**Journal of Mathematics and Science Teacher**
2024, 4(1), em056
e-ISSN: 2752-6054
https://www.mathsciteacher.com/

MODESTUM

**Research Article** **OPEN ACCESS**

# Exploring impact of student attitude, parental involvement, and teacher competence on mathematics performance in selected schools in Northern Ghana

Issaka Alorki [1], Abdul-Wahab Tahiru [2*], Rafatu Tahiru [3]

[1] Department of Mathematics and ICT Education, School of Science, Mathematics, and Technology Education, C. K. Tedam University of Technology and Applied Sciences, Navrongo, GHANA
[2] Department of Environment and Sustainability Sciences, Faculty of Natural Resources and Environment, University for Development Studies, Tamale, GHANA
[3] Department of Biochemistry and Biotechnology, Kwame Nkrumah University of Science and Technology, Kumasi, GHANA
*Corresponding Author: tahiru.abdulwahab21@uds.edu.gh

**Citation:** Alorki, I., Tahiru, A.-W., & Tahiru, R. (2024). Exploring impact of student attitude, parental involvement, and teacher competence on mathematics performance in selected schools in Northern Ghana. *Journal of Mathematics and Science Teacher, 4*(1), em056. https://doi.org/10.29333/mathsciteacher/14251

**ARTICLE INFO**

Received: 29 Jun. 2023

Accepted: 29 Jan. 202

**ABSTRACT**

The purpose of this study was to see how students' attitudes towards mathematics influenced their academic achievement in the Savelugu Municipality in the Northern Region of Ghana. The study employed the pragmatic paradigm and quantitative methodology. A 41-item semi-structured questionnaire rated using 5-points Likert scale, and document reviews were used to collect data. A combination of purposive and simple random sampling procedures was used to select 35 junior high school (JHS) in the Savulugu Municipality, questionnaires were administered to 350 JHS students, however, 315 questionnaires were returned. Data obtained from questionnaire were analyzed using Pearson product moment correlation coefficient, t-test, means, standard deviation, and percentages. The results revealed that educational institutions should develop programs to help parents become more active in their children's education. To influence students' attitudes towards mathematics study, policymakers and the Ghanaian Educational Service should promote programs such as National Mathematics Day to raise students' awareness of the importance of mathematics in their daily lives. The Ministry of Education and non-governmental organizations should endeavor to offer enough instructional resources and financial incentives to instructors to help them make teaching relevant in the classroom.

**Keywords:** mathematics, education, incentives, learners, administration

## INTRODUCTION

The study of mathematics has significance in many areas of human existence. Nasamu (2021) argues that the culture of mathematics is necessary to achieve the teaching and design of life due to mathematics' vast relevance in social contexts. In addition to its obvious educational value, the ability to think critically and reason logically is a vital life skill (Živković et al., 2022) that necessitates familiarity with mathematics. Learning mathematics helps one cultivate the accuracy, consistency, and mental discipline necessary for making good decisions and addressing problems in a responsible manner. The importance of mathematics has been emphasized by several disciplines in higher education (Oliver & de St Jorre, 2018; Sjaastad, 2012), including the technical fields, engineering, economics, finance, agriculture, pharmacy, and health sciences.

Students in other disciplines, such as the social sciences, are increasingly required to take at least one mathematics course in university curricula across the world. Their students learn foundational mathematics as well as the analytical and computational skills essential for their field of study. However, most children still find studying mathematics at the elementary and secondary school levels to be extremely difficult, leading to poor or average results in mathematics-related courses compared to other disciplines. Student achievement in mathematics is a serious issue from elementary school through college, as reported by Bernacki et al. (2021). The consistent demonstration of underachievement in mathematical studies over many years (Rodriguez, 2023) adds weight to this notion, as does the widespread acknowledgement of the value of mathematical knowledge. For instance, 32.9% of students who sat the mathematics test at the University of Cape Coast–Institute of Education Chief Examiner in 2013/14 were awarded a grade of D or D+, while 20.9% of students failed the exam (Abreh et al., 2018).

