**UNIVERSITY OF EDUCATION, WINNEBA**

# STRATEGIES MATHEMATICS TEACHERS EMPLOY IN MOTIVATING THEIR STUDENTS IN LEARNING MATHEMATICS

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# DECLARATION

**Student's Declaration**

I, **MATILDA BOAKYE**, declare that this dissertation, with the exception of quotation and references contained in published works which have all been identified and duly acknowledged, is entirely my own original work, and it has not been submitted, either in part or whole, for another degree elsewhere.

SIGNATURE…….

DATE…….…….....




**SUPERVISOR'S DECLARATION**

I hereby declare that the preparation and presentation of this work was supervised in accordance with the guidelines for supervision of dissertation as laid down by the University of Education, Winneba.

Name of Supervisor: Professor Kwesi Asiedu Addo

Signature: ……..…..……

Date: ……..…….……..

# DEDICATION

This thesis is dedicated to my sweet husband Kwabena Badu Amponsem and my lovely sons Nana Kofi Atiako Amponsem and Kwadwo Amponsem Jnr.

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Finally, I do admit responsibility for any inadequacy in this project.

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# ABSTRACT

Motivation in educational institutions is one of the issues to be taken in to consideration in other to realize the goals and objectives of education in any country. This study focused on the strategies mathematics teachers employ to motivate their students in classroom settings. The study area was Nkawie Municipal district in the Ashanti region of Ghana. The study respondents from the district involved teachers who were in the Senior High School (SHS) specifically Nkawie Senior/Technical School, Toase Senior High School and Mpasatia SHS. Interviews and questionnaires were used to solicit information from 200 teachers in three Senior High Schools at Nkawie Municipal. Quantitative analysis was done using mean and standard deviation, and regression analysis to analyze the respondents' responses to the questions for the study. Both teachers' and students' level of motivation in teaching and learning of mathematics were positive and high from the descriptive statistics. Among these strategies includes providing room for open exchange of ideas, accepting mistakes as normal part of learning, and creating encouraging and supporting environment for students to learn and grow. The study suggested that teachers should be supported academically to acquire adequate mastery of subject matter and classroom management to help them teach and use appropriate teaching methodologies and classroom management techniques. The Study recommends also that mathematics teachers should manage their classroom environment effectively and focused on discipline.

# CHAPTER 1

# INTRODUCTION

## 1.0 Overview

This chapter gives an introduction of the research. It begins with the overview, the background to the study, statement of the problem, purpose of the study, objective of the study, research questions, scope of the study, research limitations, significance of the study, and organization of the study.

## 1.1 Background to the Study

In the Sub-Saran Africa, mathematics is a key subject in the school curriculum and most countries consider it as must-pass subject to gain admission into tertiary institutions (Abreh, Owusu, & Amedahe, 2018). Mathematics is also recognised as one of the most important subjects in the school curriculum across the world (Suleiman & Hammed, 2019). It is the basis of scientific and technological knowledge that greatly contributes to a country's socioeconomic development (Suleiman & Hammed, 2019; Kiwanuka et al., 2015). Many individuals rely on mathematics in their daily lives (Ali & Jameel, 2016). Mathematics, according to Enu, Agyeman, and Nkum (2015), is one discipline that has an impact on all aspects of human existence at various levels.

Mathematics is the backbone and a tool for every country's scientific, technological, and economic advancement, according to studies by Tshabalala and Ncube (2016). Despite the highly praised and recognised importance of mathematics, as a prerequisite subject into tertiary institutions, poor achievement and lack of interest in mathematics among students continues to be a source of concern in both developed and developing countries' schools, colleges, and universities (Naiker et al., 2020; Sharma et al., 2018).

Over the years, mathematics has been one of the poorly performed subjects in the West Africa Senior Secondary Certificate Examination (WASSCE) in Ghana (Abreh et al., 2018). Great effort has been initiated by school leaderships and educational stakeholders for the adoption of appropriate teaching and learning methods that stimulate learners' interest in mathematics to improve their performance and achievement. It has generated a great deal of academic interest in the area of mathematics education and educational studies in general (Arthur et al., 2017; Tosto et al., 2016; Zhang & Wang, 2020). In recent times, some studies have sought to therefore present the antecedents of performance in mathematics (Surur, 2022; Syarifuddin & Atweh, 2022). Among the antecedents of performance in mathematics, motivation has been the most identified variable in most studies.

Many scholars have come out with a number of definitions for motivation. Motivation, according to Kearney (2018), is a force that energizes, drives, and maintains a person's work toward achieving set goals. Motivation has been defined as the psychological mechanism of behavioural aim and direction (Manzoor, 2012), and an internal drive to satisfy an unfilled need (Abeysekera & Dawson, 2015; Pelletier et al., 2013). Motivation, according to Hennessey and Amabile (2015), is defined as an internal process that motivates, directs, and sustains a given behaviour. As a result, the force pushes a person to act in a certain way (McCombs & Vakili, 2015).

Gagne (2015) defined motivation as an internal and external energy that helps people achieve personal and individual goals. Internal and external influences, according to Dörnyei and Ushioda (2021), stimulate people's desire and energy to continue to be interested in, committed to, or strive for a job or a topic. This demonstrates that institutions cannot achieve goals without workers as their foundation.

Motivation is a stimulus that encourages and energizes people to do certain activities and has physiological, cognitive and affective dimensions according to scholars and researchers (Akinbadewa & Sofowora, 2020; Al-Husban, 2020; Basarmak & Hamutoglu, 2020; Hamid, Salleh, & Laxman, 2020; Suren & Kandemir, 2020).

What can teachers do to improve students' motivation in learning especially in the classroom of mathematics? Regarding that question, the connection between students' motivation and their achievement in learning has become a common discussion. Almost all education experts and education stakeholders agree on the influence of motivation on students' behaviour in learning process. In the literature, it is argued that, to understand students' behaviour, we need to know their motives (Hannula, 2016). The students' motivation to learning mathematics concept was employed to determine students' motivation level towards mathematics based on four dimensions, namely interest, relevance, confidence, and satisfaction (Seifeddine, 2014).

Learning theorists acknowledge the positive effects of students' interest in, wishes about learning on their success in learning process. The variables that enable students to engage in learning with interest and enthusiasm could be explained by two concepts called "learning motivation" and "academic motivation" (Anderman & Midgley, 1997; Eccles & Roeser, 2009). Academic motivation is defined as a student's desire (as reflected in approach, persistence, and level of interest) regarding academic subjects when the student's competence is judged against a standard of performance or excellence (Omiles et al., 2019; Serhan, 2019; Olowo et al., 2020). It is defined as the students' desire or interest in engaging with learning and their school experience (Hulleman et al., 2016). Academic motivation is a broad term incorporating many

concepts studied by scholars to include self-efficacy, determination, resilience, etc. (Altakhyneh & Abumusa, 2020; Cayvaz, Akcay, & Kapici, 2020; Finogenow, 2017).

Academic motivation and engagement are said to be influencing factors on college students' outcomes (Chen & Lu, 2015; Roksa & Whitley, 2017; Trolian et al., 2016). Research has consistently found that academically motivated students tend to perceive school and learning as valuable, like to learn, and enjoy learning-related activities (Larsen & Puck, 2020; Zimmerman, 2008). Studies have identified lack of motivation as a primary reason for underachievement (Scheel, Madabhushi, & Backhaus, 2009; Wigfield, Lutz, & Wagner, 2005). It is expected that a student who wants to move to a better status than his/her status will have a higher motivation in academic settings. Therefore, it is expected that students who are at the center of education and training activities will reach a better status in their profession, that is, their achievement and motivation in their careers will increase. Highly motivated students are expected to make more effort to increase their academic and social achievement in their learning process. Thus, it is desirable for students to have a high career and academic motivation in terms of education.

Various factors responsible for students to lose motivation in mathematics such as lack of teacher motivation, low students' literacy abilities in understanding the mathematical problems and less parental involvement have been highlighted (Shahrill, Abdullah, & Yusof, 2015). While students perceive that only bright students are favoured during mathematics lesson, mathematics teachers believe that all learners may involve depending on the teaching method used. For instance, class discussion helps students to provide their views about the problem while authentic problems help them to appreciate the usefulness of mathematics in real life (Aloquina & Marpa, 2016).

Teachers are key actors who shape the learning environment and whose main tasks include motivating students to learn. Teachers can differ in the way in which they try to motivate students to learn and their motivational strategies can vary from person to person (Hornstra, 2015). The academic achievement is required to be of greater value and for the attainment of which the students, teachers and parents strive towards it (Verma, 2016). The role of effective teachers is fundamental in promoting student motivation and achievement. Effective teachers are described as possessing those dispositions that are recurring patterns of thoughts, feelings, or behaviours that result in higher levels of performance as a teacher (Hutajulu, Wijaya, & Hidayat, 2019; McCune & Entwistle, 2011).

To ensure that learners understand what is taught by the teacher, different instructional strategies are applied in the classroom. These instructional strategies are usually selected according to the content to be presented. Instructional strategies are everything that teachers use to aid learners in their learning process and are the means to bring about effective teaching and learning (Amos, Folasayo, & Oluwatoyin, 2015). Teaching strategies are practices used by the teacher to achieve educational aims focusing on developing the student's intellectual abilities (Amparo, Enríquez, Valencia, María, & Oliveira, 2018). Instructional strategies ensure that, there is an effective achievement of stated instructional objectives (Nafees et al., 2016) and increase student achievement (Dean et al., 2016).

Yılmaz, Altun, & Olkun, (2016) has researched into factors that connect mathematics with real life, using instructional materials, teachers' personality, teachers' content area knowledge, bad instructional practices, lack of commitment by students' and teachers' classroom management. Other factors include teachers' emotional support (Blazar &

Kraft, 2017), teachers' affective support (Sakiz, Pape, & Hoy, 2015), class activities, subject content and amount of work, scarcity of teachers and inadequate resources peer and parental influence (Enu, Agyman & Nkum, 2015). Dorfner et al., (2018), Lazarides and Buchholz (2019), and Motegi and Oikawa (2019) found that instructional quality has a significant effect on students' performance in mathematics.

There is an impression that the results of students' academic achievement might be affected by the teachers' perceptions about their classroom teaching strategies, and what is done in the classroom can be used to perfect and improve instruction in the future (Elmurabet, 2015). Therefore, once teachers have found challenging indicators, they might generate new teaching strategies that would evoke the students' conceptual understanding and deal with those challenges, towards enhanced teaching and learning (Saima & Qadir, 2011). It is the motivation of this study to investigate strategies mathematic teachers employ in motivating their students in learning mathematics at Nkawie Municipal.

### 1.2 Statement of the Problem

Early mathematics concepts are foundational for success throughout the school years and later during adult life (Lee, Park & Ginsburg, 2016; Opfer, Kim & Qin, 2018; Watts et al., 2018). Educators face several problems in designing curriculum, implementing appropriate instructional strategies, and monitoring interventions in an early childhood classroom where children are at various and often differing ends of a spectrum of mathematical abilities (Anders & Rossbach, 2015; Opperman, Anders & Hachfeld, 2016).

One of the most significant challenges in learning is for individuals to take responsibility for their own learning. When learners take responsibility for their own learning, they attribute meaning to the process of learning, leading to effective learning (Nzesei, 2015). Teachers need to understand the process of individual learning. In the learning process, individuals are interacting with the environment, i.e., uniquely processing the information and requiring a unique environment for learning. Thus, Sighn (2017) maintain that, in addressing the challenge in facilitating learning conditions, teaching strategies should be taken into consideration to help individuals to optimize their learning. To bring a fundamental change in the learner is the primary purpose of teaching at any level of education, hence teachers need to apply appropriate teaching strategies that best suit specific objectives and competencies to secure and facilitate the process of knowledge transmission (Tebabal & Kahssay, 2011).

Numerous instructional strategies and practices have been identified as characteristic of effective teaching or have been recognised as characterizing effective teachers. Such instructional strategies and practices have become the focus of initial teacher education and continuing professional development training programmes (Eriksson, Helenius & Ryve, 2018). Eriksson et al., (2018) argued that, instructional strategies and practices should only be regarded as characteristic of quality teaching if there is evidence that they generally have a positive effect on student academic performance.

Although considerable literature has shown the relations among students' learning strategy use, motivation, and academic performance, most studies consider learning strategies as mediators between motivation and academic performance (Metallidou & Vlachou, 2007; Sorić & Palekčić, 2009; Yıldırım, 2012). However, it is unclear whether learning strategies may explain the relationship between motivation and academic

performance. Given that motivation is contextual and domain-specific (Schunk et al., 2014), it is likely that students' learning motivation may differ in mathematics compared to other content areas such as reading. Despite the continuous efforts to improve mathematics education, it remains imperative to conduct a thorough assessment of the existing level of student motivation in learning mathematics at Nkawie Municipal. This evaluation is crucial for several reasons.

Firstly, understanding the current state of student motivation provides a baseline for educators and policymakers. It allows them to gauge the effectiveness of existing initiatives and interventions aimed at enhancing mathematics education. By comprehensively assessing student motivation, educators can identify specific areas that require attention and tailor interventions to address the unique needs and challenges faced by students in Nkawie Municipal.

Moreover, this evaluation involves delving into the various factors that either contribute to or hinder students' enthusiasm for mathematics. According to Deci and Ryan's Self-Determination Theory (2017), motivation is influenced by intrinsic and extrinsic factors. Intrinsic motivation stems from internal desires and personal interest, while extrinsic motivation involves external factors such as rewards or punishments. By exploring these factors in the context of mathematics education at Nkawie Municipal, educators can gain insights into the diverse sources of motivation among students.

For example, the assessment may uncover specific challenges that students face, such as a lack of resources, teaching methodologies that may not resonate with their learning styles, or societal attitudes towards mathematics. On the positive side, it may also reveal elements that contribute to high motivation, such as effective teaching practices, engaging learning materials, or a supportive learning environment.

Deci and Ryan's Self-Determination Theory emphasizes the importance of autonomy, competence, and relatedness in fostering motivation. Autonomy involves a sense of control and choice in learning, competence relates to feeling capable and successful, and relatedness refers to a sense of connection and belonging within the learning environment. The assessment process can help identify the presence or absence of these critical elements in the mathematics education landscape at Nkawie Municipal.

In conclusion, evaluating the current level of student motivation in learning mathematics is a foundational step in improving mathematics education. It provides a holistic understanding of the factors influencing motivation, enabling educators and policymakers to make informed decisions and implement targeted interventions that can positively impact students' enthusiasm for the subject in Nkawie Municipal.

The motivation of teachers is undeniably a pivotal factor that significantly influences the overall learning environment and, consequently, the educational outcomes of students. Wang and Eccles (2015) stress the importance of understanding and addressing teachers' motivation, as it directly impacts their effectiveness in the classroom. Therefore, by examining the level of motivation among mathematics teachers at Nkawie Municipal, this research aims to uncover insights that can lead to improvements in the teaching-learning process.

Firstly, the motivation of teachers plays a central role in shaping the quality of instruction. Teachers who are motivated are more likely to employ innovative and effective teaching strategies, engage students actively, and create a positive and dynamic learning atmosphere. On the contrary, demotivated teachers may struggle to inspire students, leading to a less engaging and less effective learning experience.

The research seeks to identify potential areas for improvement in teachers' motivation. This involves a nuanced exploration of the factors that contribute to or hinder teachers' enthusiasm for teaching mathematics. These factors may include professional development opportunities, recognition and support from school administration, the availability of teaching resources, and the alignment of curriculum and instructional methods with teachers' personal teaching philosophies. By pinpointing these factors, the research can provide actionable recommendations to enhance the work environment for mathematics teachers at Nkawie Municipal.

Additionally, the research aims to uncover strategies to enhance educators' enthusiasm for teaching mathematics. This could involve the implementation of targeted professional development programs, mentorship opportunities, or the introduction of innovative teaching techniques that align with the preferences and strengths of mathematics teachers. Identifying effective strategies can contribute to creating a more supportive and motivating work environment for teachers, ultimately influencing their job satisfaction and commitment to delivering high-quality instruction.

Wang and Eccles (2015) emphasize that teacher motivation is not only important for the individual teacher but also has a ripple effect on students. Enthusiastic and motivated teachers are more likely to inspire and positively influence their students, fostering a shared passion for learning mathematics.

Understanding the dynamic interplay between teachers' and students' motivation is a fundamental aspect of fostering effective mathematics education. The interaction between these two components is complex and reciprocal, influencing the overall learning environment and student outcomes. The research, guided by Urdan and Schoenfelder's work (2016), endeavors to delve into this intricate relationship by

exploring the correlation between teachers' motivation in teaching mathematics and students' motivation in learning the subject.

Urdan and Schoenfelder (2016) emphasize the reciprocal nature of the relationship between teacher and student motivation. Teachers who are enthusiastic and motivated can positively impact students by creating an engaging and supportive learning environment. On the other hand, motivated students can, in turn, inspire and energize teachers. The research aims to uncover these reciprocal influences, shedding light on how the motivation of one group can amplify or diminish the motivation of the other.

The research seeks to identify potential causal factors that contribute to the correlation between teachers' and students' motivation. These factors may include the teaching methods employed by educators, the level of teacher-student interaction, the perceived relevance of mathematics in students' lives, and the effectiveness of motivational strategies implemented in the classroom. By identifying these causal factors, the research aims to provide actionable insights for educators and policymakers to enhance both teacher and student motivation.

The correlation between teachers' and students' motivation has a direct impact on the learning environment. Motivated teachers are more likely to employ effective instructional strategies, provide constructive feedback, and create an atmosphere that encourages active student participation. Conversely, students who are motivated are more likely to engage in class activities, complete assignments, and persist in the face of challenges. The research aims to understand how this mutual motivation contributes to a positive learning environment conducive to effective mathematics education.

