-to-use formulae, theorems, and results to advance their own theories"(Peterson, 1996).

Many students still obtain poor marks in mathematics, notwithstanding the importance of the subject. Many students avoid mathematics out of fear that they will fail since they believe it to be a boring and uninteresting subject (Colgan, 2014). Students frequently express their attitudes on mathematics by saying things such, "I enjoy/dislike mathematics," or "Mathematics is dull, tough, etc." According to Sam (1999), a lot of pupils are scared of mathematics and feel helpless around mathematical concepts. They view math as being challenging, icy, abstract, and, in many societies, predominately masculine (Ernest, 1995). Fondness for mathematics, mode of studying mathematics, classroom activities engagements, and many more will be affected if students' mental state and perception of mathematics are negative.

According to Sarwat, Safia, and Manzoor (2013) perception influences performance, then performance, in turn, influences attitudes. The perception of students toward mathematics is important to get success in the subject of mathematics by increasing their rate of participation in learning mathematics (Farooq & Shah, 2008). According to Ma and Kishor (1997) perception toward mathematics is reflected through "an aggregated measure of a liking or disliking of mathematics, a tendency to engage in or avoid mathematical activities, a belief that one is good or bad at mathematics, and a belief that mathematics is useful or useless"

Statement of the Problem

Mathematics is widely regarded as a cornerstone of education, essential for fostering critical thinking, problem-solving, and analytical skills. Globally, mathematics serves as a foundation for advancements in fields such as science, technology, engineering, and mathematics (STEM). In Ghana, mathematics occupies a pivotal position within the Senior High School (SHS) curriculum, influencing students' academic trajectories and career prospects (Davis et al., 2021). Despite the relative importance of Mathematics, it is very disappointing to note that the student's performance in the subject in both internal and external examinations has remained consistently poor (Bolaji, 2005). Students' perceptions of mathematics emerge as a critical determinant of academic performance. These perceptions are shaped by individual attitudes, cultural beliefs, and systemic factors. Positive perceptions fostered by engaging teaching methods and relatable content enhance motivation and outcomes, whereas negative attitudes, often driven by anxiety and perceived difficulty, contribute to avoidance and poor performance (Bornaa et al., 2023; Bannor et al., 2023). This study therefore, seeks to

investigate learners' perceptions towards mathematics, a case study of Katombora in Kazungula district.

Purpose of the Study

The purpose of the study was to assess the learners' perceptions towards mathematics at Katombora secondary school.

Objective of the Study

1. To identify students' perceptions towards mathematics at Katombora secondary school.
2. To establish the factors affecting Mathematics Learning at Katombora secondary school.
3. To ascertain strategies of enhancing students' mathematics perception at Katombora secondary school.

Significance of the Study

By examining the different images, attitudes, beliefs and myths of mathematics that students hold, there is a potential for such images, attitudes, beliefs to be challenged, promoted or discouraged. The information obtained will enhance better strategies and measures for promoting student understanding and participation in mathematics-related fields. The results of this study might inform the extent of the influences of parents and teachers in shaping students' perceptions of mathematics. This information can be used to promote positive influence while attempting to avoid the negative influences of these sources. It would help to understand better the roles of parents and teachers in the shaping of students' images of mathematics. The findings will reflect possible implications for mathematics education and mathematics teacher education. Knowing how students perceive mathematics learning experiences in school and how this could influence their images of mathematics will help us to understand better how mathematics should be presented in the classroom. This knowledge may also help to enhance better curriculum planning and teacher development programmes. Students' views of mathematics are important as they can shape the way in which they learn mathematics. The outcome of this study will augment better approaches and measures for promoting student understanding and participation in mathematics-related fields. The study would be of immediate help to curriculum implementers in the formulation of strategies aimed at enhancing students' attitude in mathematics. The study forms a base on which others would develop their studies.

Scope of the Study

This study was carried out on only Katombora secondary school. The study was limited to exploring the perception of learners towards mathematics.

Limitations of the Study

Due to the nature of the study, some of the challenges encountered during this study included; lack of provision of adequate information by some informants, financial limitations, time and mobility challenges due to commitment to work, delayed response from informants on dates and time for interviews after submitting the introductory letters, and the reservation of information by some informants. On the other hand, finances were not adequate as was required for the buying of food and refreshments, printing, photocopying and binding and this was attributed to by a hike in the prices of photocopying and printing despite the completion of the research. Nonetheless, substantial information was gathered as some respondents still provided plenty answers to the interview questions.