According to Rampal and Subramanian (2012), mathematics is perceived as one of the "killer" courses. Most students in the Ghana's junior high schools (JHSs) lack the ability to apply logic to the solution of mathematical problems, which negatively impacts their grades in the subject (Yahaya, 2020). The low performance of learners in mathematics, their attitudes towards

studying the subject and other factors, constituted the subject of investigation of the current study. Mathematics aversion may and has been characterized in a variety of ways. Cognitive, emotional, and behavioral reactions to an item all contribute to an individual's attitude towards that thing, as several studies have shown (Chen et al., 2021). According to research by Sanders et al. (2019), students' attitudes towards mathematics learning are shaped by the responses they receive from their teachers and classmates when they encounter mathematical challenges at school. In addition, Iwu et al. (2019) posited that an attitude is a propensity that prepares a person to behave towards something; in this example, a subject that one learns or studies; and that this propensity has some perceptual, cognitive, and behavioral component. Iwu et al. (2019) found that "the students' attitudes towards mathematics varied by gender, field, and mathematics score, but not by grade" and that "the teachers' approaches and activities impacted the students' attitudes towards mathematics in some aspects." This suggests that students' perspectives are shaped by the type of instruction they receive or the courses they take.

Similarly, Jiang et al. (2020) found that students were more motivated to put in effort and had better grades when they had a positive outlook on the subject they were learning. Positive attitudes towards mathematics, as argued by Jiang et al. (2020), are crucial because they influence students' motivation to study the subject and can lead to a greater likelihood of majoring in mathematics or pursuing careers in related fields. Further, Iwu et al. (2019) analyzed Canadian Trends in International Mathematics and Science Study (TIMSS) data and showed that students' views towards mathematics were a significant predictor of their enrollment in upper-level mathematics courses. In another study, Moussa and Saali (2022) performed research in South-Western Nigeria and discovered that instructors' attitudes towards the teaching of mathematics in schools significantly impacted students' attitudes and the possibility that they would pursue mathematics in the future.

However, it is evident that the aforementioned research and others like them in the literature have largely failed to address concerns connected to students' dislike of mathematics and the role that this distaste plays in either students' low or high levels of mathematical achievement. This suggests that students' dispositions have a bearing on how well they perform in mathematics. Students' low mathematical performance is influenced by their pessimistic outlooks. Findings by Erdogan and Yemenli (2019) and other related studies, such as Iwu et al. (2019) fail to dwell on learners' attitudes, and their contribution to poor performance in mathematics. This realization further led to the current study.

Due to the widespread belief that a lack of proficiency in science, technology, engineering, and mathematics (STEM) subjects, especially mathematics, impedes prospects for personal and national development, this research is timely and important. Poor academic performance in mathematics is a persistent problem in rural Ghana, as it is in many other nations across sub-Saharan Africa, costing the country economic competitiveness. According to West African Examination Council, students' mathematical abilities are much below par (Ogbeche et al., 2021). Ogbeche et al. (2021) argues that if African countries want to succeed in today's technology-driven global economy, they must invest heavily in STEM education.

After extensively reviewing the existing literature, the researchers of this study were unable to find any studies that specifically examined the impact of students' attitudes towards mathematics and their academic performance in the Savelugu Municipality, located in the Northern Region of Ghana. Data available at the Ghana Education Service (GES) in the Savelugu Municipality shows that students generally attain low achievement in mathematics. Thus, looking at the performance of students in the basic education certificate examination over the past three years (2018-2020), the results indicate a score of 25.0% in 2018, 30.0% in 2019, and 28.0% in 2020 (Agyekum, 2023).

The constantly poor performance trend gives reason to worry. Also, preliminary observations show that the attitude of students contributes significantly to their low performance in mathematics. As a teacher in Savelugu Municipality, one of the researchers has observed many negative attitudes of students towards learning the subject. The researcher has listened to students make statements such as "mathematics is a challenging subject, I absolutely detest mathematics, sir. Please understand that I do not want to study science at the secondary level because of the mathematicsinvolved". Hence, it is impossible to overestimate the significance of this study. In light of this, the study looked at the link between JHS students' attitudes towards mathematics and their mathematical achievements in Savelugu Municipality.

### Research Hypothesis

The study tested the following research hypothesis:

1. **$H_0$.** There is no significant relationship between parental involvement/support and JHS students' attitudes towards mathematics.

   **$H_1$.** There is a significant relationship between parental involvement/support and junior school students' attitudes towards mathematics.

2. **$H_0$.** There is no significant relationship between teacher competence/attitude and JHS students' attitude towards mathematics.

   **$H_1$.** There is a significant relationship between teacher competence/attitude and junior school students' attitude towards mathematics.

3. **$H_0$.** There is no significant classroom instructions/climate and junior school pupils' attitude towards learning mathematics.