The findings of the research will have implications for teaching practices. By understanding the correlation between teacher and student motivation, educators can

tailor their instructional methods and motivational strategies to better align with students' needs and preferences. This, in turn, can contribute to a more dynamic and effective teaching-learning process in the context of mathematics education.

Identifying the research gap involves pinpointing areas within the existing literature where there is a lack of comprehensive understanding or exploration, particularly in relation to the specific objectives of the study. Let's examine the potential research gap based on the outlined objectives: The literature may lack recent and specific studies that comprehensively assess the current level of student motivation in learning mathematics at Nkawie Municipal. Previous research might not sufficiently capture the unique contextual factors influencing student motivation in this particular region.

There may be a gap in the literature concerning the motivation of mathematics teachers specifically in the context of Nkawie Municipal. Existing studies might not provide a detailed understanding of the factors that influence teacher motivation in this specific geographical and educational setting.

The literature may lack recent research that explicitly explores the dynamic relationship between teacher and student motivation in the context of mathematics education, particularly focusing on Nkawie Municipal. Previous studies might not have delved into the specific causal factors and reciprocal influences between these two variables in this particular setting. There may be a research gap in terms of a detailed exploration of the specific classroom teaching practices and strategies employed by mathematics teachers to raise students' motivation in learning mathematics in Nkawie Municipal. Previous literature might not provide a comprehensive understanding of the effectiveness of these strategies within this specific educational context.

Ulaş-Kılıç (2018) found significant relationships between academic motivation and career determination. In the literature, Parker, Bindl and Strauss (2010) argued that proactive motivation is important in individuals' academic career and performance. Again, there are very few studies that address strategies employed by teachers to motivate students in learning mathematics and the relationship between the teacher's level of motivation in teaching mathematics and students' level of motivation in learning mathematics. Therefore, it is in this context that, this study sets out to examine strategies employed by teachers to motivate students in learning mathematics at Nkawie Municipal.

In summary, the potential research gap lies in the absence of recent and context-specific studies that address the unique dynamics of student and teacher motivation, the relationship between them, and the specific teaching practices employed in Nkawie Municipal. The study aims to fill this gap by providing a detailed and up-to-date examination of these aspects within the specific educational landscape of Nkawie Municipal

### 1.3 Purpose of the Study

The purpose of this study was to investigate the strategies mathematics teachers use to motivate their students in mathematics classroom.

### 1.4 Objectives of the Study

The objectives of this study are to:

1. assess the students' level of motivation in learning mathematics at Nkawie Municipal.
2. examine teachers' level of motivation in teaching mathematics at Nkawie Municipal.

3. determine the relationship between the teacher's level of motivation in teaching mathematics and students' level of motivation in learning mathematics.
4. identify classroom teaching practices and strategies mathematics teachers employ to raise students' level of motivation in learning mathematics at Nkawie Municipal.

### 1.5 Research Questions

Within the framework of the study, certain questions need to be addressed. These questions help define the overall direction and limit of the research. The study was guided by the following research questions:

1. what are students' levels of motivation in learning mathematics at Nkawie Municipal?
2. what are the teachers' levels of motivation in teaching mathematics at Nkawie Municipal?
3. what is the relationship between the teachers' level of motivation in teaching mathematics and students' level of motivation in learning mathematics?
4. which classroom teaching practices and strategies do mathematics teachers employ to raise students' level of motivation in learning mathematics at Nkawie Municipal?

### 1.6 Scope of the Study

The study is targeted at Teachers at Nkawie Municipal situated in Ashanti region of Ghana. The study population comprised of both Teachers and students. The study sought to find out teacher's level of motivation in teaching mathematics, the students' level of motivation in learning mathematics, determine the relationship between the

teacher's level of motivation in teaching mathematics and students' level of motivation in learning mathematics among others.

### 1.7 Research Limitations

A study's limitations are its possible flaws (Leedy & Ormrod, 2013). Research limitations basically talks about factors that constraints the researcher in the collection of data to interpretation of the results. The study firstly was constrained by time because the period needed to collect data was too short, thus on the part of respondents since their workload or schedules made them hold on to the questionnaires and answer at their own time which slowed the process of data collection and collating.

Towards this research the following were observed as limitations for this study. This study was primarily delimited by its small sample size. The sample size could have been expanded by including Educational officers, students, parents and other stakeholders such as all teachers at Basic schools, especially those engaging in educational affairs like at the Nkawie Municipality. This was overcome as some of interviewee had acted in the position of educational officers, have quality of education officers, especially awareness of duties and responsibilities. The majority of teachers also have been working in Nkawie Municipality as their duties are including teachers and students in most cases. Also, some teacher-students were involved in this study sample to make sure that data about students' experience are obtained. The second limitation was time. Because of the limited time, this study was confined to a limited number of participants and limited time to interact with them.

This was solved by collecting data every day and sometimes during the night especially for those respondents who did not get time during working hours. Another limitation observed include uneven distribution of participants based on age, sex, gender and

schools. This challenge was solved by including other respondents from neighboring schools like Nkawie Senior High School and Mpatasei Senior High School which is near Toase Senior High school**.** On top of that most of the data were collected qualitatively and thus much of it was self-reported data.

This is a limitation because self-reported data rarely can be independently verified as a researcher has to take what people say as truth although it can contain several potential sources of bias such as selective memory (remembering or not remembering experiences or events that occurred at some point in the past, recalling events that occurred at one time as if they occurred at another and attribution).

This uncertainty was minimized to great extent as the researcher before data collection discussed with respondents the value and the significance of this study hence a need to provide adequate and real information free from bias based on their experiences. Accessibility, language fluency and time management also limited this study. To solve this the researcher ensured that he maintained maximum patience, communicate to school administration and school staff politely.

**1.8 Significance of the Study**

The finding of the study will be very important as it will contribute to the literature on the strategies to motivate students. This is because educational stakeholders in Ghana are constantly seeking for a better learning atmosphere which will aid academic success for all senior high school students. This study is also hoped to help teachers understand the different strategies in classroom delivery to enable them vary their teaching methods where applicable and in effect help students gain knowledge on the different strategies that can be employed by their respective teachers, helping them to adjust appropriately to positively impact on their mathematics achievements.

By ensuring academic success of students, this study will have diverse social, economic, cultural and political advantage from individual level, family, community and a nation as whole.

This research could be of great importance to all players of education especially the Ministry of Education, Ghana Education Service, the West African Examinations Council, and other organizations that play various roles in the promotion and development of Mathematics Education in Ghana. Finally, many researchers around the world may benefit from the study's findings by expanding their knowledge and learning experiences by using it as an input to their studies and ready references for relating it to their plans or already started projects where this result would be the best used as a reference.

### 1.9 Organization of the Study

The study would be organized into five (5) chapters. The introduction of the study which is chapter one, constitutes the background to the study, statement of the problem, purpose of the study, research questions, research objectives, significance of the study, delimitation of the study or scope of the study, limitations of the study, as well as how the entire work will be organised. Chapter two is dedicated to a review of current literature on relevant works done in this area of research. Chapter three establishes the methodology of the study. In this regard, this section discussed the study area, research paradigm, the approach, research design, population of the study, sample size and sampling techniques, the data collection instruments, pilot study, data collection procedure, data processing and analysis, validity and reliability of the instrument and ethical issues considered in the study. Chapter four was dedicated to results and discussion. Chapter five which is the final chapter of this study was on the summary, conclusions and recommendations.

# CHAPTER 2

# LITERATURE REVIEW

## 2.0 Overview

This chapter begins with the theoretical framework which include theory of didactical situation, the zone of proximal development, the concept of motivation, Forms of Motivation, Intrinsic Motivation, Extrinsic Motivation, Intrinsic and Extrinsic Motivation of students, Teaching and learning of Mathematics, teacher's instructional strategies, teacher's and students' level of Motivation in teaching and learning Mathematics, relationship between teacher's level of Motivation in teaching Mathematics and students' level of motivation in learning Mathematics, classroom teaching practices and strategies Mathematics teachers can employ to raise students' level of motivation in learning Mathematics, factors that contribute to learning difficulties in Mathematics, theoretical framework, theory of didactical situations (TDS), and constructivist learning theory.

## 2.1 Theoretical Framework

This section examined theories that linked strategies employed by teachers to motivate students in learning Mathematics. The theoretical framework used in this study is the Theory of Didactical Situations (TDS) developed by Brousseau (1997) and the Constructivist theory of teaching and learning of mathematics. These two theories have been adopted because they complement each other.

### 2.1.1 Theory of Didactical Situations (TDS)

The TDS, according to Sriraman and English (2010), is a three-way schema that examines the complexity of relationships between the teacher, the student, and the content. The Theory of Didactical Situations seeks to provide a model, based on the

mathematical theory of games, for scientifically investigating challenges in mathematics teaching and ways to improve it (Radford, 2008; Yuliani, 2016).

Mangiante-Orsola, Perrin-Glorian, and Stromskag (2018) contend that TDS represents a didactical situation in which the attention is on the teacher in order to study how students learn and how the teacher assists them in learning specific mathematical information. The teacher serves as a learning environment facilitator in this way. The emphasis in TDS (Selman & Tapan-Broutin, 2018) is on establishing a classroom environment in which students act as scientists and/or researchers, discovering and producing. The teacher facilitates and enhances the environment for these discoveries.

TDS also provides an opportunity to isolate moments of instruction, action, formulation, validation and institutionalization in the mathematics teaching and learning process (Wisdom, 2014). This study followed the TDS framework to explore the instructional strategies that were identified by the teachers in order to motivate the learners to solve mathematics problems. The study specifically looked at the role of the teacher within TDS to determine how they create an appropriate environment and facilitates problem solving strategies employed by teachers to motivate students in learning Mathematics. In addition, students' perception of success in learning mathematics is highly related to their motivational attitudes. Teachers' actions, attitudes and instructional design quality for mathematics lessons have greatly influenced students' motivation (Middleton & Spanias, 2013).

Vansteenkiste et al. (2009) found in their paper that, the higher levels of motivations do not directly mean a high outcome, since the quality of the motivation is poor. In addition, they explain about two kinds of motivation, these are autonomous which the motives are influenced by the individual internally and controlled motivation which the

motives are influenced and regulated by the external factors. They present research consists of two studies to address and to compare about four motivational profiles: a good quality motivation, a high quantity motivation, a low quantity motivation and a poor-quality motivation.

These groupings based on the existence the autonomous and the controlled motivations in each cluster. The result of this study shows that *students in the good quality motivation group displayed the most optimal pattern of educational outcomes relative to all other group of students in the research* (Vansteenkiste et al., 2009). The good quality motivation means the high of autonomous motivation and the low of controlled motivation. This present paper is in line with the implication of the result from the study that teachers should provide a good quality motivation in the classroom of mathematics.

### 2.1.2 Constructivist Learning Theory

The learner is the source of meaning in constructivist learning theory. This suggests that the knowledge already exists and is available, but it is up to the student to seek it out. Learners, according to this view, do not just acquire information inertly; they continually develop new knowledge based on existing knowledge and new experiences (Hmelo, Cindy, & Chinn, 2007). Unlike traditional techniques, which require students to memorise what their teachers say, constructivism allows students to bring their own fresh ideas to the table for discussion, with their ideas being recognised and improved through a variety of teaching and learning techniques that actively engage them.

Also, instead of imposing knowledge on the learner, constructivism allows knowledge to be gained via interaction between teachers and students, in which the teacher helps the learner taking a key role in developing his or her own experience and knowledge. In this approach, rather than being a passive activity involving memorizing and

acceptance of an independent body of truths, the acquisition of mathematical knowledge becomes a learner-centered activity.

Additionally, the learning process causes learners to become active constructors of meaning in the teaching process, according to constructivism (Wiggins & McTighe, 2006). Students are also required to be able to construct arguments to support their thinking while solving word problems. To demonstrate this, learners' conversations should be dominated by the characteristics of the concepts they describe as they communicate their understanding of the concept under discussion. Learners' written expressions of meaning are supposed to indicate their comfort level with the representation of concepts, generalization of information, willingness to explore, and thoughts on new information in a similar manner.

Constructivism's central challenge is to transfer the centre of control in learning from the teacher to the learner. For this constructive process to proceed and transfer to environments outside the school classroom, constructivists believe that learning must be provided in a rich context, reflective of real-world context. The measure of learning is how effective or helpful the learner's knowledge structure is in facilitating thinking in the content field (Bednar et al., 1992).

Limon (2001) proposes that, the use of constructivism theory as a base for teachers in creating a learning environment that can facilitate the complacency of students' need of autonomy, competence and relatedness. Constructivist argues that "the view of learning is the importance of connecting the new knowledge to be acquired with the existing knowledge that students have, in order to promote meaningful learning" (Limon, 2001). From this view, the researcher hereby maintains that, learners actively

construct a new knowledge by using their prior knowledge and if the construction process is “interesting”, then the students’ motivation will be increased.

### 2.1.3 Social Learning Theory

The social learning theory viewpoint on education rest on the ideas of Piaget and Vygotsky. The social constructivist learning viewpoint stresses the role of learners in constructing knowledge among both students and teachers is concluded by their zone of proximal development of events. The constructivist perspective, on which the sociocultural theory of learning is based, sees the learner as self-directed, imaginative, and inventive. Vygotsky and his associates initially systematized and applied sociocultural methods to learning and development in Russia in the 1920s and 1930s. Piaget and Vygotsky place a greater importance on learning actions than on content, and learners develop awareness through a variety of learning situations with the help of active support and assurance. Adom, Yeboah and Ankrah (2016) simplified Piaget and Vygotsky's concept of social teamwork, claiming that peer-to-peer collaboration motivates these students to learn. Problem-solving has a higher capacity than the for students to upgrade new spaces to their full capacity. That is making them creative of their own knowledge in the field of mathematics.

According to the social constructivist perspective, which is founded on Vygotsky (1978) sociocultural theory, each person constructs knowledge based on prior knowledge rather than it being a static concept that can be transmitted. Here, knowledge is created via engagement and activity (Vygotsky 1978). Social constructivism places a strong emphasis on the social component of cognition and the contribution that language creation makes to learning.

According to the social constructivist viewpoint, cooperation and learning are influenced by the social interactions that students have with others and how they create their knowledge. Given that a communicative approach is founded on construct theory and methodology, the social constructivist perspective and the approach in collaborative teaching mathematics are quite compatible (Singh and Richards, 2006). According to the constructivist viewpoint, learning happens and is built via cooperation. The students get the chance to put their theories and beliefs to the test as well as deepen their comprehension through this process. Interaction between students and the socio- cultural functions as a result of the instruction, and it is crucial for the development of language acquisition and meaning. If a student can operate as a more capable peer, the interaction between students as they study mathematics may also contribute to learning on a more individualized level.

### 2.1.4. The Zone of Proximal Development

According to Vygotsky (1978: p 85), there are two developmental stages, and learning should be linked in some way with each level. The current development level is represented by the first level, and the prospective development level by the second. The space separating them is referred to as the zone of proximal. The zone of proximal may be able to effect positive transformation via communication and contact. This illustrates an interactive theory of learning. The zone of proximal development is defined as "the difference between the degree of prospective development as assessed through critical thinking under adult direction or in partnership with more capable peers" and the level of actual growth as measured by autonomous problem solving (Vygotsky 1978: p 86). It demonstrates the variety of skills which a student can execute with assistance but finds challenging to perform alone. As a result, educators may design a teaching environment that supports students' capacity for learning mathematics through

feedback, debate, and cooperation. Today, a lot of this engagement can be done via a computer. While still acting as a more competent peer than the student, the teacher may play more of the function of a facilitator in a digital environment to aid, inspire, and organize learning.

If we want to understand the true relationships between the developmental process and learning capacities, we cannot stop at defining developmental stages (Vygotsky, 1978: p 85). In terms of educational research, Vygotsky's ideas and work are still applicable. If we want to understand the true relationships between the developmental process and learning capacities, we cannot stop at defining developmental stages (Vygotsky, 1978: p 85). In terms of educational research, Vygotsky's ideas and work are still applicable. The zone of Vygotsky’s theory is created through learning, and this learning rouses a number of internal growth development. Only when the youngster interacts with others in his area and works cooperatively with his classmates are these processes allowed to take place (Vygotsky 1978: p 90). These procedures will become a component of an autonomous developmental accomplishment once they are internalized. Therefore, in Vygotsky's opinion, learning is not progress in and of itself. However, learning will lead to mental development if it is structured appropriately. Learning in schools should encourage growth processes.

Therefore, it is crucially important that the employment of computers and related programs in education does not result in the creation of possible proximal growth zones. According to Vygotsky's thesis, external information won't get internalized if it is unsuccessful in doing so. Additionally, he asserts that there is no one approach to the issue of how important any specific topic is for mental growth (Vygotsky 1978: p 91).

Ernest (1999) stated that social constructivism, distinguishing two crucial rudiments:

- Most importantly, there is an active development of information, regular ideas and hypothesis, grounded on the foundation and existence of formal knowledge. These give the premise for appreciation and effectively guide further movements.
- Besides, there is a crucial functioning through experience and collaboration with the physical and social worlds, in both factual exertion and converse modes.