The main instrument used was questionnaires and biases in questionnaires cannot be entirely ruled out. Particularly, issues such as immaturity of children, permanent injury from parents

beating affected respondents' emotion and integrity. Respondents' inability to complete the questionnaires, other respondents' inability to fill the form while other respondents' lost the questionnaires or some pages of the questionnaires. In the process of collecting the research data, problems such as unwillingness of some participants to participate by collecting and answering the questionnaires was encountered. There was also difficulty in retrieving questionnaires from respondents because they lost or destroyed the questionnaire. Some participants forgot to fill the questionnaires while some participants also did not complete filling the questionnaires. These affected the validity of the conclusion.

Organization of the study

This study was organized into five chapters. Chapter One, deals with the background of the study, statement of the problem, purpose of study, research objectives, research questions, significance of the study, scope of the study, delimitations of the study, limitations of the study, and assumptions of the study were presented. Chapter Two, looks at the review of relevant literature to the study. Chapter Three is about methodology of the study. In Chapter Four, the data analysis, the results and discussions of major findings of the study were found. Finally, Chapter Five covers the summary of the study, conclusions and recommendations.

Theoretical Framework

It is the 'blueprint' or guide for a research (Grant & Osanloo, 2014). It is a framework based on an existing theory in a field of inquiry that is related and/or reflects the hypothesis of a study. Therefore, the theory that underpins this study is the adaptation of Albert Bandura (1986) cognitive theory based on students' perception and their interest on mathematics achievement.

Perception is defined as the process through which we select, organize and interpret information gathered by our senses in order to understand the world around us (Greenberg and Baro, 1999:72). Perception has to do with the individuals' feelings about, or appraisal of, a given object, thing or a person based on the individuals' past and present experiences. According to Bandura (1986) that nothing is more powerful than having a direct experience with something. Therefore students who have excelled in mathematics in the past will definitely have a good perception and interest in learning mathematics leading to high performance.

Definitions of Terms

- **Performance:** Accomplishing or achievement of specific goals, objectives set in any academic undertaking in basic mathematics.
- **School environment:** School environment encompasses physical environment such as buildings like classrooms and teachers' houses, classroom size, how dark or light it is, temperature, the arrangement of chairs, the noise which affects teachers and students' attraction.
- **Mathematics** refers to the study of numbers quantities and shapes.
- **Teachers altitude** refer to the way teachers look at mathematics whether in a positive or negative way
- **Student altitude** is the way student look at mathematic whether in a positive way or negativeway.
- **Students' perceptions of mathematics**, encompassing attitudes, beliefs, and emotions, are pivotal in shaping their academic engagement and success

Summary of the Chapter

This Chapter presented the background information for this study as well as the problem for the study, the purpose for conducting this study, the research objectives and the research questions. Furthermore, the chapter highlighted the significance of the study, its delimitation and its limitations. The chapter also defined the key words and concepts to avoid ambiguity. The next chapter comprises a review of related literature to the study.

2. LITERATURE REVIEW

The Students' Perceptions towards Mathematics

The perception of students about mathematics as a subject determines their approach to studying the subject. Studies showed that many students approached mathematics with disdain as a result of the perception that mathematics is a procedural and rule oriented subject (Mensah, Okyere and Kuranche, 2013).

According to Carroll and Gill (2011), negative attitudes towards the study of mathematics are quite prevalent among students. In an evaluation of the University of Limerick mathematics Learning Centre, Carroll and Gill revealed that, nearly "half of the adult population in England had negative attitudes toward mathematics" since the early 1980s (Carroll and Gill, 2011:16). Supporting this assertion, Haylock (2006) indicated that many adults in Britain are characterised by "feelings of anxiety, helplessness, fear, dislike, guilt and lack of confidence" when it comes to studying mathematics and its related tasks and activities. Citing his interaction with adult learners in a numeracy class of the London King's College, Haylock revealed that majority of these learners see themselves as failures, confused and frustrated and carried some form of negative disposition towards the subject.

Investigating the attitudes of Italian students through essays on the theme "Meand mathematics", Zan and Di Martino (2010) found that students with negative emotional disposition towards mathematics were more than those with positive attitudes towards the subject. This accounted from the perceptions students have about their own abilities or inabilities to succeed in mathematics. Employing a Problem-Based Learning (PBL) method as a Case Study in gender differences in mathematics achievement and retention scores in Nigeria, Ajai & Imoko (2015) stated that many students in Nigeria have developed negative attitudes for mathematics due to the notion that mathematics is a rigid and do-it-right subject which can only be studied effectively by exceptionally gifted students'. A research into students' experiences with mathematics teaching and learning, Mapolelo (2007) indicated that many students in Botswana disliked or have no interest in studying the subject due to their experiences in mathematics lessons. The perceptions of these students are that mathematics is a subject of strictly held and static procedures that places premium on the ability of a student to produce correctly held answers based on a high retentive memorization of concepts and formulae.