   **$H_1$.** There is a significant relationship between classroom instructions/climate and JHS students' attitudes towards learning mathematics.

## MATERIALS & METHOD

### Study Design & Instruments

Before commencing data collection, school administrators were informed to determine when the researchers would visit their individual schools to gather the required information. At the point when the researchers showed up at the schools, they provided a letter to the relevant authorities as an indication of approval sought and granted for the data collection exercise to be undertaken in each of the selected schools. The purposive sampling procedure was first utilized to select participating schools, and simple random sampling was employed in selecting participating students (Oppong, 2013). Overall, two schools were chosen from the Savelugu Municipal Assembly in the Northern Region of Ghana. The study accommodates a total of 315 students (189 male and 128 female), with an average age range of 14-17 years old. Students were selected from public JHSs. Since most people in the research area live in rural or suburban areas and rarely attend private schools, the study did not include private JHS students. Students were found in their classroom setting while learning. With approval from the head teacher, the teacher would invite the researchers to distribute the research instruments and permit them to clarify every one of the subtleties of the investigation, just as the questionnaire would have been answered. Students had to agree voluntarily to participate in the research before being given questionnaires. Students were free to ask questions before and during the filling out of the questionnaire about the research for more clarifications. To provide answers to the four research questions based on three components: the influence of parent involvement on the attitude of students towards mathematics, the effect of teachers' attitude/competence on the attitude of students towards mathematics, and the effect of classroom instruction/environment on students' attitudes towards mathematics. The present study employed both descriptive and inferential research designs. The researchers themselves designed the questionnaires based on a sample of research hypotheses. This means the questionnaire items were centered on five constructs:

1. efficacy of students,
2. teacher-student relationship,
3. students' perception of mathematics,
4. cimate and parental involvement, and
5. students mathematics achievement.

Questionnaires were administered in English to students. Apart from personal information items, the questionnaire for students contained about 41 question items. Items within the questionnaire were ranked on a five-type Likert scale ranging from one (strongly agree) to five (strongly disagree). For data analysis and presentation, frequency tables were used for the background of students, gender, and population. Also, the homoscedasticity assumption was used to ensure the validity of statistical tests such as Pearson product moment correlation coefficient (PPMCC) in measuring the strength and direction of the linear relationship between two continuous variables, and a t-test to determine the significance of the association between the various variables in the research.

The study included both male and female students, the results show that 60.0% of the students were males, while 40.0% were females, with 166 males and 154 females. The consequence is that at ten JHSs in Savulugu Municipal, there are more male students than females. The research instruments were evenly divided among the three forms of JHS in Ghana, i.e., form 1, form 2, and form 3. From the age ranges on the questionnaire, 243 students, representing 77.1%, were between the ages of 14 and 17, while 30 students, representing 9.1%, were between the ages of 10 and 13, and 42 of the students, representing 13.4%, were between the ages of 18 and above. The majority of students in ten JHSs in Savulugu Municipal were between the ages of 14 and 17. Furthermore, the study illustrates that out of the sample population, 193 individuals, accounting for 61.3%, had parents with no educational background, while 9.2%, 9.5%, and 11.4% had parents with certificates, diplomas, and undergraduate degrees, respectively, and only 8.4% of respondents had parents with a master's degree or above. Additionally, findings of the study show that respondents who stay with both of their parents form the majority, with 189 (60.0%), 36 (11.4%), and 14 (4.4%) staying with their mother only and father only, respectively. Additionally, 36 (11.4%) stayed with their grandmothers, while eight (2.5%) stayed with their grandfathers. Further, findings of the study show that respondents who stayed with their aunties recorded 28 (8.9%), while respondents who stayed with their uncles recorded four (1.3%). Finally, the study also revealed that 126 (40.0% of respondents) live with either one or none of their biological parents.

### Validity & Reliability of Instruments

The degree to which a tool's wording accurately measures what it is intended to measure, is described as validity (Kusi, 2012; Mohajan, 2017). Furthermore, Creswell and Creswell (2017) defined the degree to which research findings properly assess the social phenomenon under examination is defined as validity. There are three fundamental approaches to determining the validity of research instruments. They include construct validity, criterion validity, and content validity (Heale & Twycross, 2015). Construct validity is a method of determining how well a research tool measures the constructs for which it was designed (Heale & Twycross, 2015; Kusi, 2012). Content validity, on the other hand, is determined by assessing how accurately a research tool measures each aspect of a construct (Vial et al., 2019). The degree to which a research tool is comparable to other tools used to measure the same variables is termed as criterion validity (Heale & Twycross, 2015; Kusi, 2012). In order to improve the study's validity, the instrument was forwarded to an esteemed researchers for professional evaluation and scrutiny on all the aforementioned fundamental approaches to ascertaining the validity of research instruments. His advice was followed, and all suggested changes were implemented.