Huitt (2003) confirmed that the social constructivism maintain that, culture, social guidelines and customs are the prevailing elements during a kid's mental development of an events, particularly within the space of thought and language. The development of complexity and transformation among learners as indicated by Vygotsky is impacted by such factors because the home climate, peer connections, the food they eat, the clothes they wear and therefore the dominance of language (Henson, 2015). This proposes that the changing social attributes of impeded students can have effect on their mental progress. Huitt (2003) highlighted the importance of the applied framework for the progressive internalization of data, attained by social collaboration between a beginner and a more skilled companion or grown-up who gives a model. Huitt (2003) noticed the accompanying components of constructivism:

- There is a substantial job of discussion in learning
- The place of friends in informative acts of numerous learning responsibilities, the cooperation design of all learning assignments. Hence, learning is the consequence of incorporation of social processes. The informative cycles from Vygotsky underlines that, there is instructor co-activity, instructors support to

their students and language improvement of the learner. In such manner, Matthews (2020) identified six fundamental qualities of the useful methodology, to be specific,

- Learner's results depend on material, purpose and inspiration carried by the learner into the training condition.
- Education comprises individual advance of implications.
- Meaning is made through a functioning, persistent cycle.
- Developed meaning are assessed by students, who can dismiss or acknowledge them.
- The students embrace last liability regarding their acquisition of knowledge.
- Encourages kinds of meaning built by students through encounters with physical things as they learn through natural language.

From a social learning approach, prior knowledge of students, learner-centered learning, environment, and interaction were all achieved to build students confidence and develop their interest in mathematics.

**2.2 The Concept of Motivation**

In several disciplines ranging from the fields of management, psychology and sociology, the concept of motivation has been applied. A variety of definitions may be found in the literature as a result of the many applications. Tims, Derks, and Bakker (2016) define motivation as a complex mix of forces that come into play in a person's decision to start and remain at work or in an organization. Buchanan and McCalman (2018 p. 4) conceptualized motivation as "the process that accounts for an individual's intensity, direction and persistence of effort toward attaining a goal" in a recent definition. These definitions suggest that, motivation is a type of fuel that encourages

individuals to do more and not only emphasis motivation as a force that invigorates, drives, and sustains a person's desire to go over and beyond in order to achieve a goal.

As such, the motivated individual will be more driven to work hard toward the attainment of organizational goals as compared to an unmotivated employee. Motivation can also be defined as a management process that enables employees to perform efficiently for the company's success by supporting them with their basic needs-based motives (Nduka, 2016). Nizam and Shah (2015) explained that, motivation is the process of motivating performance, which leads to individuals taking action and achieving a desired goal. Therefore, it is the process of motivating people to behave by reflecting, sustaining, and guiding their behaviors. In order to achieve organizational and personal goals, motivation according to Cameron and Green (2019), is an internal drive that provides individuals with energy. Hence, work motivation has been defined as the process that contributes to the initiation and maintaining goal-directed performance (Larsson, Eriksson, & Pesämaa, 2018).

Motivation is not a one-time event, but rather a multi-step process that must be carefully orchestrated over time in order to reach the intended results. Scholars have sought to hypothesize this complicated process and the strategies that might be used to maximize its benefits over the years. Gopalan et al. (2017) hinted that, in order to pursue a certain course of action, the motivation process, necessitates enthusiasm and persistence. The lack of a physiological or psychological need that triggers behaviour, or a desire oriented at a goal, is the commencement of the motivation process. For Gopalan et al. (2017), the perception of unfulfilled needs, whether conscious or unconscious, initiates a needs-related model of motivation.

Wants are desires to accomplish or gain something. Goals set are thought to satisfy needs and wants, and behaviour pathway which is selected is expected to attain the goal (Armstrong, 2010). Zheng et al. (2017) avert that, a key component of a motivation strategy is that the process of achieving the goal must be motivating in and of itself. This necessitates establishing a process for accomplishing goals and controlling the incentive approach to ensure that employees do not lose up during the implementation phase.

For carrying out everyday tasks and motivating employees with common goals, a motivation strategy is required. It involves the use of a set of skills to achieve it and not just a decision or a set of words to describe the goal (Steers & Lee, 2017). The motivation process follows specific specified processes from an organizational perspective, which, as a continuum, must be examined and strategized on a regular basis to maintain its effective renewal (Omollo & Oloko, 2015). Student and teacher's motivation is maintained as a result of this.

Learning theorists acknowledge the positive effects of students' interest in learning on their success in learning process. The variables that enable students to engage in learning with interest and enthusiasm could be explained by two concepts called "learning motivation" and "academic motivation" (Eccles & Roeser, 2009). Academic motivation is defined by a student's desire (as reflected in approach, persistence, and level of interest) regarding academic subjects when the student's competence is judged against a standard of performance or excellence (Omiles et al., 2019; Olowo et al., 2020). Academic motivation is a broad term incorporating many concepts studied by scholars to include self-efficacy, determination, resilience among others (Alharthi,

2020; Altakhyneh & Abumusa, 2020; Cayvaz, Akcay, & Kapici, 2020; Finogenow, 2017).

### 2.2.1 Forms of Motivation

Two main forms of motivation are discussed in the literature and these are; intrinsic and extrinsic. These two forms are not mutually exclusive but are composed of different incentives with different influences on students and teacher's motivation.

### 2.2.2 Intrinsic Motivation

Shin and Grant (2019) advance that, intrinsic motivation borders on "an individuals' need to feel competency and pride in something and captures the aspects of doing work for its own sake" (p. 12). Internal factors such as job satisfaction, responsibility, freedom to act, scope to use and develop skills and abilities, and challenging work and opportunities for development are all covered by this form of motivation. Intrinsic motivators care about the quality of one's work life and are more likely to have a long-term impact. Facilitators involves employees in decisions that affect them not only increases their personal commitment, but also motivates them to advocate for their decisions, are examples of these motivators (Kuvaas et al., 2017).

Vanek (2017) was of the view that, intrinsic motivation cannot be forced by management because it is inherited in people though it is the best since it has long-term and significant benefits on them. Intrinsic rewards produce a pleasant emotional reaction and work to drive people to keep improving and make long-term behavioural changes when necessary (Ryan & Deci, 2020). When someone successfully completes a task, for example, they often feel satisfied and satisfied. In order to continue experiencing those positive emotions, this intrinsic motivation then drives the individual to complete the task successfully in the future.

Various researchers have addressed various aspects of intrinsic motivation and its impact. Psychological benefits and well-being (Ryan & Deci, 2020); accomplishment (Ryan & Deci, 2017); self-actualization (Herzberg, 2003); increased responsibility (Osterloh, Frost, & Frey, 2002) and self-sustenance (Osterloh et al., 2002). Generally, in more autonomous work environments, intrinsic motivation increases resulting in more behaviour outcomes and positive attitude (Kearney, 2018). Jovanovic and Matejevic (2014) argued that, intrinsic factors become more great motivators, and student/staff motivation require intrinsic benefits such as work satisfaction and a sense of doing something worthwhile if pay rises over the subsistence level.

Furthermore, Mosquera, Soares, and Oliveira (2020) in three of Portugal's leading real estate agencies, investigated the influence of intrinsic incentives on satisfaction. Intrinsic incentives had a positive and considerable effect on student/staff satisfaction, according to the findings of their research.

### 2.2.3 Extrinsic Motivation

External factors that may be assessed in monetary terms, such as salary, perks, promotion, and disciplinary action, are examples of extrinsic motivation. Whilst simultaneously suggesting that negative factors such as punishment may also energies workers, Armstrong (2010) focuses on the ability of physiological necessities such as food, shelter, and clothing to motivate workers as crucial parts of extrinsic motivation. Although they are not always long lasting, extrinsic motivators, according to Dartey-Baah and Harlley (2010), can have an immediate and significant effect.

Singh (2019) avers that, motivation has psychological as well as managerial implications. Whereas the managerial meaning refers to the activity of managers and leaders in inducing others to produce results desired or outlined by the organization or

by the manager, and which conforms to a motivation, ability, and performance relationship, the psychological meaning refers to a person's internal mental state as it relates to the initiation, persistence, direction, termination of behaviour and intensity. Employee performance is affected by both intrinsic and extrinsic motives in general. Extrinsic motivation is based on external regulating variables such as explicit rewards, whereas intrinsic motivation is focused with rewards as the activity itself (Singh, 2019).

### 2.2.4 Intrinsic and Extrinsic Motivation of Students

When it comes to intrinsic motivation of students, Duncan and McKeachie (2005) defined intrinsic motivation as a focus on learning and mastery adding that, students who are intrinsically motivated engage in learning tasks because they perceive them as inherently interesting. In contrast, extrinsic motivation is a focus on performance and approval from others (Duncan & McKeachie, 2005). Students who are extrinsically motivated engage in learning tasks because they view them as essential and useful for the future.

Previous studies have found that intrinsic motivation plays an important role in students' learning in most countries (Chiu & Chow, 2010; Mullis, Martin & Loveless, 2016; Zhu & Leung, 2011). Extrinsic motivation has revealed different patterns between East Asian and Western countries (Chiu & Chow, 2010; Jerrim, 2015; Zhu & Leung, 2011). Jerrim (2015) showed that East Asian students reported higher extrinsic motivation than students in Australia and England. Chiu and Chow (2010) found that the effects of extrinsic motivation on academic performance were lower for American students than Hong Kong students. Moreover, intrinsic and extrinsic motivation positively predicted mathematics performance in East Asian countries, but extrinsic motivation negatively predicted mathematics performance in Western countries (i.e.,

Australia, England, Netherlands, and USA) in the Trends in International Mathematics and Science Studies (TIMSS) 2003 (Zhu & Leung, 2011).

Chung (2000) found that intrinsic motivation did not significantly predict language and mathematics performance through several mediators including learning strategies among fifth-grade Korean students. Similarly, Yıldırım (2012) showed that learning strategies did not mediate the relations of intrinsic and extrinsic motivation with students' mathematics performance in a Turkish sample. In contrast, Metallidou and Vlachou (2007) found cognitive learning strategies as well as control strategies positively mediated the relations of motivation with language and mathematics performance. Although Lee, Ng, and Yeo (2019) had similar findings as Metallidou and Vlachou (2007) as their findings showed small positive to null relations between control strategies and academic performance, when control strategies were mediators between intrinsic motivation and achievement.

### 2.3 Motivational Strategies

Motivating learners is an important aspect of learning as it can aid learners to be successful and effective in their studies. There are numerous strategies in which teachers can employ during lessons as in green's motivational strategies, conveying confidence, conveying high aspirations and valuing of tasks.

#### 2.3.1 Green's motivational strategies

Green (2002) explains strategies for motivating learners to want and like to learn mathematics by using the expectancy-value theory. Green et al (1999) assume that academic lessons in classrooms have both a social and an academic text. The academic text consists of the structure and content of the lesson while the social text conveys what learners regard as important to do and to learn. Teachers' contribution to learning

needs to go beyond specific academic content. The expectancy-value theory according to Green (2002) states that the amount of effort that learners are willing to expend on a task is a product of (a) the degree to which they expect to succeed at the task; and (b) the degree to which they value the task, and also value success on the task.

Wigfield and Eccles (1992) cited in Green (2002) examined expectancies and values of learners as well as their relationships and fluctuations over time. They found that teachers influence learners' motivation to learn through provision of experiences and communication of beliefs and expectancies. For example, the value that learners attached to both English and Mathematics correlated with their past degree of task success in those subjects. Green (2002) noted that the nature of individual learner-teacher interactions in classrooms has an impact on learners' expectancies about their future success. Based on the expectancy-value theory, a number of motivational strategies have been identified that can be used to increase learners' expectancies for success as well as to promote their valuing of learning tasks (Green, 2002). These strategies include the following major categories: conveying confidence, conveying high aspirations, giving comments, and valuing learners' tasks.

### 2.3.2 Conveying confidence

Conveying confidence in learners' abilities entails having a belief that all learners will succeed in a given task. This suggests that teachers use comments like, "It will be hard, but I know you all can do it," to motivate learners to strive for success. The above is confirmed by the self-efficacy theory. The self-efficacy theory (Dembo 1994) postulates that one's judgement of one's confidence and ability to achieve a particular task is a potent source of motivation as it helps to boost one's sense of worth. The lower the level of confidence, the lower the level of motivation to achieve given or set tasks,

and vice-versa. Borich and Tombari (1997) believe that this theory is based on the premise that an individual's personal expectations, internal standards and self-concept can be tailor-made to be a source of motivation to learn. Confidence can also be built if the teacher creates conditions that enable learners, even at a very low level, to experience success as often as possible.

### 2.3.3 Conveying high aspirations

Challenging all learners in a class to do well and surpass their previous achievements is an important motivational strategy (Green, 2002). A statement like, "Can somebody tell me another way to solve the above problem?" may serve as a way to make learners become more creative in their solving of problems. Setting a goal towards which one may aspire is an important motivational tool in the learning of mathematics (Dembo, 1994). Setting high aspirations (Dembo, 1994) in the form of goals may motivate individuals if they are provided with information about their success or failure.

### 2.3.4 Commenting to the whole class or to individuals

Green (2002) believes that comments are very important for confirming expectations met or simply for confirming admiration for the accomplishment of a task by the whole class or by an individual. Comments such as, “What a bright class!" Or, "Almost all of you got the answer." Or, "This is good work, Susan," are very important for motivating students to improve their performance. Comments should be spread across the whole lesson for them to have an all- round appealing effect on the students. This implies that lessons should include introductory, process, and concluding comments, as illustrated below.

***Introductory motivational comments***: To enthuse learners to want to learn right from the outset, Green (2002) states that comments like the following can be used in lesson introductions: "Fractions is one of my favourite topics in Math," when the teacher is introducing the topic "fractions." This is called teacher modeling of enjoyment. To show the usefulness of a topic, the teacher can use a comment such as," If you are dividing something between you and a friend, you use fractions"; or "If you are baking, you use fractions when measuring quantities of ingredients."

***Process-related motivational comments***: While it has been observed that teachers, in general, favour this phase of teaching, research according to Green (2002) has shown that most of the comments given are just matter-of-fact, or general comments which do not motivate and improved performance of the learners. Green therefore proposes simple yet effective process- related teacher comments such as" I am impressed with the work that I see", Or" I like the way you are solving the word problems", Or " You guys are good at this, even the hard ones."

***Outcome-related motivational comments***: It is very important for the teacher to give confirmation of good work learners have done during the introductory and process phases of a teaching episode by giving inspiring comments that will help to guide learners. The outcome or concluding phase of a lesson acts as a summary of work done and hence teachers should use encouraging comments during this phase such as, " Everybody did a wonderful job today", Or "There was a lot of creativity today in the way you solved the given problems"; Or "Some of you still need to look at word problems and practice solving them further".

### 2.3.5 Valuing of tasks

Within the expectancy-value theory, further strategies can be identified to promote learners' valuing of tasks. These strategies according to Green (2002) include the teacher emphasizing the usefulness of a task, importance of a task, enjoyment during the task, offering of rewards, modelling of enjoyment, connecting tasks, mentioning the rationale, and offering choice.

***Emphasizing the usefulness of a task***: The teacher can use comments such as, "This will help you when you have to write your algebra test", Or "This will help you when you want to pursue a career in accounts".

***Emphasizing the importance of a task***: The teacher can emphasize the importance of a task according to Green (2002) by using comments such as, " You will be doing this all the time next year in your next grade", Or" You need to understand this task because further mathematics you will learn will depend on this task."

***Emphasizing enjoyment***: interesting lessons may stimulate learners to want to learn even more, especially if the learning offers further opportunities for success. According to Green (2002), a teacher can allow for learner enjoyment during tasks through comments such as "Solving quadratic equations is a lot of fun"; Or, "Last year's class loved using games to solve these problems."

***Offering rewards***: Offering of rewards is a very important strategy of motivating learners and forms one of the tool kits of the valency-expectancy theory. Green (2002) believes that rewards can be offered for growth, excellence, or for completion of tasks. The rewards can only be meaningful as motivational tools if it is made clear before the task whether rewards will be token rewards, or will result in promotion to another group or grade (Green, 2002). Use of praise and rewards is an important motivational tool is

supported by the Skinnerian school of thought as the essence of extrinsic motivation. The behaviourist school of thought asserts that only when external conditions which include rewards and punishment are in place, will a pupil respond favourably. Skinnerians believe that learners can only be motivated to work harder by an external system of reward and punishment.

Use of an external inducement as a motivational tool is supported by Dennis (1993) who believed that incentives in the form of praise, encouragement, promotion and even tangle rewards, are all potent sources of motivating learners to want to improve their learning of mathematics. Farrant (1991) stated that externally imposed motivation which includes fear and reward, can spur learners to be more diligent in their learning of any subject. Dworetzky (1988) alludes to the importance of rewards as sources of motivation by saying that people, learners included, like to work even harder when rewarded either through praise, recognition, promotion or other tokens. However, a number of psychologists caution that such rewards can only be meaningful and effective as sources of motivation if they are related to the learners' chronological and cognitive maturity. What motivates young children as rewards may not motivate older children.

***Teacher modeling enjoyment***: Teacher can motivate learners to want to learn by modeling enjoyment or enthusiasm for a task. Through comments such as "That is one thing I really like about quadratic equations"; Or “That is my kind of approach to solving word problems", Or "That is one of my favourite methods of solving linear equations", Or "I can't wait to solve such a problem using this method." If a teacher models enjoyment and has a good rapport with learners, the chances are good that learners will follow suit, and also enjoy the lesson (Mwamwenda, 1996). According to

Mwamwenda (1996), if a learner has a special regard for a particular teacher, he/she will work hard in that teacher's subject for two reasons:

- To please and receive the teacher's approval
- To identify with the teacher.

***Connecting tasks***: A motivation-oriented teacher tries to connect learning tasks to learners' knowledge or experience, or even goes beyond that to motivate learners by personalizing tasks (Green, 2002). Using this strategy, the teacher can use statements such as the following when teaching, "If a sweet costs 5 cents, how many sweets will you buy with one dollar"; Or "Last year you learnt about Pythagoras' Theorem and today can somebody tell me how we can use the same theorem as a step to help find the area of the shape on the board?"