The negative perception of students and people who disliked mathematics has created quite unfortunate and bad public image of mathematics in Ghana, where Bole District is not an exception and other parts of the world describing mathematics as difficult, cold, abstract, theoretical and uninterested subject (Wang, Lukowski, Hart, Lyons, Thompson, Kovas, et al. 2015; Björklund, 2010 & Sam, 2002). This problem of misconception and negative perception needs to be eradicated from students' minds, in order to improve students' interest in the learning of mathematics in all levels of our education curricular.

Students' perceptions of mathematics, encompassing attitudes, beliefs, and emotions, are pivotal in shaping their academic engagement and success. Positive perceptions lead to

enhanced motivation and resilience, allowing students to persist through challenges and achieve higher outcomes (Davis *et al.*, 2021; Bannor *et al.*, 2023). Conversely, negative perceptions, often influenced by anxiety and systemic barriers, correlate with avoidance behaviors and reduced performance (Bornaa *et al.*, 2023). These perceptions are influenced by a range of individual, cultural, and systemic factors, including the quality of instruction, curriculum relevance, and societal expectations (Alorki *et al.*, 2024). Understanding the interplay between perceptions, engagement, and achievement forms the basis for this study, as it highlights how targeted interventions can foster positive attitudes toward mathematics (Fordjour *et al.*, 2024).

Supportive parents and community engagement play pivotal roles in shaping students' perceptions. Parents who emphasize the importance of mathematics and provide learning support positively influence students' aspirations (Davis *et al.*, 2021). Conversely, in rural communities where parents often lack mathematical knowledge, students are less likely to receive reinforcement at home (Karadaar *et al.*, 2024). Workshops that equip parents with basic skills to support their children's learning can help bridge this gap.

The Factors affecting Mathematics learning

According to Albelbisi & Yusop (2019), student learning difficulties are influenced by many factors, both internal and external factors. Internal factors that influence such as: problem solving, intelligence, learning motivation, mindset of subjects, and personality. External factors that influence such as: lecturer performance, family support, campus environment, learning methods, and so on. These factors need special attention from several related parties, especially the teaching staff. Acharya (2017), examined the difficulties of public school students in learning mathematics in relation to their learning. The research objective was to explore the causes of learning difficulties in mathematics. The qualitative research design and interviews were conducted with respondent students in three schools of Arghakhanchi district. The results of the analysis show that students, teachers, and parents have an important role in increasing student graduation.

A study was conducted by Leonard, (2016) on Factors affecting students' interest in mathematics in Secondary Schools in Enugu state. The reason for the study was to find the possible factors that affected students' interest in mathematics. The study employed a survey research design and it also made use of quantitative data analysis techniques. The research findings revealed that, teacher factor, student factor, instructional strategy, mathematics anxiety and infrastructural problem correlated positively with students' interest and their mathematics achievements.

Rimma (2017) conducted a research on students' interest and engagement. Perspectives on mathematics in the Classroom. The main purpose of the study was to investigate how interested and engaging students are, in a mathematics class, and the perception they had about mathematics during the lesson. The researcher made use of mixed methods, using both quantitative and qualitative data together. The following results were identified; Majority of the students showed less interest in mathematics due to inappropriate methodology used by teachers. Most students deliberately not engaging themselves in mathematics lessons with the notion that mathematics is difficult. Whiles few testified that interest is manifested through their engagement in mathematics lessons with a positive perception. The findings also showed that students' interest and engagement was developed by teachers during classroom interaction as perceived by the students in mathematical tasks. The study concluded that students' interest and engagement had a very significant relation with mathematics classroom achievement.

1. Use of Teaching and Learning Materials

Teaching and Learning Materials (TLMs) may be seen as any material that aids the teaching and learning process in classrooms. TLMs are mostly used by teachers to stimulate and engage the interest of learners during the learning processes (Mathematical Association of Ghana, 2013). Akuamoah, Ampadu, Asamoah, Baffoe Bonney and Pray (2004) see teaching and learning materials as instructional materials that aid students to comprehend a given lesson. They went further to add that teaching and learning materials, also known as instructional materials are any audio-visual or teaching aids which contributed to the learning process. According to them, TLMs are now referred to as instructional media or multimedia in these contemporary times.