**Table 1.** Pilot testing results (Field Data, 2022)

| Scale | First test | Second test |
|---|---|---|
| Section B | 0.85 | 0.85 |
| Section C | 0.78 | 0.76 |
| Section D | 0.79 | 0.80 |
| Section E | 0.82 | 0.83 |

### Pilot Testing of Instruments

In the Kunbumgu District, the instrument was tested. 30 respondents were employed in total for the quantitative phase, while six students were chosen for the qualitative interview. The goal of the instrument's piloting was to evaluate the instrument's consistency, accuracy, and application. A test-retest technique was employed to evaluate the dependability of the quantitative instrument. In order to verify for similarities, a questionnaire was delivered to respondents to answer, and then two weeks later, the same respondents were given same questionnaire to complete. The internal consistency of the test items was determine using Cronbach's alpha. The findings of the questionnaire's pilot test are scaled in **Table 1**.

A summary of the study's pilot test results is provided in **Table 1**. The first test and the second test both yielded similar results, as shown in **Table 1**, which means they were consistent. Sections B, C, D, and E, for instance, displayed consistent findings for both tests (0.85, 0.78, 0.79, and 0.82, and 0.85, 76.00, 80.00, and 83.00). Cronbach alpha level for the first test was 0.81, and it was also 0.81 for the second test. By then again, the instrument's average alpha level was 0.81. This was accomplished by calculating the average of the alpha levels. The instrument's alpha level rating of 0.81 indicates its reliability. According to Mohajan (2018), an instrument is considered to be highly reliable if it produces an alpha level greater than 0.7. Six pupils were purposefully selected by the researchers to test the qualitative interview. 10-15 minutes were allotted for each interview session. For the interview protocol preparation, the researchers adapted Castillo-Montoya's (2016) method. All ethical guidelines were followed prior to data collection before the researchers conducted the interviews. **Appendix A** shows ethical review evaluation. During the pilot testing of the instruments, the following procedure were followed:

**Modification of the questions:** The original questions were too wordy, convoluted, unclear, and hard for the respondents to comprehend. Following the pilot testing, more comprehensive/concise interview questions were designed.

1. Improving explanation or clarification skills, for example, the researchers found that some of the respondents' statements still required translation into the local dialect (Dagbani) for the comprehension of the respondents.
2. Data collection at the research area was conducted prior to reviewing the interview questions

### Ethical Consideration

This study followed research ethics policy of Clement Kubindiwor Tedam University of Technology and Applied Science, ensuring compliance with permission, confidentiality, anonymity, and informed consent. Data collection activities were time-consuming as such observing all protocol is crucial for reliability of the research (Ezer & Aksut, 2021; Prinja et al., 2020). Researchers obtained permission from authorities in the study area and consent from study participants (Curtis et al., 2016; Majoko, 2013) before collecting data for a comprehensive analysis. Institutional Review Board, Savelugu Municipality Director of Education, and headteachers/mistresses of selected JHSs in Savelugu Municipality were consulted for ethical approval and permission.

### Informed Consent

To provide informed consent, research participants needed to be properly informed about the procedure, goals, risks, and benefits of the study as the basis for their decision to participate or not. Before being enrolled in the study, research participants were given an informed consent form to sign (or verbally obtain, as needed) after agreeing to participate in the study.

### Confidentiality

The researchers took precautions to protect the identities and responses of the research subjects (Tahiru et al., 2023). While data was being collected, the researchers ensured that no information could be directly linked to or traced back to any specific study participant, protecting the participants' identities at all times. Participants, however, were assured that the data would only be used solely for academic purposes.

### Anonymity

According to Takal et al. (2023), anonymity refers to a participant's right to remain anonymous throughout a study. To help keep study participants' identities anonymous, the researchers ensured that group data were presented during the study rather than individual data. The participant's identity was presented using a serial code.