***Mentioning the rationale for a task***: Green (2002) believes that telling students right from the start the reason for a task they will be required to learn stimulates them to want to learn. Green believes that this will give learners focus as well as develop in them a sense of anticipation about what really will be taught. Teachers can use comments such as 'Today we will do some fill-in-the blanks to find out how much you remember about formulae of different shapes', Or 'These formulas will be important later when we do a course in Statistics.'

***Offering choice***: At times learners should be given responsibility for their learning. This according to Green (2002) can be done by the teacher using statements like, 'Find a suitable method to determine the area of a trapezium', Or, 'When doing this task, work either individually, in pairs or in any small groups.' According to Mwamwenda (1996), offering learners choice to solve given mathematical problems using their own initiatives and methods is an important motivational tool that helps learners to

demonstrate their competence. This is confirmed by the competence theory which postulates that the inherent desire by all people to want to perform competently or demonstrate mastery over their environment or body of knowledge or skills, is a potent source of motivation for people to put more effort into their work. Teaching which offers learners choice should satisfy the following conditions:

- Learners must assume responsibility for all their learning
- Learners must be offered opportunities to experiment and gain new insights into different mathematical concepts
- Feedback and reinforcement must be given continuously (Shultz & Shultz,1994).

### 2.4 Teaching and Learning Mathematics

In everyday life, mathematics plays an important part. Learning mathematics improves students' analytical thinking and reasoning abilities, as well as their ability to develop lifetime learning skills to solve challenges (Prayoga & Abraham, 2017). Mathematics is a subject that many students either love or detest academically, and it is mostly disliked by students who do not find figures interesting, particularly those who are more interested in social sciences (Prayoga & Abraham, 2017). Regardless of the fact that they recognise its relevance in the development of science and technology in any society, students consider mathematics to be an abstract subject (Kiwanuka et al., 2015).

Mathematics is seen negatively by the majority of students (Zakaria et al., 2013). Students develop negative attitudes and concerns about mathematics as a result of the formulas and rules included in a mathematics lesson (Altintas & Ilgün, 2017). Mathematics, according to Murugan and Rajoo (2013), was created to generate

competent people who can apply mathematics in their daily lives and to improve problem-solving and decision-making abilities. The training and preparation of students to perform well in mathematics has become a core goal of education in most countries since it is frequently deemed important for the success of the students and the country (Butakor, 2016).

Mutodi (2014) therefore proposed that, students should be permitted to communicate mathematically, reason mathematically, and acquire self-confidence in solving mathematical issues in order to increase their mathematics performance. Individuals taking responsibility for their own learning is one of the most difficult challenges in learning. When students take responsibility for their own learning, they give the process of learning meaning, which leads to more effective learning (Nzesei, 2015). Individual learning needs to be understood by teachers. Individuals interact with their surroundings during the learning process, uniquely processing information and necessitating a unique learning environment. As a result, in order to assist individuals in optimizing their learning, addressing the difficulty of promoting learning circumstances while structuring such encounters should be considered (Sighn, 2017).

Attitude refers to a person's taught tendency to respond positively or negatively to an item, circumstance, concept, or another person (Sarmah & Puri, 2014). Children's attitudes may change and grow over time (Syyeda, 2016), and having a positive attitude can help them learn more effectively (Akinsola & Olowojaiye, 2008). A negative attitude, on the other hand, inhibits effective learning and, as a result, has an impact on learning outcomes and performance (Joseph, 2013). In research done in Ghana, Mensah, Okyere, and Kuranchie (2013) discovered a substantial positive correlation between students and teacher's performance.

As indicated by their grades, a variety of factors impact students' mathematical performance. To Biswas (2015), this study will primarily focus on students' affective characteristics, which include study habits and attitudes, which are then referred to as study orientations. For college students, mastering time management and developing good study habits are two major challenges. The factors identified by Bashir and Mattoo (2012) demonstrated a significant correlation between a variety of study habits and academic performance.

According to the findings of Khurshid et al. (2012), there was a definite correlation between study habits and academic accomplishment. Three factors determine student achievement in mathematics, according to Morosanova et al. (2016) and Guy et al. (2015): teaching quality, intelligence quotient (IQ) and cognitive entrance abilities and emotional characteristics.

Research suggests that future efforts should be directed at identifying non-intellectual qualities that might assist explain the remaining diversity although mathematics is intellectual and college grades are connected to non-intellectual factors such as study habits and attitudes (Guy et al., 2015). For Bawuah (2013), the difficulty of teaching and learning mathematics is exacerbated when the community in which students are educated does not regard school as a very important factor in their lives; a community in which education is not valued; and where parents and guardians prefer their children to farm or stay at home rather than attend school.

There is nothing a teacher can do to aid schoolchildren because he or she may not know the student's abilities, knowledge, or educational capabilities in such a community. Such individuals do not maintain a constant attitude toward their education, making it difficult for them to complete what they are studying, especially when the subject being

taught is one of the most difficult and feared. Kassena-Nankana, Churcher, Asiedu-Owuba, and Adjabui (2015) evaluated the performance of high school students in mathematics education. The outcome of the research showed inadequacy of study resources such as textbooks, as well as the performance of teachers, were the primary causes of students' low mathematical performance. Parental and extracurricular activities, most likely activities at home, were also found to be a factor in the low student performance. As a result, Arthur, Asiedu-Addo, and Assuah (2017) proposed that hands-on teaching techniques would properly motivate students even while assisting in the reduction of negative mathematics perceptions in order to increase interest.

### 2.5 Teacher's Instructional Strategies

Education is an effort to improve people's abilities to live their best lives as individuals or members of society (Siagian & Surya, 2017). Simbolon et al. (2017) assert that, education development in this period is inextricably linked to the goal of all stakeholders in education to enhance the quality of teaching and learning in order to help students achieve better academic results. One of the purposes of mathematics learning in school, according to Rizqi and Surya (2017), is to train students in thinking and reasoning in order to reach conclusions, develop the ability to solve problems, and develop the ability to provide information or communicate ideas through speech, pictures, writing, graphs, diagrams, maps, and other means.

Hasanah and Surya (2017) believe that all learners, starting in elementary school, should be taught mathematics in order to equip them with the ability to think analytically, rationally, systematically, creatively, cooperatively and critically. Since Mathematics is so important to human and societal development, there is a need for

effective teaching and learning strategies that will help students achieve better academic results in Mathematics so that they can fully participate in science and technology, which are indicators of national development (Ayinla, 2015). So far, research has examined the impact of instructional strategies on students' academic performance (Ganyaupfu, 2013), with findings indicating that when the majority of students in a class do badly, it is invariably linked to the use of ineffective instructional strategies (Ganyaupfu, 2013).

Teachers in mathematics classrooms utilise identified instructional strategies and practises, despite the fact that using them does not guarantee an effective teacher (Hoge, 2016). Gregory and Chapman (2013) suggest that teachers need a wide range and large number of instructional strategies in order to impart material in a variety of ways. According to Gregory and Chapman (2013) this is important in order to address the learners' individuality in the classroom.

Mathematics learning is a process that is purposely structured with the goal of providing an environment that allows one to participate in mathematics learning activities, and it is centered on educators teaching mathematics through active student participation (Esmonde, 2017). A teacher uses a variety of strategies, designs, and activities to accomplish this, one of which is the use of instructional strategies in the classroom. Instructional strategies are ways that teachers can employ to facilitate the teaching and learning of a certain subject or course, according to Koko and Nkpolu-Oroworuko (2016).

Teaching approaches and techniques that support effective teaching and learning are referred to as instructional strategies (Koko & Nkpolu-Oroworuko, 2015). One of the most important functions of instructional techniques is to concretize students' learning

and help them attain educational objectives (Koko & Nkpolu-Oroworuko, 2016). On the other side, improper use of instructional strategies in the classroom can have negative consequences for students.

Some instructional strategies for teaching large classrooms, according to Bûsljeta (2013), include supporting the process of learning, decoding, organizing, and integrating educational content, as well as logical thinking and reasoning. However, it should be noted that whether or not these objectives are met is entirely dependent on the efficient application of instructional strategies in the classroom. Evidence-based teaching practices, according to Killian (2016), should be used in the classroom since they are thought to have the greatest influence on student results. Killian (2013) further mentioned that, using questioning to check for knowledge, summarizing new material in a graphical format, lots of good practice, providing students with feedback, and motivating students to work together in productive manner are some of the strategies mathematics teachers employed in teaching and learning of mathematics.

One of the current challenges in the teaching-learning process is determining the most effective teaching approach and strategies that are also compatible with students' learning styles. According to recent research, the following instructional strategies for teaching mathematics are common and effective: cooperative learning (Javed, Saif, & Kundi, 2013), lecture type, deductive approach (Baig, 2015), inductive approach (Atta, Ayaz, & Nawaz, 2015; Padmavathy & Mareesh, 2013), demonstrative approach (Ramadhan & Surya, 2017), repetitive exercises (Warthen, 2017) and integrative approach (Panicker, 2014).

Cooperative learning is a basic strategy that allows students to collaborate in groups or pairs to solve an issue (Razak, 2016). After the fundamental instructions have been given, the teacher will divide the class into pairs or groups to work on problems (Chan & Idris, 2017). The students may discuss the issues and work together to solve them since the pairs are working as a team. Cooperative learning seeks to teach students critical thinking abilities that will be useful in solving mathematical issues in the future and in everyday life (Sari, Mulyono, & Asih, 2019; Zakaria et al., 2013). Repetition, or repeating practice, is a basic approach a teacher may employ to develop arithmetic skills. Students are better able to absorb things at a faster pace by repeating and revisiting past formulae, lessons, and information (Bates, 2020).

Integrative approach is a strategy that links other topic matter in other subject areas. This is another strategy to organize information from a different subject area and make an instructional design more engaging and integrative (Panicker, 2014). All aspects that might contribute to the teaching-learning process are examined in this strategy (Adunola, 2011). Another type of traditional classroom style that needs a step-by-step process for addressing mathematical problems is the demonstration way of teaching (Ramadhan & Surya, 2017). It focuses on achieving psychomotor and cognitive objectives.

Induction is another method for teaching students how to learn rather than what to learn. This is a good way to assist children grasp concepts and generalizations while also helping them build higher-order thinking abilities (Rahmah, 2017). The inductive strategy is a considerably more student-centered approach that employs the 'noticing' concept. Learners are supplied with a variety of data and examples from which they

must deduce rules or create a general formula. Therefore, it is a method of constructing a formula using a sufficient number of concrete examples (Singh & Yadav, 2017).

Meanwhile, the deductive strategy is the polar opposite of the inductive approach, in which the instructor introduces and explains concepts to learners before assigning them assignments to practise the concepts. The learners are provided all of the broad concepts or information in this technique, and the particular ideas or facts are covered afterwards (Singh & Yadav, 2017). In research done in Tanzania by Namamba and Rao (2017), it was discovered that there was a paucity of instructional resources in the teaching of history compared to the sciences. Fundamentally, the inadequacy of instructional strategies is not a rational basis for teachers to explain their utter incompetence when it comes to the application of instructional strategies (Koko & Nkpolu-Oroworuko, 2016).

### 2.6 Teacher's and Students' Level of Motivation in Teaching and Learning Mathematics

Steinkuehler (2010) suggested that learning as a process of achieving knowledge, enhancing motivation skills through using multiple strategies of teaching and multimedia teaching practice to learn mathematics at secondary level. Authors such as Shahrill, Abdullah and Yusof (2015) have highlighted various factors responsible for students to lose motivation in mathematics such as lack of teacher motivation, low students' literacy abilities in understanding the mathematical problems and less parental involvement. In the study investigating the teachers' beliefs on motivating factor to students learning approach used to address their learning motivation (Matteson, Swarthout, & Zientek, 2011), the results indicated that teachers believe that motivation is vital towards learning, though it is difficult for teachers to identify motivational

strategies associated with pedagogy and curriculum, while some of them emphasized utilizing tangible rewards.

Several studies emphasize the significance of assessing student motivation in mathematics, as it is a crucial factor influencing academic achievement (Deci & Ryan, 2017; Wang & Eccles, 2015). Research by Deci and Ryan (2017) suggests that intrinsic motivation, driven by personal interest and engagement, is particularly important for sustained learning. However, literature specific to the assessment of student motivation in the context of Nkawie Municipal may be lacking. This study aims to build upon existing frameworks and explore the unique factors influencing student motivation in this specific region

The assessment of student motivation in mathematics is widely acknowledged as a critical aspect of understanding and improving academic achievement. Deci and Ryan (2017) and Wang and Eccles (2015) have conducted significant research in this area, highlighting the importance of motivation in the context of learning mathematics. According to Deci and Ryan (2017), intrinsic motivation, which is driven by personal interest and engagement, stands out as a particularly influential factor for sustained learning.

Deci and Ryan's (2017) Self-Determination Theory posits that when students are intrinsically motivated, they are more likely to experience a deep and enduring engagement with the subject matter. Intrinsic motivation involves a genuine interest and enjoyment in the learning process rather than being solely driven by external rewards or pressures. Wang and Eccles (2015) similarly stress the role of motivation in influencing students' academic choices, persistence, and achievement outcomes.

However, despite the existing body of literature on the general importance of assessing student motivation in mathematics, there may be a gap when it comes to literature specific to the context of Nkawie Municipal. Each educational setting is unique, influenced by cultural, social, and economic factors that can shape students' attitudes towards learning. This study recognizes the need to build upon existing frameworks and delve into the specific factors influencing student motivation in Nkawie Municipal.

The unique factors that may influence student motivation in Nkawie Municipal could include regional cultural values, socio-economic conditions, and the availability of educational resources. These factors may impact students' perceptions of the relevance of mathematics, their confidence in the subject, and the level of support they receive from their immediate environment.

By acknowledging the potential lack of literature specific to Nkawie Municipal, this study aims to contribute to the broader understanding of student motivation in mathematics. It seeks to explore and identify the unique contextual factors that may influence motivation in this region, building on existing theories and frameworks. In doing so, the research aims to provide insights that can inform targeted interventions and strategies to enhance student motivation and, consequently, improve academic achievement in mathematics within the specific context of Nkawie Municipal.

Since mathematics learning is challenging and may include nervousness; therefore, Kaphesi (2014) argued that, perseverance as the on-going effort will be needed to bring prize; and positive or negative perception of mathematics learning is related to the active or passive role of the learner him/herself. For instance, learner-centred teaching approaches have been recognised as one of the most effective approaches to implement in mathematics classrooms in order to tackle and reduce significantly the problem of

underachievement (Nsengimana, Habimana, & Mutarutinya, 2017). Though Mathematics is perceived to be complex and difficult (Miranda-Tirado & Marisa, 2015), learning mathematics enables us to possess knowledge to solve everyday problems, make daily needed calculations and operations as well as to think logically, teaching mathematics involves transmitting knowledge and reasoning ability, and showing how to share it and solve problems.

This negative attitude towards the subject has led to a loss of motivation and interest in mathematics by most learners in most African countries of which Rwanda is part (International Mathematics Union, 2014). While students perceive that only bright students are favoured during mathematics lesson, mathematics teachers believe that all learners may involve depending on the teaching method used. For instance, class discussion helps students to provide their views about the problem while authentic problems help them to appreciate the usefulness of mathematics in real life (Aloquina & Marpa, 2016). In their investigations, Mutodi and Ngirande (2014) found that the perceptions shared by the students in South Africa about mathematics performance are due to one ‘s self-confidence, family background, teacher teaching/learning materials, interest in mathematics, traditions, and beliefs. Difficulties and weaknesses in mathematics are the main causes of such perceptions.

As far as parents are concerned, Mutodi and Ngirande (2014) confirmed that students, who accredited their success to the interest, self-confidence, as well as family background, have a chance to come up with higher achievements than those who point their academic success to chance and natural talent. Indeed, Haque and Farhana (2017) investigated and found out that parents ‘perception of mathematics has an influence on their children’s perception, and hence influence their performance. A study conducted

in South African schools (Tsanwani, Harding, Engelbrecht, & Maree, 2014), it was expressed by educators and learners that their commitment and motivation, learners' attitudes, self-concepts, career prospects, their perceptions of peers and teachers as well as teachers' perceptions of learners are factors inducing underprivileged learners' judgments to continue and achieve in mathematics in spite of their problematic settings.

Bringula et al., (2017) found that motivation and the nature of feedback from mobile-assisted learning application were significant determinants of performance in mathematics. García et al. (2016) found that affective motivational variables brought the distinction between high and low performance in mathematics. Froiland and Davison (2016) identified parent and student perceptions and motivation as determinants of performance in mathematics. Motivation, emotional support and self-efficacy were also identified by Skaalvik et al. (2015) as determinants of performance in mathematics. Carvalho (2015) affirms that teachers who are confident with mathematics have a tendency to impart that confidence upon their students. Therefore, teachers need to demonstrate to the students that mathematics is a key element that will sharpen their thinking capacity in solving real-world problems as at the social constructivism point of view, the sense of belonging to a community and teamwork in the classroom increases by offering more opportunities for learners to exchange together.

Li et al., (2020) found motivation, peer relationships, and self-efficacy, as the contributing factors for performance in mathematics. In the study of Prast et al., (2018), perceived competence was the only motivational variable found to influence high achievement in mathematics. Pitsia, Biggart and Karakolidis (2017) also identified

instrumental motivation, self-efficacy, anxiety, and attitudes towards mathematics as determinants of performance in mathematics.

### 2.7 Relationship between Teacher's Level of Motivation in Teaching Mathematics and Students' Level of Motivation in Learning Mathematics

Previous studies have shown that teachers' behaviours and instructional practices play an important role in students' motivation to learn (Loima & Vibulphol, 2014; Loima & Vibulphol, 2016; Urhahne, 2015). Teachers set the learning teaching process to create the situation to be interesting so the students can be motivated. The teaching method is also a vital factor that influences student motivation and if the teacher apply appropriate method in teaching a subject, the students can be more comfortable in the learning process (Loima & Vibulphol, 2014).