Some examples of TLMs mostly used by instructors are real objects such as photographs and sketches and drawings. The role of TLMs in promoting the understanding and raising positive attitudes of students towards studies cannot be overemphasized. According to Akuamoah et al (2004:148), the use of TLMs arouses the interests of learners and as well promotes self-learning and transfer of knowledge.

Despite the significance of teaching and learning materials in mathematics education, some teachers still teach the subject in abstraction without recourse to any teaching aid. Akuamoah et al (2004:148) postulated that such teachers ended up being frustrated and aggravated for the inability of their students to perform well in the subject. Research revealed that most schools in developing countries such as Ghana are not equipped with the required instructional materials. Teachers in such schools are left to their fate to either improvise these materials or to do without them (Legotlo and Maaga, 2002).

Educational resources in the form of infrastructural resource materials are essential ingredients in any teaching/ learning situation. According to Fuller (1987) and Dembe, Moorad, and Afemikhe (2008) who all reported that school resources account for more of the variations in students achievement in school subjects such as mathematics. Furthermore, Dambe, et al (2008) reported that few effective studies undertaken in developing countries, those educational resources are very important input in achievement. The use of teaching resources particularly in mathematics will shift the psychological phobia, anxiety and abstraction associated with mathematics to real life situation and practically oriented.

2. Students Motivation towards Mathematics as a Subject

The question of how to motivate learners in the classroom has become a leading concern for teachers in all disciplines, let alone in mathematics. Therefore the role of motivation in learning mathematics and its achievement cannot be overlooked. Motivational factors are very crucial in determining the kind of attitude students have towards mathematics as a subject and their efforts in studying it. Motivation towards mathematics has to do with the factors that inform and influence people and or students to pursue the subject. Students are motivated towards mathematics as a school subject of study if their expectations are that it will lead them to a desired goal. According to Baba (2012), motivation is defined as the willingness of an individual to exert high levels of efforts towards the realization of organizational goals. Motivation is also defined as all the inner striving conditions such as wishes, desires and urges which lead to the stimulation of a person's interest in a particular activity (Ofoegbu, 2004). For Akuamoah et al (2004:214), "motivation is both the internal and external desires which pushes and sustains one's interest to achieve a goal".

Motivation for mathematics may therefore be seen as those internal drives, desires and expectations which urge students and people to pursue mathematics as a subject of study or interest in schools. There are three major components of motivation. They are; effort, desire and affect. Effort has to do with the energy exerted towards some activity. A student who is

highly motivated will exert more effort such as attending extra classes and doing extra studies into his/her mathematics and other areas of learning interest. A desire for achievement will surely influence the seriousness or perception of a student towards his/her studies. The affect component of motivation deals with the enjoyment, excitement, interest and the fun associated with performing a task such as studying Mathematics. It must be noted that these three components of motivation are interrelated and interconnected. Any student who lacked any of these components might not be fully motivated for the subject (Mathematics) and hence may find difficulties in studying and achieving in mathematics which may subsequently result in the development of negative attitude or perception towards mathematics (Saeman, 2009 and Baba, 2012).

3. The Attitudes and Beliefs of the Mathematics Teacher (Teacher Factor)

The role of the teachers' attitude and beliefs towards mathematics cannot be overemphasized. Teachers with positive attitudes and strong knowledge of mathematical concepts and principles are more likely to positively influence the perception and interest of learners for the subject than those with negative perception or attitudes and lack of confidence.

Research on students attitude towards mathematics performance: does the teacher attitude matter conducted by Mensah et al (2013) in Ghana disclosed that teachers who devoted themselves in encouraging and supporting their students did not only help in shaping the perception or attitudes and behaviours of their students, but also, they provided opportunities for their learners to face realities associated with school life with ease and confidence. They added that "teachers are, invariably, role models whose behaviours are easily copied by students". With this, Mensah and his colleagues maintained that the "likes or dislikes" of a teacher does have "significant effects" on the academic and psycho-social lives of his/her student (Mensah et al,2013:135).

Yara (2009), however, asserts that, many teachers seldom realize this vital role played by teachers. A study carried out on learners' attitude towards mathematics and academic achievements in some selected schools in Nigeria revealed that learners are mostly characterised by positive attitudes towards mathematics just like any other subject at the early stages of their academic persuasions. However, the demeanour, attitude, knowledge, skills and pedagogical techniques of the teacher are mostly responsible for the development of positive or negative attitudes or perception of the student towards mathematics (Yara, 2009). In this regard, Yara proposed the development of high levels of mathematical competence and skills through comprehensive training of teachers, coupled with the development of positive, gender- sensitive attitude and appropriate and child-centred methods of teaching mathematics.