### Procedure for Data Collection

This section investigates the researcher's data collection procedure. The data collection procedure was split into two stages. The methodology used by the researchers to collect the quantitative data served as the foundation for this research. According to Kees et al. (2017) and Kusi (2012), the quality of data gathered from a field is dependent on the researcher. By the assertion of Kusi (2012), the researchers used field assistants to collect comprehensive and in-depth data for the study. Field assistants were given extensive training on ethical considerations and the data collection procedure. The following stage describes how the researchers gathered quantitative data for the study.

**Table 2.** Effect of parental involvement/support on pupils' attitudes towards mathematics (Field Data, 2022)

| Variable | SA (%) | A (%) | D (%) | SD (%) | M | SD |
|---|---|---|---|---|---|---|
| If my parents make me aware that, they want the best education for me and make me feel loved, it will inspire me to study hard to achieve high marks to make them proud of me. | 52.4 | 41.3 | 4.1 | 2.2 | 3.43 | 0.68 |
| I would be able to overcome my fear of learning mathematics if my parents provide me with my needs and demands as well as the assistance, I require from them. | 41.6 | 44.4 | 10.2 | 3.8 | 3.41 | 2.34 |
| My parents showing me that, they have high expectations for me to perform well in mathematicswill increase my interest in learning math. | 49.5 | 42.2 | 6.7 | 1.6 | 3.39 | 0.69 |
| My parents giving me praise and reward when I score high mark in mathematicswill encourage me to do more. | 47.9 | 38.7 | 10.8 | 2.5 | 3.32 | 0.77 |
| My parents monitoring my studies at home would motivate me to stay focused and devote more time to my studies at home. | 46.3 | 41.3 | 8.9 | 3.5 | 3.30 | 0.78 |
| My parents' discussions about the importance of mathematics to me will challenge me to always have a positive attitude towards learning mathematics. | 42.5 | 47.3 | 7.0 | 3.2 | 3.29 | 0.73 |
| My parents' encouragement and provision of mathematicslearning materials would motivate me to learn the subject. | 43.8 | 42.9 | 11.1 | 2.2 | 3.28 | 0.75 |
| My parents' encouragement to set a high academic goal for myself in mathematicswill force me to develop a strong interest in learning mathematics to achieve high score. | 40.3 | 50.8 | 4.8 | 4.1 | 3.27 | 0.74 |
| My parents motivating and encouraging me to learn mathematics even when I received low grades inspired me to develop a positive attitude towards mathematicslearning. | 37.1 | 38.4 | 19.4 | 5.1 | 3.07 | 0.87 |
| My parents motivate, encourage, and advise me to learn. | 30.1 | 27.0 | 19.4 | 23.5 | 2.64 | 1.14 |
| My parents provide me with mathematics textbooks, pamphlets etc. for my studies. | 25.4 | 25.4 | 32.1 | 17.1 | 2.59 | 1.05 |
| My parents allow me enough time for my studies at home. | 25.1 | 26.0 | 21.0 | 27.9 | 2.48 | 1.15 |
| My parents monitor my studies at home. | 21.0 | 31.1 | 22.5 | 25.4 | 2.74 | 1.09 |
| Means of mean | | | | | 3.10 | 0.98 |

Note. SA: Strongly agree; A: Agree; D: Disagree; SD: Strongly disagree; M: Mean; & SD: Standard deviation

### Quantitative Data Phase

After the researchers had followed all ethical considerations, the procedure for collecting data for the quantitative phase was carried out with the aid of field assistants. Before the researchers started collecting data, the heads of various JHSs in the study area were sent and shown an introduction letter obtained from the municipal director of education. Thereafter, the researchers discussed informed consent, privacy, anonymity, and confidentiality with the selected participants before the commencement of data collection in the selected schools.

The researchers then aided by field assistant to help speed up the data gathering process as they administered the questionnaire (**Appendix B**) to a randomly selected subject (students). Participants were allowed 20 minutes duration to complete the questionnaire. The researchers carefully administered the questionnaire, gave the participants time to complete it, and then collected it the next day. The questionnaire was distributed to a total of 315 participants, and once they completed it, the collected questionnaires were gathered for further analysis.

### Cumulative Performance

To obtain accurate data on each student's achievement in mathematics, each student's performance on assessments in their end-of-term scores were accurately reviewed and documented, resulting in each student's academic achievement in mathematics being recorded. The researchers did this in order to learn more about the student's academic performance and determine whether or not it was possible to link academic performance to students' attitudes towards mathematics.