MacGrath (2005) stated that relationships are at the heart of teaching, since it is an activity based on communication. MacGrath (2005) advised that, there is the need to give each learner his/her due respect as it befits him/her, recognize individual skills and promote them, attend to individual needs, take interest in learners as individuals and listen to their problems and show them they are people worthy of respect and consideration.

Research into the changing role of teachers in classrooms underscored that students are the central focus with teachers taking on the persona of guides (Cindrić & Pavić, 2017; Gan, Liu, & Yang, 2017; Patel & Laud, 2015). Teachers as guides and motivation are more beneficial in the learning process than the role of content experts in learning mathematics (Weimer, z2013). Furthermore, teachers who create rich learning environments for their students help them to develop a sense of autonomy, which motivates them to be more responsible and self-directed in their learning (Cindrić &

Pavić, 2017; Gan et al., 2017). Teachers who train their students to make practical contributions to learning tasks and to track their progress (Dole, Bloom & Kowalske, 2016; Patel & Laud, 2015) are giving them the opportunity to play a significant role in their mathematics learning. In the changing role of the student, teachers see students as partners in the learning process there is a relationship between teacher's motivation and students' level of motivation in learning mathematics (Cindrić & Pavić, 2017).

The role of effective teachers is fundamental in promoting student motivation and achievement. Effective teachers are described as possessing those dispositions that are recurring patterns of thoughts, feelings, or behaviours that result in higher levels of performance as a teacher (Hutajulu, Wijaya, & Hidayat, 2019; McCune & Entwistle, 2011). Accomplished teachers exhibit an awareness of and attention to content and students, affecting classroom achievement (Long & Hoy, 2006).

Combinations of carefully employed educational variables have been successful in increasing student engagement. These variables include quality teacher and student interaction (Kelly, 2007), high levels of student efficacy (Linnenbrink & Pintrich, 2003), appropriate instructional methods (Johnson, 2008), higher teacher expectations (Tyler & Boelter, 2008), and establishing a supportive and caring classroom community for both teachers and students (Walker & Greene, 2009). The study's findings conducted by Shernoff et al. (2014) indicate that challenging tasks by teachers produce positive emotions, thereby creating the best opportunity for engagement in learning mathematics. Effective classrooms reflect academically intense lessons charged with relevant activities, fostering feelings of student control in their learning environment and building self-confidence in their academic ability. In these classrooms, students

concentrate, experience enjoyment, and secure immediate intrinsic satisfaction, which creates a foundation of future interests in learning mathematics (Shernoff et al., 2014).

Hwang, Wang, and Lai (2021) established that mathematics performance among students was influenced by social regulation-based online learning strategy. Rockinson-Szapkiw and Wendt (2020), Alegre et al. (2019) and Thurston et al., (2020) identified that peer tutoring had a statistically significant influence on students' performance in mathematics. Zhang and Wang (2020) identified that self-efficacy, mathematics interest, and mathematics anxiety, influenced performance in mathematics. Dorfner et al. (2018), Lazarides and Buchholz (2019), and Motegi and Oikawa (2019) found that instructional quality had a significant effect on performance in mathematics.

The significance of teacher motivation is a well-established aspect of educational research, and it plays a pivotal role in shaping overall educational outcomes (Wang & Eccles, 2015). Motivated teachers contribute to a positive learning environment, fostering student engagement, academic achievement, and overall success. Research by Urdan and Schoenfelder (2016) has demonstrated that motivated teachers not only impact students' academic performance but also influence their motivation to learn.

Despite the existing body of literature on the importance of teacher motivation, there may be a gap in the specific context of Nkawie Municipal, particularly concerning mathematics teachers. The unique cultural, social, and economic factors that characterize Nkawie Municipal could have distinct effects on the motivation of mathematics teachers in this region. These factors might include limited resources, varying levels of community support, or specific challenges faced by educators.

The research by Wang and Eccles (2015) suggests that motivated teachers are more likely to employ effective instructional strategies, create positive learning

environments, and contribute to students' overall enthusiasm for learning. However, the application of these findings to the context of Nkawie Municipal might require a nuanced understanding of the specific challenges and opportunities present in this region.

This study seeks to bridge the potential literature gap by focusing specifically on the motivation of mathematics teachers in Nkawie Municipal. By doing so, it aims to contribute valuable insights into the factors influencing teacher motivation within this unique context. The examination of these factors may include an exploration of the professional development opportunities available to teachers, the level of recognition and support they receive from school administration, and the alignment of curriculum and instructional methods with the local educational landscape.

Identifying areas for improvement in teacher motivation is crucial for enhancing the overall quality of mathematics education in Nkawie Municipal. By delving into the factors that influence teacher motivation, this study aspires to inform targeted interventions and strategies that can contribute to a more motivating and supportive work environment for mathematics educators. Ultimately, addressing the motivation of mathematics teachers in Nkawie Municipal is a step towards improving the quality of education and, subsequently, positively impacting students' learning experiences and outcomes in mathematics.

### 2.8 Classroom Teaching Practices and Strategies Mathematics Teachers can employ to Raise Students' Level of Motivation in Learning Mathematics

Instructional strategies are classroom techniques that aim to increase student learning and achievement (Arends, Winnaar, & Mosimege, 2017). Nichols (2015) posits that instructional strategies are a subset of teaching approaches and one of its components.

Nichols (2015) describes instructional strategies as techniques used by teachers during the course of education to help students understand the subjects being taught. Instructional strategies, according to Nichols (2015), comprise programmes, techniques, and other aspects connected to teaching defined by school personnel. When instructional strategies are used effectively in teaching, they have the potential to incorporate students' learning experiences, making subject information more receptive and interesting, according to Boadu (2015).

Adequate preparations and appropriate use of vital learning resources in teaching are required for good or effective teaching (Koko & Nkpolu-Oroworuko, 2016). Additionally, instructional strategies can be utilized to promote teaching and learning. It can also assist pupils in concretizing learnable material by lowering the rate of forgetting (Koko & Nkpolu-Oroworuko, 2016). In math and other subjects, studies on the influence of instructional strategies on learner or student performance have yielded mixed findings. Differentiated instruction, flexible grouping, and teaching for higher-order thinking abilities had the highest significant link with student achievement in mathematics, according to Eze (2011), but administrative oversight showed no meaningful relationship with student achievement. Onweh and Akpan (2014) looked at the impact of discussion, lecture, and demonstration on students' performance in electrical installations in technical institutions.

In electrical installations, they discovered that the demonstration technique had the greatest impact on student academic achievement. Jepketer (2017) studied the influence of student-centered instructional strategies, teacher-centered instructional strategies, and assessment strategies on student performance. Jepketer (2017) established a model

based on her findings, stating that when teaching strategies are enhanced through targeted in-service training, student performance is affected.

In order to ensure efficacy in the use of instructional strategies, Bûsljeta (2013) identified three primary stages that teachers must follow: selection and first evaluation, presentation and interpretation, and final evaluation. It must be stated unequivocally that the competencies required at each step are mutually included. According to Bukoye (2019), the factors that teachers must examine while choosing instructional strategies are critical to ensure that they are used effectively. This suggested that if teachers take into account important factors while selecting teaching strategies, the effectiveness of the strategies will be affected.

Le Donne, Fraser, and Bousquet (2016) highlight three teaching strategies that are mainly used: The first is active learning which promotes students' engagement in the creation of their knowledge. Students' discussions, group work, co-operative are necessary activities that support active learning. The second is cognitive activation which stimulates students' higher-order thinking, such as problem-solving, critical thinking, and decision making and the third highlighted teaching strategy is teacher-directed instruction, which guides students by explaining mathematics concepts, providing feedback, and summarizing what they have learned. Pantziara and Philippou (2007) argued that teaching strategies such as problem-solving and the use of visual aid in the mathematics classroom could increase students' motivation and morale to their performance.

Ali, Hukamdad, Akhter, and Khan (2010) confirmed also that problem-solving strategies help students perform better in mathematics than those taught by traditional methods. An experimental study by Muema, Mulwa, and Mailu (2018) showed that

there is a positive correlation between teaching methods and students' academic achievement. Likewise, Walters et al. (2014) noted that using student-centered instruction in teaching mathematics transforms mathematics classrooms into lively and engaging learning environments. Students take control of their learning while making meaningful connections to the world in which they live and also allow students to interact, collaborate, negotiate and communicate with their peers.

The study done by Mitana, Muwagga, and Ssempala (2019) on the influence of national examination on classroom practice in primary schools in Uganda found that the teaching strategies used by the teachers are directly influenced by national examinations. The methods used in teaching were those that encourage rote learning and memorization of facts. Furthermore, Kathare (2020) in the research done in Kenya found that interactive between teacher and learner such as personalized teaching and interactive learner to learner teaching such as peer tutoring are used by the teachers to alleviate some specific mathematics difficulties in learners. However, teachers wish to involve students in their learning through reliable tasks, and teachers are motivated to teach for understanding rather than to the test (Whittle, Telford & Benson, 2018).

The literature suggests a strong connection between teacher and student motivation (Urdan & Schoenfelder, 2016). Motivated teachers can inspire students, creating a positive learning environment (Wang & Eccles, 2015). However, specific studies exploring the intricate relationship between teacher and student motivation in the context of mathematics education at Nkawie Municipal may be limited. This research aims to fill this gap by investigating the unique causal factors and reciprocal influences within this specific educational setting.

The literature consistently underscores the substantial connection between teacher and student motivation, emphasizing the significant impact motivated teachers can have on creating positive learning environments (Urdan & Schoenfelder, 2016; Wang & Eccles, 2015). Motivated teachers, according to Wang and Eccles (2015), contribute to a positive educational climate by inspiring and engaging students. However, while these general principles are well-supported in educational research, there is a recognized need for specific studies examining the intricate relationship between teacher and student motivation in the context of mathematics education at Nkawie Municipal.

The study by Urdan and Schoenfelder (2016) indicates that teacher motivation is not only associated with individual success but also has reciprocal effects on student motivation. In environments where teachers are motivated, students are more likely to experience higher levels of engagement and enthusiasm for the subject matter. These studies provide a foundation for understanding the broad principles of the teacher-student motivation relationship, but the context-specific nuances of this relationship in Nkawie Municipal have yet to be thoroughly explored.

In the unique context of Nkawie Municipal, cultural, economic, and regional factors may play a crucial role in shaping the dynamics of teacher-student motivation. This research aims to address this specific gap in the literature by delving into the causal factors and reciprocal influences within the educational setting of Nkawie Municipal. By doing so, the study seeks to uncover how the motivation of mathematics teachers in this region influences students' motivation and, conversely, how students' motivation may impact teachers.

The investigation into unique causal factors may include an examination of the local teaching practices, the socio-economic conditions of the community, and the cultural perspectives on education. Additionally, the study aims to explore the reciprocal influences between teacher and student motivation, identifying how the motivation of one group may positively or negatively impact the motivation of the other in the specific context of mathematics education at Nkawie Municipal.

Ultimately, this research intends to provide a more comprehensive understanding of the teacher-student motivation relationship in Nkawie Municipal, contributing valuable insights that can inform targeted interventions and strategies for improving both teacher and student motivation. By filling this specific gap in the literature, the study aims to provide context-specific knowledge that can enhance the overall quality of mathematics education in Nkawie Municipal.

Effective teaching practices play a crucial role in enhancing student motivation (Hattie, 2017). Research has shown that certain strategies, such as incorporating real-world applications and fostering a supportive classroom environment, can positively impact student motivation in mathematics (Deci & Ryan, 2017; Hattie, 2017). However, literature specific to the teaching practices employed by mathematics teachers in Nkawie Municipal may be scarce. This study aims to contribute by identifying and analyzing the strategies employed by teachers in this region to raise students' motivation in learning mathematics.

The importance of effective teaching practices in enhancing student motivation is widely recognized in educational research (Hattie, 2017). Hattie's work, in particular, emphasizes the substantial impact teachers can have on student outcomes through intentional and well-implemented instructional strategies. Furthermore, research by

Deci and Ryan (2017) reinforces this idea, highlighting those specific strategies, such as incorporating real-world applications and fostering a supportive classroom environment, can positively influence student motivation, particularly in the context of mathematics education.

However, despite the existing body of literature on effective teaching practices and their impact on student motivation, there may be a scarcity of literature specifically addressing the teaching practices employed by mathematics teachers in Nkawie Municipal. Each educational context possesses its unique set of challenges, opportunities, and cultural influences that can shape the effectiveness of teaching strategies. This study aims to contribute by filling this potential gap in the literature and focusing on the specific strategies employed by mathematics teachers in Nkawie Municipal to raise students' motivation in learning mathematics.

The investigation into teaching practices in Nkawie Municipal may involve exploring how teachers incorporate real-world applications into their lessons, whether they adapt instructional methods to align with the local culture, and how they create a supportive classroom environment. Understanding these practices is crucial for tailoring educational interventions to the specific needs and context of Nkawie Municipal.

Identifying and analyzing these strategies is essential for several reasons:

1. **Contextual Relevance:** The study aims to explore teaching practices that are not only effective in general but are specifically relevant and meaningful in the educational landscape of Nkawie Municipal. This includes considering cultural nuances, resource availability, and the unique characteristics of the student population.

2. **Effective Resource Allocation:** By understanding the strategies that are proven to raise student motivation, educators and policymakers can allocate resources more effectively, focusing on interventions that have a higher likelihood of success in the specific context of Nkawie Municipal.

3. **Informing Professional Development:** Findings from this study can inform professional development programs for mathematics teachers in Nkawie Municipal. Targeted training based on identified effective strategies can enhance teachers' capacity to motivate students effectively.

In summary, this research aims to contribute by shedding light on the specific teaching practices employed by mathematics teachers in Nkawie Municipal to raise students' motivation in learning mathematics. By doing so, the study seeks to provide insights that can inform educational practices, interventions, and policies, ultimately contributing to an improved and more motivating mathematics education in the region.

## 2.9 Factors that Contribute to Learning Difficulties in Mathematics

Mathematical or numerical abilities, as well as success in this field of study, are generally thought to be based on one's ability to understand and communicate language (Cross et al., 2019). Working memory, when combined with language, can play a significant role in early mathematics (Archibald & Griebeling, 2015). Working memory encompasses the ability to retain numbers for manipulation, such as that required to solve basic equations.

A typical play behaviours (i.e. perseverance on objects, unusual social interactions, or limited play skills) and barriers to play-based learning (i.e. educators' personal values regarding play), as well as attitudinal (i.e. educators' personal values regarding play), structural (i.e. time, materials, etc.) and functional barriers within the context or

environment (lack of professional development training for teachers) are all factors that contribute to learning difficulties (Baron et al., 2016).

At times, planning for differentiated instruction is also a barrier for teachers (Ensign, 2012; Tomlinson, 2014) due to time constraints, availability of materials, and space within the classroom, among other factors. Lower socio-economic status also plays a role in opportunities for success with mathematics according to a plethora of research (Geist, 2015; Hachey, 2013; Harvey & Miller, 2016; Lee, Park, & Ginsburg, 2016), stating that children within this population are four times more likely to have fewer opportunities to engage with quality mathematical experiences compared to peers in the middle to upper socio-economic status.

According to a variety of studies, many early childhood educators are afraid or anxious about teaching mathematics concepts because they are unsure of how or what they should teach, and they are unaware of the importance of their students mastering these concepts during their early childhood years in order to ensure future success (Beilock et al., 2010; Chen et al., 2014; Geist, 2015; Vogt et al., 2018). Kinkead-Clark (2019) examined structural challenges such as a lack of resources and materials for play, as well as attitudinal and functional barriers such as teacher knowledge and administrative attitudes toward play in the classroom (Kinkead-Clark, 2019).

In many educational environments, formal teaching strategies largely rely on expressive and receptive language (Cross et al., 2019; Hughes, Powell & Stevens, 2016). To assist students in understanding mathematical language and generalizing abilities and concepts, educators should utilize clear and precise mathematical terminology that communicate between subjects and grade levels (Hughes et al., 2016). The use of mathematical vocabulary that is clear, short, and consistent across grade

levels may aid in the generalization of concepts for children with language issues (Cross et al., 2019; Hughes et al., 2016; Van Luit & Toll, 2015).

Many studies have highlighted three common challenges that students confront while attempting to solve equations: Kilpatric and Izak (2008) found a lack of symbolic understanding of variables and coefficients within an equation, as well as a lack of understanding of the equal sign (Knuth et al., 2006) and reliance on procedural information without conceptual understanding (Capraro & Joffrion, 2006; Star, 2005; Siegler 2003). To Fredua-Kwarteng and Ahia (2015), the "transmission" and "command" models still dominate mathematics teaching and learning in Ghanaian schools.

According to Fredua-Kwarteng and Ahia (2015) Ghanaian schools have a mathematics learning culture in which children learn mathematics by listening to their teacher and copying from the chalkboard rather than asking questions for clarification. As such, rather of searching for meaning and understanding of mathematical concepts, students study mathematics by remembering facts, theorems, or formulae. Students rarely ask about the reasoning or philosophy behind the mathematical concepts, facts, or formulae. The researchers call for solutions to the above challenges.

### 2.10 Conceptual Framework

Teachers' levels of motivation are positive and high for students' performance and as a result they attempt to use numerous strategies to create, maintain and protect motivation. Notwithstanding, classroom teaching practices identified by teachers that helped in raising students' level of motivation was positive which were through creating the basic motivational condition, generating initial motivation and maintaining and protecting motivation the use of these strategies as shown in the Table 4.6.