4. Teaching Methodologies Employed During Mathematics Lessons

Douglas (2002) defines teaching methodologies as interventions adopted by a teacher to enable students arrive at a learning objective. He added that teaching and learning is a "dynamic interaction among four components: the teacher, the learner, the curriculum and the learned repertoire" (Douglas, 2002:4). Adding to this view, Ozkan (2011) emphatically stated that "teaching is not just a matter of telling stories, and learning is not just a matter of listening to stories". Ozkan defined teaching methods as "the types of principles and methods used for instruction" (Ozkan, 2011:1).

Depending on the type of subject, content, environment, level of students and objectives of a particular lesson, a teacher may employ one or more of these identified teaching methodologies: activity or child-centred methodology, demonstration, lecture, question-and-

answer as well as drama and role-play (Douglas, 2002, Smith, 2004, Mapolelo, 2009; Ozkan, 2011 and Mathematical Association of Ghana, 2013).

According to Yara (2009), inappropriate teaching methodology employed by teachers has contributed greatly to killing the innate curiosity and aspirations of learners. Writing on the topic “poor teaching”, Smith (2004) said that poor teaching is the process by which teachers employ inappropriate strategies that is characterised by a mismatch between the study curriculum and the needs of the student. He added that poor teaching also involves the inability of the teacher to identify the different learning and special needs as well as the behavioural learning styles of students so as to adopt appropriate strategies and measures to addressing those differing need.

5. Attitudes of Parents and Their Involvement in Students Education

The attitudes of parents towards their children directly influenced their involvement in the education and academic performance of these children. Parents are considered as the first teachers of children at our various homes. The type of attitudes, perceptions, beliefs and values held by children towards any subject (especially mathematics) is believed to be greatly influenced by his/her parents. This is because, as first teachers of the child, parents and the family normally inculcate their own attitudes, perceptions, values, interests, beliefs, customs and norms in the child, which in turn influence how he/she perceives things and behaves towards things and issues (Akuamoah et al 2004 and Mji and Makgato, 2006).

Parents are valuable resources because they invest a lot in their children’s education. Parents provide the required needs such as school uniforms, school fees, books and other stationery for their children. The concept of parental involvement has been defined as the participation of parents in every facet of their children’s education and development from birth through to adulthood. The term simply means that parents are actively involved in assisting their children to learn effectively in schools and out of school and as well partnering with schools in the decision-making and advisory process with regards to their children’s education (National PTA, 2012). An “involved parent”, according to LaBahn (1995:1) is one who is “sympathetic, understanding, reassuring and encouraging”. LaBahn indicated that parents who showed interests, and effectively involved themselves in the education of their children have contributed significantly to the academic performance of their children as well as renewed interests and attitudes towards education.

Despite these seeming benefits of parental involvement, many parents in Africa are not effectively involved in their children’s education especially girls. Among the reasons accounting for low involvement of parents in their children’s education are illiteracy, family pressures, financial challenges and perceptions of parents towards the child and subjects of study (LaBahn, 1995 and Akuamoah et al 2004). Dandala (2013) found that literate parents were more involved in their wards education and choice of courses than illiterate parents. This he said could account from the fact that illiterate parents might not be fully aware of the importance of education let alone to know the importance of parental involvement. Family pressure is also another stumbling block to parental involvement. Socio-cultural problems such as divorce and single parenting coupled with time constraints may also affect the ability of a parent to effectively involve themselves in their wards education.

Supporting this assertion, Asikhia (2010) postulated that polygamous parents wireless likely to be involved in their children’s education and academic performances than their counterparts in monogamous parents. This is so because, there is so much pressure in the polygamous or extended family as compared to the monogamous or nuclear family. Closely linked to this is financial pressure. The lack of or passive participation of some parents in their children’s education is blamed on difficult economic situations facing those families.

Lack of or passive involvement of some parents does not necessarily mean they are neglecting their parental duties, but rather, they are financially handicapped (LaBahn, 1995).

6. The School Environment

The school environment has also been identified as a major factor that influences gender differences in students' attitudes towards the study of mathematics. The nature and type of environment learners find themselves does affect the type of attitude being developed. Students who find themselves in a hostile environment are more likely to develop negative attitudes, hence no interest for the subject than those in a congenial environment (Gallagher & Kaufman, 2006).

In a study on students and teachers' perceptions of the causes of poor academic performance in Nigeria, Asikhia (2010) stated that in unconducive school environment such as large class size has not only contributed to the negative perception and attitudes of learners but also, it has contributed to the poor academic performance of students. Classroom size, social interaction within the school (between students and school authorities, or among students themselves), methods of assessment in the school and the content of the curriculum are some features of the school environment that influence learners' perception and interests in mathematics (Gallagher & Kaufman, 2006).

7. Math Anxiety

There are many different types of anxiety, but one type of anxiety that is prominent in classrooms of all different grade levels and sizes is math anxiety (Ashcraft, 2002). At first glance, math anxiety might appear to only affect students, but math anxiety is also prominent in teachers. Math anxiety is "a feeling of tension, apprehension, or fear that interferes with math performance" (Ashcraft, 2002, p. 181) and is more commonly found in women than in men. Starting at a young age, children tend to mimic the behaviors that they see of the adults who are the same gender as them, so young children, particularly female children, who see their female teachers feeling anxious about math are very likely to develop those same feelings towards math (Beilock et al., 2010).

According to Burns (1998), many students have fears and loathsome experiences about mathematics. Such negative experiences are caused by mathematics anxiety which knows no boundaries irrespective of age or gender. Mathematics anxiety is the feeling of tension, helplessness, mental disorganization and dread one when required to manipulate numbers and shapes and the solving of mathematics problems (Ashcraft and Faust, 1994). One of the most notable consequences of mathematics anxiety is poor mathematics achievement and competence (Ashcraft, 2002). Students who are infested with mathematics anxiety will lack interest to learn mathematics, and consequently may tend to achieve poverty in the subject.

8. Gender

Similar to the lack of representation in math regarding race, there is also less representation in math-related fields for women. Females are less likely than males to pursue careers relating to math partly because of gender role association and their own mathematical self-concept. Mathematical self-concept refers to how someone views their math abilities in comparison to those of other genders (Sax et al., 2015). Gender differences in mathematical self-concept appear as early as elementary school and are present until college, where it then widens even further (Sax et al., 2015).

Strategies of Enhancing Students' Mathematics Perception

An immense factor in experiencing mathematics in the classroom is the relationship that is building between the teacher and student. According to Rossnan (2006), math anxiety can cause one to forget the material and their self-confidence to decrease. The important sub factors for building a strong and trusting relationship in the classroom is creating a healthier way to increase self-efficacy beliefs and to mold the confidence in helping overcome math. This is achieved by boosting student's self-esteem and improving their attitudes towards themselves. Students most likely will benefit from creating and maintaining a healthy support system aimed at lowering math anxiety.

Teachers can offer such skills to students and can offer support for students when they feel some tensions towards mathematics. For example, coping skills like breathing, focusing, and relaxing techniques might aid in lessening the math anxieties students have in a math class. Gurefe & Bakalim (2018) state that students who have developed coping skills or a coping strategy had lower math anxiety and performed well in math classes.

According to Furner, Yahya, & Duffy (2005) knowledge of the language of mathematics is an important skill necessary to succeed in today's world. In math, language is what math is built on. English Language Learners often need specially designed instruction in English by building strong vocabularies to learn the material (Furner, Yahya, & Duffy, 2005). Mathematics is a language that students must understand first as they are learning math. Teachers must use techniques and other strategies to build those math vocabularies and allow time for concepts to set in for their students to observe. We can also add motivation as a key concept of learning.

Liu, McKelroy, Corliss & Carrigan (2017) investigate the impact of an adaptive learning intervention to offer remedial instruction in the field of math. The research shows that students learn more effectively when instruction is individualized to the learner's needs. In other words, teachers should offer different ways to differentiate the instructions to their students. If teachers offer support and differentiated instructions, all this can happen and be successful if the learning environment is nurturing and respected.

Vygotsky, a child psychologist, explains that the way to increase a student's ability in performance is to work closely in assisting in their learning and understanding (Miller, 2011). Vygotsky, like Bandura, draws from the idea of imitation. This is what teachers do for students to observe their teacher's actions and skills. It is like the saying, monkey see, monkey do; the teacher shows, the student gains knowledge. According to Vygotsky, meaningful imitation must be distinguished from automatic copying. In other words, problem solving is distinguished by learning from another and it requires repetition and trial and error learning (Miller, 2011).

In comparison to Vygotsky theory, Bandura (1994) states that vicarious experiences are provided by the sustained efforts of the model. If a failing student observes a successful model, that student will then believe that they possess the capabilities to succeed as well. In other words, Bandura explains that students capture the efforts and abilities that the teacher models in the classroom. Imitation is how we learn from one another to pass on skills and philosophies to the next generation. Mental imagery can be so powerful that learning a skill by imitating can be almost as effective as actually performing it (Sousa, 2016). We can say that vicarious experience and imagery go hand and hand to increase the capability that the student will model the same behavior of the teacher in the classroom. Imagery can be used in many classroom activities, including note taking, cooperative learning groups, and alternate assessment options (Sousa,

2016). Teachers should always remember that their students are constantly modeling their skills and behaviors in the classroom, so teachers should watch how they act in front of their audience. Vicarious experiences are being expressed in many forms from the teacher such as,

their responses and their teaching methods, but most importantly, how they reply to the student performances.