It can be evidently seen from the T 4.6 that best strategies with positive levels of motivation to learn bring positive results to students. With positive and high levels of motivation and good strategies in mathematics classroom there will be good relationship between students' levels of motivation and teachers levels of motivation the intended results will be attained.

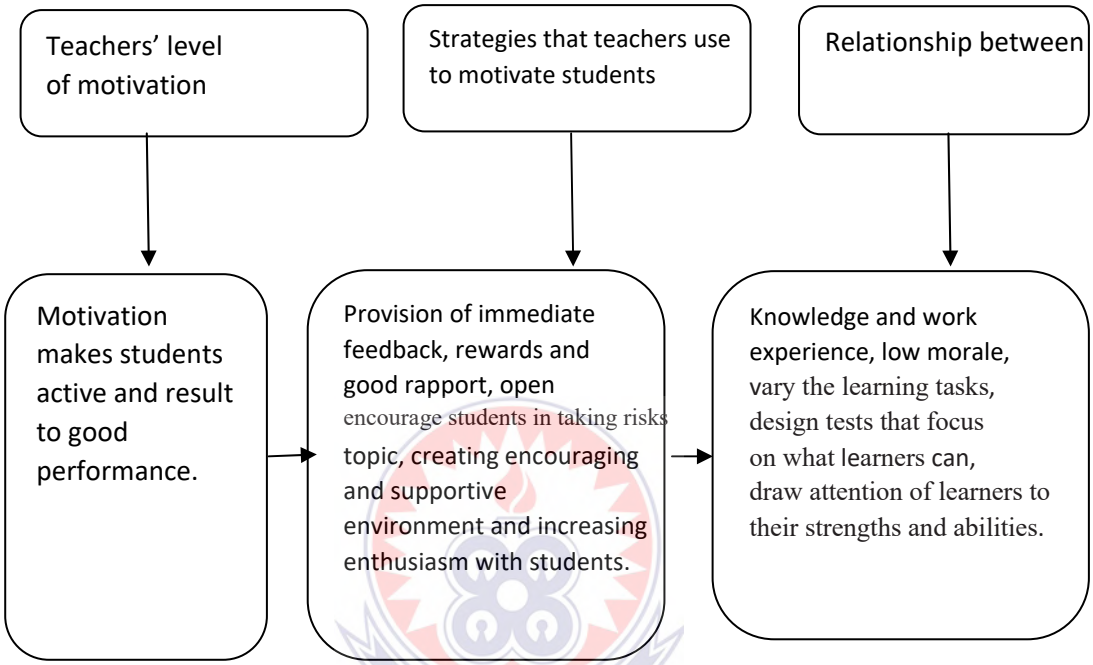


**Figure 2.2: Conceptual Framework**

Source: Field Data (2023)

# CHAPTER 3

# RESEARCH METHODOLOGY

## 3.0 Overview

This chapter covered the methodological steps which include the research design and population. The other thematic areas were sources of data which consisted of the study area, sampling, research paradigm, research approach, research design, population and sample size, sampling technique, data collection instruments, pilot study, data collection procedure, data processes and analysis, validation and reliability of instrument and ethical considerations.

## 3.1 Research approach

The study used a quantitative research approach for the study. Quantitative studies are involved in exploring how and why phenomena vary, Tavakol and Saunders (2014) noted. Mathematical models and statistics are used for quantitative studies to analyse, providing more objective numerical results. To Weinreich (2009), quantitative research uses approaches to natural science to ensure generalizability, reliability and objectivity, which was applied in this current study. Again, McMillan and Schumacher (2010) have argued that in measuring and explaining a phenomenon, quantitative sample designs stress objectivity. As such, by using numbers, statistics, structure and control, the research design maximizes objectivity hence its adoption for this study.

## 3.2 Research Design

Research design is an appropriate framework for a study. For Kassu-Jilcha (2019), the choice of research design in terms of how relevant information should be gathered for a study is a very important decision, but there are also other important decisions in the

research design process. The descriptive and regression design were used in this study. The descriptive study provides information on current phenomena from specific, relevant and general conclusion under consideration (Sekaran & Bougie, 2016). The regression analysis was used since Sarstedt and Mooi (2014), that regression analysis can provide insights that few other techniques can. According to Sarstedt and Mooi (2014), the key benefits of using regression analysis are that it can:

1. Indicate if independent variables have a significant relationship with a dependent variable.
2. Indicate the relative strength of different independent variables' effects on a dependent variable.

The goal of a research design is to lay out an approach for assembling empirical evidence to answer the study questions (McMillan & Schumacher, 2006). The study used a descriptive survey as its research design. A research design is said to be descriptive if the form of study from which the sample of people is given a questionnaire at a specific time to characterize their attitudes, opinions, behaviors, perceptions, or attributes (Creswell, 2012).

According to Creswell (2012) survey researchers deploy questionnaires to collect measurable, numerical data, which they are formerly statistically analyze to characterize trends in answer to questions and evaluate study questions or hypotheses. The survey design was found adequate in terms of gathering data from a large group of respondents in a relatively short period of time, given the nature of the study.

### 3.3 Research Paradigm

Every study is based on a fundamental paradigm. Our belief systems (frames of reference) or mental models (also known as "paradigms"), which are frequently used to organize our observations and reasoning influence the design and conduct of our study

(Bhattacharjee, 2012). A paradigm, according to Kuhn (1977), is an integrated cluster of substantive variables, ideas, and issues linked to corresponding methodological tools and approaches. A paradigm is defined as a collection of procedures and ideas that come together to form a scientific process and a worldview (Godfrey-Smith, 2003). In this study, the research paradigm that the study supported was positivism. The positivism research paradigm is based on deductive logic. That is, forming of hypotheses, making analysis of the hypotheses which involves calculations, giving explanation based on the test conducted, and concluding.

Post positivist research, empirical science, and scientific method are all terms used to describe the positivist paradigm (Creswell, 2014). Comte (1798–1857), a French philosopher and sociology's founder, coined the term "positivism" from a combination of empiricism and rationalism; "it holds that, to rely entirely on theories that can be tested directly, science or knowledge creation should be limited to what can be observed and measured" (Bhattacharjee, 2012, p2). Comte explained that there is a periodic relationship between theory and observation. Crotty (1998) further describes the positivist paradigm as a procedural philosophy of quantitative research that uses a scientific approach to discover social science research. Therefore, supported by evidence, a good understanding of real-world phenomena must be measured (Hammersley, 2013).

### 3.4 The Study Area

The study focused on Senior High Schools at Nkawie. Nkawie is the district capital of Atwima Nwabiagya District which is one of the largest districts in the Ashanti Region. The district lies approximately on latitude 6° 75'N and between longitude 1° 45' and 2° 00' West. It is one of the 27 political and administrative Districts in Ashanti Region.

It is situated in the Western part of the region and shares common boundaries with Ahafo Ano South and Atwima Mponua Districts (to the West), Offinso Municipal to the North, Amansie–West and Bosomtwe-Atwima Kwanwoma Districts to the South, Kumasi Metropolis and Kwabre Districts to the East. It covers an estimated area of 294.84 sq km. Many researchers have studied strategies employed by teachers to motivate students in learning mathematics, however from the researcher's readings, Nkawie Municipal has not been studied so well. To this end, the researcher thought it wise to use Nkawie Municipal for this study and bring to light what pertains there.

### 3.5 Population of the Study

Populations are a large number of people or objects that are the focus of research for the purpose of the study (Bernard, 2017). Bernard (2017) indicated that a study population is a well-defined set of related characteristics and usually a general, connecting feature or characteristic of individuals or items. Therefore, the population of this study encompassed 400 staff of Senior High Schools at Nkawie Municipality according to the researcher's check at the Nkawie Municipal Education Service. The population for the study comprises staff of Senior High Schools at Nkawie Municipality. There are three senior high schools in the Nkawie Municipality. Therefore, the population of this study encompassed 400 staff of Senior High Schools at Nkawie Municipality according to the researcher's check at the Nkawie Municipal Education Service.

### 3.6 Sample Size

The sample size of a research study should have adequate power and significance, allowing the investigators to be confident that the study findings cannot be attributed to random variations in the population of interest (Majid, Ennis & Bhola, 2017). The

researcher's check at the Nkawie Municipal Education Service revealed that, there were 400 staff of Senior High Schools. Therefore, the researcher applied Miller and Brewer (2003) mathematical formula for determining sample size, which was as follows:

$$n = \frac{N}{1 + N(a)^2}$$

Where N is the sample frame, n is the sample size and is the margin of error (fixed at 5%). The sample size was then calculated as n;

$$n = \frac{400}{1+400(0.05)^2}$$

$$n = \frac{400}{1+400(0.0025)}$$

$$n = \frac{400}{1+1}$$

$$n = \frac{400}{2}$$

$$n = 200$$

this suggests that the number of sample size which was used for the study in the data collection was a total of two hundred (200) selected staff within the Nkawie Municipal.

### 3.7 Sampling Technique

Kothari (2017) found out that sampling involves only a portion of the information collection method focused on an entire population. The study employed a simple random sampling technique. According to Garson (2012), simple random sampling is a sampling technique that allows data to be gathered in which every participant in the target group has a probability of being chosen, whether or not the researcher is informed about them beforehand. This gave all respondents who were chosen to participate in the

research an equal opportunity. The lottery method of simple random approach was used as a sampling technique in the data gathering

Since the objective of the study was to generalize the interpretations to a population a simple random sampling technique was used. In this simple random sampling, a sample of 200 participants was selected in such a way that every participant in the population had same probability of being selected for the study, and that the selection of a participant didn't affect selection of any other individual. 200 teachers selected represented teachers with diverse level of qualification, ranging from certificates to master's degree in education, included teachers with a range of working experience from low experience of less than five (5) years to high experience of more than twenty years. Involved in this population also are male and female teachers from Nkawie Municipal who are from almost all corners and region of Ghana. Both open ended questions as well as closed ones were used with various research instruments such as interview and questionnaire in this study so as to ensure the validity of the data obtained.

### 3.8 Data Collection Instrument

A primary data was used as the mode in collecting data from respondents. Kothari (2017) defined primary data as new and first collected and thus, original in character. The primary data obtained for this study was done through questionnaire. A closed-end questionnaire was used to collect data for the research. A questionnaire was used because it was less costly and ensures standardization of measurements. Also, the questionnaire facilitated the researcher to gather more valid data since there is minimal chance for the influence of the researcher. It offers greater assurance of anonymity, easy to administer, covers a wider geographical radius, and above all produces quick results (Buame, 2006). The five-point Likert scale was used. The questionnaire (see Appendix

A section B) was divided into five sections. Section A comprises the socio-demographic (Appendix A, section A) characteristics of participants. This includes gender, age, educational qualification, and working experience. Appendix A Section B contained a statement about students' level of motivation in learning mathematics, Section C had statement pertaining to teachers' level of motivation in teaching mathematics and Appendix A Section D had statement about classroom strategies of motivation in teaching mathematics.

### 3.9 Validity and reliability of the instrument

To improve the validity and reliability of the instrument, a pre-test was conducted. The validity, as a concept, can be defined as the degree to which an instrument measures what it is supposed to measure (Yin, 2018). According to Cohen et al. (2018), experience from pre-testing an instrument is used to improve and amend the instrument before sending it out to the main research population. The validity, in the context of this study, refers to how accurately the questionnaire was able to collect the responses from the respondents as intended by the researcher. Internal validity was assessed to test the ability of the instruments to measure what they were purported to measure and to help detect any errors that could obscure the meaning of items and prevent them from eliciting specious responses.

The study ensured that the items on the instrument covered the domain that the instrument purports to measure. This was determined by the expert judgment of the researcher's supervisor. The researcher took note of the supervisor's comments to modify and delete items that were considered inaccurate or items that infringe on the confidentiality of the respondents. This was done to eliminate any ambiguity or lack of clarity.

The consistency of the instruments in tapping information from more than one responder is referred to as reliability. The reliability coefficient was analysed using the Cronbach's alpha reliability test. Researchers use Cronbach alpha when measures have items that are not scored simply as right or wrong, such as attitude scales, unilinear scales, or essay tests (Best & Kahn, 2015). Research has shown that scales with Cronbach's alpha coefficient of 0.70 or more are considered reliable (Cohen et al., 2018; Mukherjee et al., 2018).

### 3.10 Pilot Study

In order to evaluate the validity and reliability of the study instruments, questionnaires were prepared and sent to the researcher's supervisor at University of Education, Winneba verification and approval before it was used for the pilot study. After the sent questionnaires were received back and necessary modifications made, a pre-test was conducted at Yaa Asantewaa Senior High School and sent to Yaa Asantewaa Senior High School in the Kumasi Metropolitan Assembly. A sample of 50 teachers were chosen for the pre-test study. The selected school was chosen for the pre-test because the school possess similar characteristics as those in the Nkawie Municipal. The Cronbach alpha reliability coefficient obtained from each of the items on the questionnaire are shown in Table 3.1

***Table 3.1: Cronbach alpha reliability coefficient***

| Variables | Number of items | Cronbach Alpha |
|---|---|---|
| students' level of motivation | 8 | 0.789 |
| teachers' level of motivation | 8 | 0.904 |
| classroom strategies of motivation | 15 | 0.843 |

**Source: Field survey, 2023**

Table 3.1 presents the Cronbach alpha reliability co-efficient of the pre-test conducted on the questionnaire. From the analysis, students' level of motivation had eight possible items with its alpha value 0.789>0.05, teachers' level of motivation had eight (8) possible items with its alpha value 0.904>0.05, and classroom strategies of motivation had fifteen (15) possible items with its alpha value 0.843>0.05. Since the alpha value for each variable was greater than 0.07 by suggestion by Best & Kahn (2015), it identifies that the data instrument can be used for further analysis.

### 3.11 Data Collection Procedure

The researcher collected an introductory letter approving the research work from the researcher's Department to conduct the study. Thereafter, the researcher booked an appointment with the senior high schools in the district through the headmasters to visit and administer the questionnaire. The researcher then visited each of the schools and administered the questionnaire. The participants were given instructions and assured of confidentiality after which they were given enough time to fill out the questionnaire. Giving respondents seven days to fill in the questionnaire aimed at increasing the return rate. After all, questionnaires were filled in by the respondents, the researcher collected them. All 200 questionnaires were retrieved from respondents which constituted a response rate of 100%.

### 3.12 Data Processing and Analysis

This study generated quantitative data; hence quantitative techniques such as descriptive statistics were used to analyze the data obtained. Descriptive statistics involved the use of frequencies and percentages. The process of data analysis required

the use of a computer spreadsheet and for this reason, the Statistical Package for Social Sciences (SPSS) version 20 was used.

### 3.13 Ethical Issues Considered in the Study

The issue of ethics is an important consideration in research that involves human subjects. It refers to the appropriate behaviour of a researcher relative to the norms of society (Cohen et al., 2018). Ethical issues in the research were upheld during the research process. Informed consent was sought from the participants. The right of participants to privacy and confidentiality was also observed by desisting from disclosing the participants' identification details. Measures were adopted to ensure that participants in the study were not exposed to any harm (Wilkinson, 1991).

# CHAPTER 4

# RESULTS AND DISCUSSION

## 4.0 Overview

This chapter presents the analyses of the data collected from the self-administered questionnaire. The discussion includes the interpretation of the data regarding related work in the literature, theory and specific responses given by the respondents per the research objectives. The purpose of the study was to investigate the strategies mathematics teachers use to motivate their students in classroom settings.

The first part of the chapter deals with the background characteristics of respondents which serve as a preliminary analysis of the study. The second part is devoted to the specific objectives of the study. Descriptive statistics were employed in the data analysis. At the end of data collection, the study retrieved 200 questionnaires, which represents a 100% response rate.

## 4.1 Socio-demographic Characteristics

This part of the chapter deals with the background characteristics of the respondents which are based on their sex, highest level of education, age and working experience. These variables were examined descriptively to understand the dynamics of these variables. The data in this section were analysed using frequency and percentage distributions. The results are presented in Table 4.1.

*Table 4.1: Demographic Background of Respondents*

| Variables | Sub-scale | Frequency (No.) | % |
|---|---|---|---|
| Gender | Female | 122 | 61 |
| | Male | 78 | 39 |
| Highest level of education | Diploma | 84 | 42 |
| | Bachelor's Degree | 110 | 55 |
| | Masters | 6 | 3 |
| Age in years | Below 30 | 52 | 26 |
| | 30 – 39 | 113 | 56.5 |
| | 40 – 49 | 25 | 12.5 |
| | 50 and above | 10 | 5 |
| Working Experience | Less than 5 years | 85 | 42.5 |
| | 5 - 10 years | 98 | 49 |
| | 11 and above | 17 | 8.5 |

Source: Field Data, 2023

As contained in Table 4.1, majority (61%) of the respondents were females while 39% were males. Based on this finding, one may argue that in terms of percentage, the total number of females outnumbered that of males.

**4.2 Analysis of Data on the Research Questions**

This section presents the results of the specific objectives of the study. The data were analysed quantitatively. Descriptive statistics was used to analyze the data collected. SPSS statistical tool was used for the data analysis because the responses to the items concerning the variables were measured numerically using a unilinear scale.