Improving a student's success on board exams requires effective study techniques. Increased long-term retention can be achieved by retrieval practice, in which pupils frequently recollect knowledge. Retrieval practice helps students remember material better during exams and helps them retain their knowledge, as noted by Roediger and Butler (2011). Another important strategy is to practice exams. Practice exams enable students to become comfortable with exam formats and reinforce learning through repeated retrieval, as shown by Pyc and Rawson (2009). This strategy helps to improve performance and lessen exam anxiety. It is also helpful to encourage students to elaborate on why something is true, a strategy known as "elaborative interrogation." According to Wade et al. (1999), this strategy improves memory retention and fosters deeper understanding. Brewster and Fager (2000) also stress the significance of creating a comfortable study environment.

Summary of the Literature Review

The chapter discussed themes derived from the objectives which were the students' perceptions towards mathematics, the factors affecting Mathematics Learning and the strategies of enhancing students' mathematics perception.

3. RESEARCH METHODOLOGY

Research Design

The research design is the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in the procedure (Kumatongo & Muzata, 2021). Research design is defined as a plan of gathering research subjects and collecting information from them, (Kruger & Welman, 2001). The study adopted a mixed methods approach. The research design was a descriptive survey, as (Khan 2006) pointed out that a descriptive study may often result in the formation of important principles of knowledge and solutions to significant problems. The study incorporated both qualitative and quantitative aspects of research. Creswell (2009) acknowledges that there are three main elements that influence the choice of research design, which is world view, strategy, and methods. The main types of research design are:

- Descriptive research, which provides an accurate account or description of the facts and events surrounding an identified situation. This research type only provides a description on the phenomena, but falls short in explaining the cause(s) of the phenomena, (Saunders & Lewis, 2012).
- Explanatory research, which entails studying occurrences or problems with the aim of explaining relationships between variables, (Saunders & Lewis, 2012).

Causal research studies of one occurrence influences another, (Saunders & Lewis, 2012). A combination of explanatory research and descriptive statistics was used in this study.

Target Population

A population is the total of all the individuals who have certain characteristics and are of interest to a researcher (Kitchen ham, Dyba & Jorgenson 2004). Saunders & Lewis (2012) define the population as the complete set of group members. In this study, the population was all pupils, all parents and all teachers at katombora secondary.

Sample Size

Sampling refers to the technique used in the selection of unit of analysis from the base representing the research population or universe, in the absence of access to the entire population, (Saunders & Lewis, 2012). The results obtained from the units of analysis selected can be used to generalize or extrapolate to the population, (Tharenou, Donohue, & Cooper, 2007). According to Brynard and Hanekom (2005:43) it happens in research that the population to be studied for a particular project is of such a magnitude that it could take researcher years to complete the research. As a result a small group from the population is selected, this is called sample. In this study the researcher could not access all SCOs, all human rights defenders (HRDs), all journalists, PPs and all marketers in order to get the data. Armstrong (1993:75) states that sampling denotes extracting systematically from a large group so as to represent adequately the larger group. Sampling is done to simplify the research, to save time and cut costs (Brynard and Hanekom 2005:43). The sample size for this study therefore, included 30 pupils that is 10 pupils per grade from 10 - 12, 20 parents and 4 mathematics teachers at katombora secondary bringing the total number of respondents to 54.

Sampling Technique

This study employed a mixed-methods design and therefore employed a mixed sampling procedure of a Convenience sampling and purposive sampling. Purposeful sampling as one of the types of non-probability sampling was used. It is the most important kind of non-probability sampling (Welman and Kruger 2001:63). They continue to say researchers rely on their experience, ingenuity to deliberately obtain units of analysis in such a manner that the sample they obtain may be regarded as being representative of the relevant population. McMillan & Schumacher (2001:175) state that in purposeful sampling the researcher selects particular elements from the population that will be representative or informative about it. Convenience sampling was chosen as the primary sampling technique due to ease of access to the target participants. Therefore, purposive sampling was used to select teachers of mathematics whereas Convenience sampling selected parents and pupils.