Responses to the closed-ended items used in eliciting data on the issues regarding the concepts were measured on a five-point unilinear scale ranging from one to five where one represented the strongest disagreement to the issues while five represented the strongest agreement to the issues. Based on the recommendation of Sarstedt and Mooi (2019), the study adopted mathematical approximation techniques to interpret the mean scores. Thus, Strongly Agree (4.5 – 5.0), Agree (3.5 – 4.4), Neutral (2.5 – 3.4), Disagree (1.5 – 2.4), and Strongly Disagree (1.0 – 1.4). The results are presented as follows:

### 4.3.1 Research question one: What are students' levels of motivation in teaching mathematics at Nkawie Municipal?

This research question seeks to find from the respondents' student's levels of motivation in teaching mathematics at Nkawie Municipal. This was done using a closed-ended question where respondents were allowed to select from the numerous options, student's levels of motivation in teaching mathematics at Nkawie Municipal. Respondents' views were coded and it was answered using the mean, and standard deviation from SPSS (version 23). Table 4.3 shows the results

***Table 2.3: students' levels of motivation in teaching mathematics***

| Student's levels of motivation | SD | D | N | A | SA | Mean | Std. Deviation |
|---|---|---|---|---|---|---|---|
| I establish a good rapport with students in and outside the classroom. | 3 | 12 | 45 | 68 | 72 | 3.82 | 1.004 |
| I give rewards to students when they succeed to keep them motivated during the teaching and learning process. | 3 | 17 | 62 | 66 | 52 | 3.64 | 0.968 |
| I remind students those mistakes are part of the learning process. | 2 | 16 | 45 | 62 | 71 | 3.74 | 0.957 |
| I encourage students to set specific learning goals for themselves. | 6 | 16 | 45 | 58 | 71 | 3.71 | 1.088 |
| I tell students that they can succeed if they make the reasonable effort | 11 | 50 | 63 | 55 | 21 | 3.45 | 1.107 |
| I invite former successful students to share their learning experiences | 2 | 16 | 53 | 63 | 66 | 3.43 | 0.827 |
| I highlight and review class learning objectives with students | 11 | 16 | 40 | 60 | 73 | 3.64 | 0.968 |
| I provide my students with assignments and other home works | 12 | 20 | 60 | 58 | 50 | 3.71 | 1.088 |
| **TOTAL** | | | | | | **3.64** | **1.001** |

**Source: Researcher's Field Work (2023)**

Table 4.3 discusses student's levels of motivation in teaching mathematics at Nkawie Municipal. This was answered using mean and standard deviation. As demonstrated in Table 4.3 most 70 (45.8%) of the respondents agreed on the statement "I establish a good rapport with students in and outside the classroom", 3 of the respondents disagreed to the statement, 12 of the respondents strongly disagreed with 45 of the respondents uncertain to the statement. The result saw a majority 140 of the respondents who agreed and were satisfied that teacher establish a good rapport with students in and outside the classroom. This was with a mean and a standard deviation of (Mean= 3.82, S. D= 1.004).

The statement 'I give rewards to students when they succeed to keep them motivated during the teaching and learning process', saw most 66 of the respondents agreeing to the statement, 20 of the respondents were also in disagreement to the statement, 62 of the respondents neither agreed nor disagreed to the statement with 52 of the respondents who strongly agreed to the statement. The result indicated that majority 66 (43.1%) of the respondents agreed that teachers give rewards to students when they succeed to keep them motivated during the teaching and learning process. This was with a mean and a standard deviation of (Mean= 3.64, S. D= 0.968).

The statement, 'I remind students those mistakes are part of the learning process' saw 62 respondents who agreed to the statement, 18 of the respondents disagreed to the statement, 45 of the respondents were uncertain to the statement with 71 of the respondents strongly agreed to the statement. The result demonstrated that majority 129 of the respondents agreed that teachers made teachers remind students those mistakes are part of the learning process. This was with a mean and a standard deviation of (Mean= 3.74, S. D= 0.957).

The statement 'I encourage students to set specific learning goals for themselves' surprisingly saw most 45 of the respondents who were uncertain to the statement, 22 of the respondents disagreed to the statement, 71 of the respondents strongly agreed to the statement with the remaining 58 of the respondents agreeing to the statement. The results indicated that majority 68 (44.4%) of the respondents agreed that teachers encourage students to set specific learning goals for themselves. This was with a mean and a standard deviation of (Mean= 3.71, S. D= 1.088).

The statement I tell students that they can succeed if they make the reasonable effort, had most 76 of the respondents who agreed to the statement, 50 of the respondents disagreed to the statement, 11 of the respondents also strongly disagreed to the statement, and 63 of the respondents neither agreed nor disagreed to the statement. The result demonstrated that majority 76 of the total respondents agreed to this statement.

The statement *I invite former successful students to share their learning experiences*, most 63 of the respondents agreed to the statement, 2 of the respondents were also in disagreement to the statement, 16 of the respondents disagreed to the statement whiles 66 of the respondents strongly agreed to the statement. The result showed that more than half 129 of the respondents agreed that teachers invite former successful students to share their learning experiences. This was with a mean and a standard deviation of (Mean= 3.43, S. D= 0.827).

Regarding the statement *I highlight and review class learning objectives with students,* 60 of the respondents agreed to the statement, 27of the respondents disagreed to the statement, 40 of the respondents strongly agreed to the statement, with 73 of the respondents who neither agreed or disagreed to the statement. The result indicated that more than half 133 of the respondents agreed that teachers highlight and review class

learning objectives with students. This was with a mean and a standard deviation of (Mean= 3.64, S. D= 0.968).

The last statement I provide my students with assignments and other home works, had most 58 of the respondents who agreed to the statement, 50 of the respondents strongly agreed to the statement, 32 of the respondents were in disagreement to the statement, with 60 of the respondents uncertain to the statement. The result showed a majority 108 of the respondents who agreed that teachers are doing a worthwhile job. This was with a mean and a standard deviation of (Mean= 3.71, S. D= 1.088).

This explains that teachers' view on student's levels of motivation in teaching mathematics at Nkawie Municipal were with high responses rate and the conclusion is that the analysis on student's levels of motivation in the teaching and learning process of mathematics was significant affecting their performance, this affirms the suggestion from Hair et al. (2010), since the total mean is greater than the midpoint value (3.0).

### 4.3.2 Research question two: What are teachers' levels of motivation in teaching mathematics at Nkawie Municipal?

This research question sought to find respondents view on teachers' levels of motivation in teaching mathematics at Nkawie Municipal. This was done using a closed-ended question where respondents were allowed to select from the numerous options, teachers' levels of motivation in teaching mathematics at Nkawie Municipal. Respondents' views were coded and it was answered using the mean, and standard deviation from SPSS (version 23). Table 4.4 shows the results.

*Table 4.4: teachers' levels of motivation in teaching mathematics*

| **Statements** | **Responses** | | | | | | |
|---|---|---|---|---|---|---|---|
| **Teachers' level of motivation** | **SD** | **D** | **U** | **A** | **SA** | **Mean** | **S. D** |
| I notice and react to any positive contributions from my students. | 4 | 23 | 4 | 101 | 68 | 4.32 | 0.061 |
| I provide regular feedback about the progress my students are making and the areas in which they should concentrate | 28 | 4 | 1 | 81 | 86 | 3.87 | 0.236 |
| I regularly include tasks that involve the public display of the student's skills. | 30 | 5 | 59 | 6 | 100 | 3.74 | 0.957 |
| I offer rewards for participating in activities that students may get drawn into because they require creative goal-oriented behaviour and offer novel experiences and consistent success. | 87 | 3 | - | 20 | 89 | 3.16 | 1.105 |
| I encourage accurate student self-assessment by providing various self-evaluation tools. | - | 75 | 26 | 32 | 84 | 3.56 | 0.569 |
| I regularly use small-group tasks where students can mix. | - | 18 | 44 | 74 | 64 | 3.24 | 1.012 |
| I encourage learners to apply their mathematics proficiency in a real-life situation. | 59 | 23 | - | 71 | 47 | 3.60 | 0.331 |
| I avoid face-threatening acts such as humiliating criticism or unexpectedly putting students in the spotlight. | 25 | 40 | 30 | 60 | 45 | 3.45 | 0.067 |
| **Total** | | | | | | **3.62** | **0.542** |

**Source: Researcher's Field Work (2023)**

Table 4.4 discusses teachers' levels of motivation in teaching mathematics at Nkawie Municipal. This was answered using mean and standard deviation. Among the questions which were asked to answer this objective were "I notice and react to any positive contributions from my students." had a (Mean= 4.32, S. D= 0.062), "I provide regular feedback about the progress my students are making and the areas in which they

should concentrate" had a (Mean= 3.87, S. D= 0.236), "I regularly include tasks that involve the public display of the student's skills" had a (Mean= 3.74, S. D= 0.957), "I offer rewards for participating in activities that students may get drawn into because they require creative goal-oriented behaviour and offer novel experiences and consistent success" had a (Mean= 3.16, S. D= 1.105), "I encourage accurate student self-assessment by providing various self-evaluation tools" had a (Mean= 3.24, S. D= 1.012), "I encourage learners to apply their mathematics proficiency in a real-life situation" had a (Mean= 3.60, S. D= 0.331), and teachers' view on "I avoid face-threatening acts such as humiliating criticism or unexpectedly putting students in the spotlight" had a (Mean= 3.45, S. D= 0.067). From this analysis, the total mean and standard deviation was reported as 3.62 and 0.542 respectively. This explains that teachers' levels of motivation in teaching mathematics at Nkawie Municipal was positive and that the analysis confirms that teachers' levels of motivation in the teaching and learning process of mathematics was positive and high since the total mean is greater than the midpoint value (3.0), it confirms that student's levels of motivation in teaching mathematics was positive and high, this buttresses Hair et al. (2010).

### 4.3.3 Research question three: What is the relationship between the teacher's level of motivation in teaching mathematics and students' level of motivation in learning mathematics?

This research question sought to find from the respondents the views on the relationship between the teacher's level of motivation in teaching mathematics and students' level of motivation in learning mathematics. This was done using a closed-ended questions and their views were coded. Their responses were analysed using linear regression model from SPSS (version 23). Table 4.5 shows the results

***Table 4.5: relationship between the teacher's level of motivation and students' level of motivation***

| Model | | Unstandardized Coefficients | | Standardized Coefficients | | |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | T | Sig. |
| 1 | (Constant) | 2.395 | .238 | | 10.060 | .000 |
| | Students' Level | .401 | .058 | .400 | 6.877 | .000 |
| | | **R =0.400, $R^2$ =0.016, F =47.287, P-value =0.000** | | | | |

a. Dependent Variable: Teachers' level of motivation

***Source**: Field survey, 2023*

Regression model was performed to determine the relationship between the teacher's level of motivation in teaching mathematics and students' level of motivation in learning mathematics. The regression model was significant (F = 47.287, p< .01), with an R indicating that there is 40% of the effect of teacher's level of motivation on students' achievement which can be explained by the predictor variables (students' level of motivation). Furthermore, the change in R was statistically significant indicating that there is a relationship between the teacher's level of motivation in teaching mathematics and students' level of motivation, 0.016<0.05 level (2 tailed).

Table 4.5 displayed the regression weight for the analysis of the relationship between the teacher's level of motivation in teaching mathematics and students' level of motivation. From the Table 4.5, it was seen that teacher's level of motivation in teaching mathematics impact students' level of motivation by 40% with ($\beta = 0.401, Std. Error = 0.058$). To answer the research hypothesis one in this study, it is defined by the value of the t-test in Table 4.5. From the table 4.5, the t-test value was 6.877>3.0 and p-value of 0.000<0.05. Since the value of the t-test is greater than 3.0 as suggested by Hair et al. (2010), the research confirm that, there is a relationship between

the teacher's level of motivation in teaching mathematics and students' level of motivation. Moreover, the p-value from the Table 4.5 had a p-value of 0.000<0.05 and by this, there is a positive moderate relationship between the teacher's level of motivation in teaching mathematics and students' level of motivation.

### 4.3.4 Research question four: Which classroom teaching practices and strategies do mathematics teachers employ to raise students' level of motivation in learning mathematics at Nkawie Municipal?

This research question sought to find from the respondents the views on classroom teaching practices and strategies mathematics teachers employ to raise students' level of motivation in learning mathematics at Nkawie Municipal. This was done using a closed-ended question and their views were coded and it was analysed using descriptive statistics (mean and standard deviation) model from SPSS (version 23). Table 4.6 shows the results

***Table 4.6: Classroom teaching practices to raise students' level of motivation***

| Classroom teaching practices | Mean | Std. deviation |
|---|---|---|
| Creating the basic motivational conditions | **3.83** | **.719** |
| Generating initial motivation | **3.78** | **.866** |
| Maintaining and protecting motivation | **3.84** | **.681** |

***Source**: Field survey, 2023*

Table 4.6 identifies three (3) major classroom teaching practices and strategies mathematics teachers employ to raise students' level of motivation in learning mathematics. That is, creating the basic motivational conditions, generating initial motivation, and maintaining and protecting motivation. Out of these factors, Creating the basic motivational conditions had a least score of mean as (Mean= 3.69, S. D=

0.999). The second factor in raising students' level of motivation was generating initial motivation with a highest mean as (Mean= 3.90, S. D= 0.021). The third factor was the variable "maintaining and protecting motivation" with a second highest mean of (Mean= 3.73, S. = 0.068). Since the total mean for each variable were all greater than the midpoint value (3.0), it confirmed that the major classroom teaching practices and strategies mathematics teachers employ to raise students' level of motivation in learning mathematics was rated higher by the respondents as suggested from Hair et al. (2010). The subsequent tables give explanation of the classroom teaching practices and strategies mathematics teachers employ to raise students' level of motivation in learning mathematics. This was explained on the three (3) major classroom teaching practices and strategies mathematics teachers employ to raise students' level of motivation in learning mathematics

***Table 4.7: Creating the basic motivational conditions***

| **Creating the basic motivational conditions** | **SD** | **D** | **N** | **A** | **SA** | **Mean** | **Std. Deviation** |
|---|---|---|---|---|---|---|---|
| I pay attention and listen to students. | 8 | 18 | 43 | 70 | 61 | 3.69 | .999 |
| I establish a norm of tolerance with students | 12 | 23 | 60 | 63 | 42 | 3.90 | .021 |
| I encourage students in taking risks and accept mistakes as a natural part of learning. | 6 | 16 | 74 | 65 | 39 | 3.73 | 1.168 |
| I bring in and encourage humor among students. | 3 | 20 | 69 | 67 | 41 | 3.90 | .997 |
| I encourage learners to personalize the classroom environment according to their tastes. | 6 | 15 | 69 | 70 | 40 | 3.78 | 1.117 |
| I regularly use small-group tasks where student can mix. | 5 | 16 | 53 | 84 | 42 | 3.87 | .411 |
| I try and prevent the emergence of rigid seating patterns among students. | 26 | 36 | 53 | 80 | 5 | 3.97 | .320 |
| **Total** | | | | | | **3.83** | **0.719** |

***Source**: Field survey, 2023*

Table 4.7 defines variable items for creating the basic motivational conditions which is a factor mathematics teachers used to raise students' level of motivation higher. From the items in Table 4.7, "I pay attention and listen to students" had (Mean= 3.69, S. D= .999), "I establish a norm of tolerance with students" had (Mean= 3.90, S. D= .021), "I encourage students in taking risks and accept mistakes as a natural part of learning" had (Mean= 3.73, S. D= 1.168), "I bring in and encourage humour among students" had (Mean= 3.90, S. D= .997), "I encourage learners to personalize the classroom environment according to their tastes" had (Mean= 3.78, S. D= 1.117) while "I regularly use small-group tasks where student can mix" and "I try and prevent the emergence of rigid seating patterns among students" had (Mean= 3.87, S. D= .411) and (Mean= 3.97, S. D= .320) respectively.

***Table 4.8: Generating initial motivation***

| **Generating initial motivation** | **SD** | **D** | **N** | **A** | **SA** | **Mean** | **Std. Deviation** |
|---|---|---|---|---|---|---|---|
| I provide feedback on the student's views after providing various answers to the students | 30 | 29 | 6 | 73 | 50 | 3.80 | 1.021 |
| I regularly remind students that the successful mastery of mathematics is instrumental to the accomplishment of their valued goals. | 5 | 64 | 22 | 81 | 28 | 3.86 | 1.137 |
| I encourage learners to apply their mathematics proficiency in a real-life situation. | 23 | 44 | 24 | 59 | 50 | 3.50 | 1.125 |
| I make sure that the students receive sufficient preparation and assistance. | 8 | 18 | 43 | 70 | 61 | 3.94 | .184 |
| **Total** | | | | | | **3.78** | **0.866** |

***Source**: Field survey, 2023*

Table 4.8 defines variable items for generating initial motivation which is a factor mathematics teachers used to raise students' level of motivation higher. From the items in Table 4.8, "I provide feedback on the student's views after providing various answers to the students" had (Mean= 3.80, S. D= 1.021), "I regularly remind students that the successful mastery of mathematics is instrumental to the accomplishment of their valued goals" had (Mean= 3.86, S. D= 1.137), "I encourage learners to apply their mathematics proficiency in a real-life situation" had (Mean= 3.50, S. D= 1.125), and "I make sure that the students receive sufficient preparation and assistance" had (Mean= 3.94, S. D= .184).

***Table 4.9: Maintaining and protecting motivation***

| **Maintaining and protecting motivation** | **SD** | **D** | **N** | **A** | **SA** | **Mean** | **Std. Deviation** |
|---|---|---|---|---|---|---|---|
| I vary the learning tasks and other aspects of my teaching as much as I can. | 12 | 26 | 42 | 60 | 60 | 3.94 | .494 |
| I make tasks challenging to students to reason critically as means of motivating them in the study of mathematics. | 12 | 10 | 39 | 74 | 65 | 3.97 | .451 |
| I personalize learning goals. | 11 | 13 | 50 | 84 | 42 | 3.55 | 1.125 |
| I design tests that focus on what learners can rather than cannot do and include improvement options. | 40 | 52 | 3 | 34 | 71 | 3.93 | .501 |
| I draw attention of learners to their strengths and abilities | 82 | 66 | - | 27 | 25 | 3.82 | .836 |
| **Total** | | | | | | **3.84** | **0.681** |

***Source**: Field survey, 2023*

Table 4.9 defines variable items for Maintaining and protecting motivation which is a factor mathematics teachers used to raise students' level of motivation higher. From the

items in Table 4.9, "I vary the learning tasks and other aspects of your teaching as much as you can" had (Mean= 3.94, S. D= .484), "I make tasks challenging to students to reason critically as means of motivating them in the study of mathematics" had (Mean= 3.97, S. D= .451), "I personalize learning goals" had (Mean= 3.55, S. D= 1.125), "I design tests that focus on what learners can rather than cannot do and include improvement options" had (Mean= 3.93, S. D= .501), and "I draw attention of learners to their strengths and abilities" had (Mean= 3.82, S. D= .836).