Research Instruments

The following section presents research tools used in the collection of data. A research instrument is any tool, device, or method that researchers use to collect, measure, and analyse data. These instruments can vary widely depending on the nature of the research, the type of data being collected, and the methodology being employed. In simpler terms, research instruments are the means by which data is gathered to answer research questions. The research tools that were used are questionnaires and, interview guides. According to Cohen, Manion and Morris (2000) no single method can act in isolation because it can distort the whole picture of reality that the researcher is investigating.

Questionnaires

A questionnaire is a research instrument consisting of a series of questions and other prompts for the purpose of gathering information from respondents. Questionnaires are a list of questions either open-ended or close-ended for which the respondents give answers. The questionnaire is a way of obtaining information or data using statements or questions that require participants to respond to something written for specific purposes (McMillan & Schumacher 2006:194). A questionnaire is very useful in this research as it used both qualitative and quantitative methods and so suits for quantitative methods.

Interviews

Interview is a face-to-face conversation with the respondent. In interview the main problem arises when the respondent deliberately hides information otherwise it is an in depth source of information. The interviewer can not only record the statements the interviewee speaks but he can observe the body language, expressions and other reactions to the questions too. This enables the interviewer to draw conclusions easily. A semi-structured interview can be taken as a conversation between a researcher and participants, with the researcher attempting to understand the behaviour of the participants without imposing any a priori categorization which might limit the field of enquiry (Punch 1998). Interviews were used as they are very useful in qualitative methods.

Data Collection Techniques

The researcher was given an official introductory letter from Chalimbana University that was delivered to the respondents. This enabled the researcher to officially conduct the study in the area under consideration.

Data Analysis

Data analysis refers to the practical application of formal mathematical procedures to the analysis of social science data. It is concerned with sensitizing social researchers to the use, interpretation and evaluation of relevant data (Rose and Sullivan, 1993). The data collected in this research was analyzed using Microsoft Excel 2007 to generate charts. Analysis involves categorizing, ordering, manipulating and summarizing them before describing data using meaningful terms. Qualitative data was analyzed using thematic analysis. Common themes were categorized and put together under each research question.

Reliability and Validity

Reliability and validity both relay the reasoning and precision of a test, (Wilckens, 2010).

1. Reliability

The main goal of measuring reliability is to ascertain the internal consistency of the research measurement instrument pertaining to each variable, (Teo, 2011). Zikmund and Babin (2006) state that reliability examines the consistency of the measurement instrument, where diverse efforts to assess a variable meet at the same result. Reliability is concerned with whether the findings of a study are repeatable, (Bryman & Bell, 2011).

2. Validity

Validity in research probes whether the measurement instrument assesses what they are meant to assess, (Bryman & Bell, 2011). Welman, Kruger and Mitchell (2005) posit that construct validity tries to establish the degree to which the measurement items precisely captures the variables that are being measured.

Ethical Considerations

The concept of ethics in education research is increasingly becoming a very important undertaking just as it is in the medical and other sensitive fields that require that individual's privacy and rights to participate in studies are protected. Ethics, according to Johnson and Christensen (2012) are principles and guidelines that help uphold the things we value. Confidentiality is a very important aspect in research ethics. Cooper (2016) advises researchers to take into consideration several steps that ensure subject's identities and the link between their identity and data to remain confidential. According to Cooper (2016) such steps

should include assigning subjects identification numbers that should not be related to the data they give. Before the research can commence, it needs to be scrutinized by this committee. Following Denscombe's (2014) advice, the researcher applied for ethical approval from the University's research ethics committee. In sum, the researcher was very vigilant about the issues that could bring doubt about to the authenticity of the study and therefore considered seriously the ethical standards that safeguard the conduct of research.

Summary

1. In summary, this chapter discussed the methodologies that were in this study. The study applied the mixed-methods design. The chapter explained the population, sampling and its procedures, the research tools used and how the data was collected and further explains the analysis procedures and the ethical considerations that employed. Validity and reliability have been discussed.

2. CONCLUSION

The study concluded that many pupils hold negative perceptions towards mathematics, viewing it as difficult, boring, abstract, and difficult to understand. These perceptions contribute to fear of failure, anxiety, low confidence, avoidance of the subject, and poor academic performance. The findings also revealed that negative teacher behaviors, such as lack of encouragement and dismissive attitudes, further discourage students' participation in mathematics lessons. However, the study established that positive teaching practices, supportive classroom environments, and the integration of technology such as simulations and gamified learning platforms can improve learners' interest, confidence, engagement, and overall performance in mathematics. Professional development for teachers and the use of student-centered teaching methods were also identified as important strategies for improving mathematics education.

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