## 4.5 Discussion of results

The results are discussed under the headings below:

### 4.5.1 Students' levels of motivation in teaching mathematics

Based on the findings from Table 4.3, students' levels of motivation in teaching mathematics had a higher responses rate. This finding was in conformity with Shahrill, Abdullah and Yusof (2015) whose conclusion highlighted various factors responsible for students to lose motivation in learning mathematics such as lack of teacher motivation, low students' literacy abilities in understanding the mathematical problems and less parental involvement. Mutodi and Ngirande (2014) found that the perceptions shared by the students in South Africa about mathematics performance are due to one 's self-confidence, family background, teacher teaching/learning materials, interest in mathematics, traditions, and beliefs. Difficulties and weaknesses in mathematics are the main causes of such perceptions.

As far as parents are concerned, Mutodi and Ngirande (2014) confirmed that students, who attributed their academic success to the interest, self-confidence, as well as family background, have a chance to come up with higher achievements than those who point their academic success to chance and natural talent. Haque and Farhana (2017)

investigated and found out that parents 'perception of mathematics has an influence on their children's perception, and hence influence their performance. A study conducted in South African schools (Tsanwani, Harding, Engelbrecht, & Maree, 2014), it was expressed by educators and learners that, commitment and motivation, learners' attitudes, self-concepts, career prospects, perceptions of peers and teachers as well as teachers' perceptions of learners are factors inducing underprivileged learners' judgments to continue and achieve in mathematics in spite of their problematic settings.

Bringula et al., (2017) found that motivation and the nature of feedback from mobile-assisted learning application were positive determinants of performance in mathematics. García et al. (2016) found that affective motivational variables brought the distinction between high and low performance in mathematics. Froiland and Davison (2016) identified parent and student perceptions and motivation as determinants of performance in mathematics. Motivation, emotional support and self-efficacy were also identified by Skaalvik et al. (2015) as determinants of performance in mathematics. Carvalho (2015) affirms that teachers who are confident with mathematics have a tendency to impart that confidence upon their students. Therefore, teachers need to demonstrate to the students that mathematics is a key element that will sharpen their thinking capacity in solving real-world problems as at the social constructivism point of view, the sense of belonging to a community and teamwork in the classroom increases by offering more opportunities for learners to exchange together.

Li et al., (2020) found motivation, peer relationships, and self-efficacy, as the contributing factors for performance in mathematics. In the study of Prast et al., (2018), perceived competence was the only motivational variable found to influence high

achievement in mathematics. Pitsia, Biggart and Karakolidis (2017) also identified instrumental motivation, self-efficacy, anxiety, and attitudes towards mathematics as determinants of performance in mathematics.

### 4.5.2 Teachers' levels of motivation in teaching mathematics

Based on the findings from Table 4.4, teachers' levels of motivation in teaching mathematics had a higher responses rate. Studies that support this study were Carvalho (2015) affirms that teachers who are confident with mathematics have a tendency to impart that confidence upon their students. Therefore, teachers need to demonstrate to the students that mathematics is a key element that will sharpen their thinking capacity in solving real-world problems as at the social constructivism point of view, the sense of belonging to a community and teamwork in the classroom increases by offering more opportunities for learners to exchange together.

Li et al., (2020) found motivation, peer relationships, and self-efficacy, as the contributing factors for performance in mathematics. In the study of Prast et al., (2018), perceived competence was the only motivational variable found to influence high achievement in mathematics. Pitsia, Biggart and Karakolidis (2017) also identified instrumental motivation, self-efficacy, anxiety, and attitudes towards mathematics as determinants of performance in mathematics. Yusof (2015) have highlighted various factors responsible for students to lose motivation in mathematics such as lack of teacher motivation, low students' literacy abilities in understanding the mathematical problems and less parental involvement. In the study investigating the teachers' beliefs on motivating factor to students learning approach used to address their learning motivation (Matteson, Swarthout, & Zientek, 2011), the results indicated that teachers believe that motivation is vital towards learning, though it is difficult for teachers to

identify motivational strategies associated with pedagogy and curriculum, while some of them emphasized utilizing tangible rewards.

### 4.5.3 The relationship between the teacher's level of motivation in teaching mathematics and students' level of motivation in learning mathematics.

Based on the findings from Table 4.6, the relationship between the teacher's level of motivation in teaching mathematics and students' level of motivation in learning mathematics was significant. Previous studies have shown that teachers' behaviours and instructional practices play an important role in students' motivation to learn (Loima & Vibulphol, 2014; Loima & Vibulphol, 2016; Urhahne, 2015). Teachers set the learning teaching process to create the situation to be interesting so the students can be motivated. The teaching method is also a vital factor that influences student motivation and if the teacher apply appropriate method in teaching a subject, the students can be more comfortable in the learning process (Loima & Vibulphol, 2014).

MacGrath (2005) stated that relationships are at the heart of teaching, since it is an activity based on communication. MacGrath (2005) advised that, there is the need to give each learner his/her due respect as it befits him/her, recognize individual skills and promote them, attend to individual needs, take interest in learners as individuals and listen to their problems and show them they are people worthy of respect and consideration.

Research into the changing role of teachers in classrooms underscored that students are the central focus with teachers taking on the persona of guides (Cindrić & Pavić, 2017; Gan, Liu, & Yang, 2017; Patel & Laud, 2015). Teachers as guides and motivation are more beneficial in the learning process than the role of content experts in learning mathematics (Weimer, z2013). Furthermore, teachers who create rich learning

environments for their students help them to develop a sense of autonomy, which motivates them to be more responsible and self-directed in their learning (Cindrić & Pavić, 2017; Gan et al., 2017). Teachers who train their students to make practical contributions to learning tasks and to track their progress (Dole, Bloom & Kowalske, 2016; Patel & Laud, 2015) are giving them the opportunity to play a significant role in their mathematics learning. In the changing role of the student, teachers see students as partners in the learning process there is a relationship between teacher's motivation and students' level of motivation in learning mathematics (Cindrić & Pavić, 2017).

### 4.5.4 Classroom teaching practices and strategies that mathematics teachers employ to raise students' level of motivation in learning mathematics.

Based on the findings from Table 4.7, classroom teaching practices and strategies mathematics teachers employ to raise students' level of motivation in learning mathematics were identified with three components, thus, creating the basic motivational conditions, generating initial motivation, and maintaining and protecting motivation. This had a higher rate of responses from the data analysis. Previous studies that support this current study was Jepketer (2017) who established a model based on her findings, stating that when teaching strategies are enhanced through targeted in-service training, student performance is affected.

Bûsljeta (2013) identified three primary stages that teachers must follow: selection and first evaluation, presentation and interpretation, and final evaluation. It must be stated unequivocally that the competencies required at each step are mutually included. Le Donne, Fraser, and Bousquet (2016) highlight three teaching strategies that are mainly used: The first is active learning which promotes students' engagement in the creation of their knowledge. Students' discussions, group work, co-operative are necessary

activities that support active learning. The second is cognitive activation which stimulates students' higher-order thinking, such as problem-solving, critical thinking, and decision making and the third highlighted teaching strategy is teacher-directed instruction, which guides students by explaining mathematics concepts, providing feedback, and summarizing what they have learned. Pantziara and Philippou (2007) argued that teaching strategies such as problem-solving and the use of visual aid in the mathematics classroom could increase students' motivation and morale to their performance.

Ali, Hukamdad, Akhter, and Khan (2010) confirmed also that problem-solving strategies help students perform better in mathematics than those taught by traditional methods. An experimental study by Muema, Mulwa, and Mailu (2018) showed that there is a positive correlation between teaching methods and students' academic achievement. Likewise, Walters et al. (2014) noted that using student-centered instruction in teaching mathematics transforms mathematics classrooms into lively and engaging learning environments. Students take control of their learning while making meaningful connections to the world in which they live and also allow students to interact, collaborate, negotiate and communicate with their peers. The study done by Mitana, Muwagga, and Ssempala (2019) on the influence of national examination on classroom practice in primary schools in Uganda found that the teaching strategies used by the teachers are directly influenced by national examinations. The methods used in teaching were those that encourage rote learning and memorization of facts. Furthermore, Kathare (2020) in the research done in Kenya found that interactive between teacher and learner such as personalized teaching and interactive learner to learner teaching such as peer tutoring are used by the teachers to alleviate some specific mathematics difficulties in learners. However, teachers wish to involve students in their

learning through reliable tasks, and teachers are motivated to teach for understanding rather than to the test (Whittle, Telford & Benson, 2018).

# CHAPTER 5

# SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

## 5.0 Overview

This chapter deals with a summary of the key findings of the study, conclusions drawn and recommendations to report some issues identified from the research. The chapter closes with suggestions for people who would like to conduct research around the topic.

## 5.1 Summary

The study was about the strategies mathematics teachers use to motivate their students in classroom settings. The study area was the Nkawie Municipal district in the Ashanti region of Ghana. The study respondents from the district involved teachers who were in the Senior High School (SHS) specifically Nkawie Senior/Technical School, Toase Senior High School and Mpasatia SHS. The study employed quantitative design with descriptive survey approach. The population of the study was made up four hundred (400) Mathematics teachers in the stated schools.

A simple random approach was used in selecting the samples for the study. Therefore, the data analysis focused on 200 respondents. Questionnaire were used in the data collection, and these questions were scaled based on the variables under the study include: students' level of motivation, teachers' level of motivation and classroom strategies of motivation. Data analysis was done using descriptive statistics (mean and standard deviation and regression analysis). Based on the data analysis, the study found the following:

The finding of this study on respondents view on students' levels of motivation in teaching mathematics at Nkawie Municipal was rated positive with the mean score of 3.64 and the standard deviation of 1.001. Among the observable items, "I invite former

successful students to share their learning experiences" had (Mean= 3.43, S. D= 0.827) as lowest score among the respondents' view and the item "I establish a good rapport with students in and outside the classroom" had (Mean= 3.82, S. D= 1.004) as highest score among the respondents' view.

This study further finds that on respondents view on teachers' levels of motivation in teaching mathematics at Nkawie Municipal was rated positive and significant with the mean score of 3.62 and the standard deviation of 0.542. Among the observable items, "I notice and react to any positive contributions from my students" had (Mean= 4.32, S. D= 0.061) as a highest score among the respondents' view and the item "I offer rewards for participating in activities that students may get drawn into because they require creative goal-oriented behaviour and offer novel experiences and consistent success" had (Mean= 3.16, S. D= 1.105) as a lowest score among the respondents' view.

The findings on this study reported that the relationship between the teacher's level of motivation and students' level of motivation was significant and that teacher's level of motivation has an effect on students' level of motivation was significant from the regression model at p-value of 0.000.

The study's findings informed that three (3) basic classroom teaching practices identified by teachers that help in raising students' level of motivation. These practices include creating motivational conditions in the classroom for students, generating initial motivation strategies for students, and maintaining and protecting the motivation initiated for students.

## 5.2 Conclusion

Based on the objectives of this study which was to investigate the strategies mathematics teachers use to motivate their students in classroom settings, the research results have answered the research questions.

1. There were higher and positive rate concerning students' levels of motivation in teaching mathematics from the descriptive statistics.
2. There were positive and high rate concerning teachers' levels of motivation in teaching mathematics.
3. There was positive moderate relationship between the teacher's level of motivation and students' level of motivation.
4. Classroom teaching practices identified by teachers that helps in raising students' level of motivation had a higher response rated.

## 5.3 Recommendations

Based on the findings of this study, the following recommendations were made as strategies mathematics teachers use to motivate their students in classroom settings.

1. The mathematics teachers at Nkawie Municipality should manage their classroom environment effectively and focused on discipline, relation between teachers and students and arousing curiosity so that it can help to motivate their students.
2. The mathematics teacher at Nkawie Municipality should motivate their students at the beginning the lesson by using different warming up activities with the students.

3. Mathematics teachers at Nkawie Municipality should employ better teaching method and instructional materials according to the context and content such that it can motivate their students to learn mathematics.
4. Mathematics teachers at Nkawie Municipality should use students-oriented teaching methods to make learners actively participate in class during mathematics lessons.

### 5.3.1 Suggestions for further work

According to the conclusions derived from the finding of this study, the researcher proposes some recommendation that would be helpful for further research work. The recommendation is that since this study was conducted only in Nkawie municipality in the Ashanti region of Ghana, in other to establish the finding in similar studies in other districts, similar studies should be conducted in other Senior High Schools and Basic schools either than Nkawie Municipality.

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# APPENDIX A

## QUESTIONNAIRE

This questionnaire seeks to investigate mathematics teachers' strategies to motivate their students to learn mathematics. The responses you provide would contribute to improving performance in the study of mathematics. There is no right or wrong answer. The information you provide would be used solely for academic purposes and your anonymity shall be kept in ultimate confidentiality.

**SECTION A**

Demographic Profile

Gender: Male [ ] female [ ]

Age: 20 – 30 years [ ] 31 – 45 years [ ] 46 years and above [ ]

Educational Qualification: Diploma [ ] Degree [ ] Masters [ ]

Work Experience: 1 – 5 years [ ] 6 – 15 years [ ] 15 years and above [ ]

**SECTION B**

**STUDENTS' LEVELS OF MOTIVATION IN LEARNING MATHEMATICS**

Teachers were to indicate their level of response from 'strongly disagree' to 'strongly agree'.

SD- strongly disagree D- disagree N- neutral A- agree SA- strongly agree

| S/N | VARIABLE | SA | A | N | D | SD |
|---|---|---|---|---|---|---|
| 1. | I establish a good rapport with students in and outside the classroom. | | | | | |
| 2. | I give rewards to students when they succeed to keep them motivated during the teaching and learning process. | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 3. | I remind students that mistakes are part of the learning process. | | | | | |
| 4. | I encourage students to set specific learning goals for themselves. | | | | | |
| 5. | I tell students that they can succeed if they make the reasonable effort | | | | | |
| 6. | I invite former successful students to share their learning experiences | | | | | |
| 7. | I highlight and review class learning objectives with students | | | | | |
| 8. | I provide students with assignments and other home works | | | | | |

**SECTION C**

**TEACHERS' LEVELS OF MOTIVATION IN TEACHING MATHEMATICS**

Teachers were to indicate their level of response from 'strongly disagree' to 'strongly agree'.

SD- strongly disagree D- disagree N- neutral A- agree SA- strongly agree

| S/N | VARIABLE | SA | A | N | D | SD |
|---|---|---|---|---|---|---|
| 1. | I notice and react to any positive contributions from my students. | | | | | |
| 2. | I provide regular feedback about the progress students are making and the areas in which they should concentrate | | | | | |
| 3. | I regularly include tasks that involve the public display of the student's skills. | | | | | |
| 4. | I offer rewards for participating in activities that students may get drawn into because they require creative goal-oriented behavior and offer novel experiences and consistent success. | | | | | |
| 5. | I encourage accurate student self-assessment by providing various self-evaluation tools. | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 6. | I regularly use small-group tasks where students can mix with colleagues. | | | | | |
| 7. | I encourage learners to apply their mathematics proficiency in a real-life situation. | | | | | |
| 8. | I avoid face-threatening acts such as humiliating, criticism or unexpectedly putting students on the spotlight. | | | | | |

**SECTION D**

**CLASSROOM STRATEGIES OF MOTIVATION IN TEACHING MATHEMATICS**

Teachers were to indicate their level of response from 'strongly disagree' to 'strongly agree'.

SD- strongly disagree D- disagree N- neutral A- agree SA- strongly agree

| S/N | Teachers' motivational strategies | SA | A | N | D | SD |
|---|---|---|---|---|---|---|
| A | **Creating the basic motivational Conditions** | | | | | |
| 1 | I pay attention and listen to students. | | | | | |
| 2 | I establish a norm of tolerance with students | | | | | |
| 3 | I encourage students in taking risk and accept mistakes as a natural part of learning. | | | | | |
| 4 | I bring in and encourage humor among students. | | | | | |
| 5 | I encourage learners to personalize the classroom environment. | | | | | |
| 6 | I regularly use small-group tasks were student can mix with their mates. | | | | | |
| 7 | I try and prevent the emergence of rigid seating patterns among students. | | | | | |
| B | **Generating initial motivation** | | | | | |
| 1 | I provide feedback on the student's views after providing various answers among the students | | | | | |
| 2 | I regularly remind students that the successful mastery of mathematics is instrumental to the accomplishment of their valued goals. | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 3 | I encourage learners to apply their mathematics proficiency in a real-life situation. | | | | | |
| 4 | I make sure that the students receive sufficient preparation and assistance. | | | | | |
| C | **Maintaining and protecting motivation** | | | | | |
| 1 | I vary the learning tasks and other aspects of teaching as much as I can. | | | | | |
| 2 | I make tasks challenging to students to reason critically as means of motivating them in the study of mathematics. | | | | | |
| 3 | I personalize learning goals. | | | | | |
| 4 | I design tests that focus on what learners Can do rather than cannot do and include improvement options. | | | | | |
| 5 | I draw attention of learners to their strengths and abilities | | | | | |