## RESULTS

### Characteristics/Factors That Influence Positive Attitude of Students Towards Learning Mathematics

This part includes data analysis regarding factors influencing students' development of positive attitudes towards mathematics learning. This part was specifically related to research question one (what characteristics describe JHS students' attitudes towards mathematics?). In this subsection, participants were asked if they agreed or disagreed with a number of statements concerning the variable that influence their attitudes towards learning mathematics. Because the researchers wanted to determine how the characteristics/factors that influence the attitudes of students towards learning mathematics affect them, the effects were split into three components and analyzed. They are, as follows: the influence of parent's involvement on the attitude of students to mathematics, effect of teachers' attitude/competence on the attitude of students towards mathematics, and effect of classroom instruction/environment on students' attitude towards mathematics. The aforementioned is explained below. **Table 2** presents how parental involvement/support in their ward's education affects towards learning mathematics.

#### *Influence of parents' support/involvement on students' attitudes towards mathematics*

This part investigates how parental involvement/support in their ward's education affects their attitude towards learning mathematics. Parents were obliged to afford their children with learning resources, inspiration, and affection and provide them with a conducive learning environment at home as well as emotional support and encouragement to help them have peace of mind to learn properly.

**Table 3.** Effects of teacher competence/attitude on students' attitude towards mathematics (Field Data, 2022)

| Variable | SA (%) | A (%) | D (%) | SD (%) | M | SD |
|---|---|---|---|---|---|---|
| My mathematicsteacher always encourages and motivates us to learn. | 54.6 | 38.4 | 5.4 | 1.6 | 3.46 | 0.67 |
| My mathematicsteacher is knowledgeable about mathematics and makes it simple for me to learn. | 55.6 | 39.0 | 3.8 | 1.6 | 3.48 | 0.65 |
| Every day my mathematicsteacher takes time to summarize what we have learned, and this increases our understanding of what we were thought. | 50.5 | 34.6 | 10.8 | 4.1 | 3.43 | 2.38 |
| My mathematicsteacher is friendly and approachable so I can go to him for clarification on a topic that I do not understand. | 61.0 | 27.3 | 4.7 | 7.0 | 3.42 | 0.87 |
| My mathematicsteacher praises us when we give correct answers in class and encourages us when we give incorrect answers, this makes me always participate in his class. | 50.8 | 34.6 | 12.4 | 2.2 | 3.33 | 0.78 |
| My teacher marks our exercises on time and assists us with corrections. | 46.0 | 40.0 | 11.1 | 2.9 | 3.29 | 0.77 |
| My mathematicsteacher spends a lot of time revising with us and does not move until he/she is confident that we understand what has been taught. | 44.1 | 42.5 | 9.8 | 3.5 | 3.27 | 0.78 |
| When it comes to mathematics lessons, I feel comfortable. | 43.8 | 39.4 | 12.4 | 4.4 | 3.22 | 0.83 |
| When my teacher walks into class with a cane, I get scared and lose concentration in class. | 32.1 | 28.9 | 21.0 | 18.1 | 2.74 | 1.09 |
| When I see my mathematicsteacher arrive for class, I get bored and scared. | 22.2 | 20.3 | 29.8 | 27.6 | 2.37 | 1.11 |
| Means of mean score | | | | | 3.20 | 1.10 |

Note. SA: Strongly agree; A: Agree; D: Disagree; SD: Strongly disagree; M: Mean; & SD: Standard deviation

Unfortunately, the majority of children do not receive the necessary assistance, emotional support, and resources, as well as parental encouragement, which affects their attitude towards mathematics as a subject. **Table 2** shows the respondents' responses to how parental support and involvement affect their attitude towards learning mathematics.

According to **Table 2**, 93.7% of respondents strongly agreed that parental support and expressions of love significantly influence their dedication to academic excellence, particularly in challenging subjects. The majority (86.0%) also expressed confidence in overcoming their fear of learning mathematics if provided with necessary assistance, while 91.7% acknowledged that parental expectations positively impact their interest in math. Additionally, 86.6% found praise and rewards for high marks motivating. Parental monitoring of studies at home was deemed crucial by 52.1% of respondents, and discussions about the importance of mathematics positively challenged 89.8%. Encouragement to set high academic goals was embraced by 91.1%, demonstrating its impact on fostering a strong interest in math. However, only 57.0% felt adequately motivated, encouraged, and advised by their parents to learn. Approximately 50.0% reported a lack of parental provision of mathematics learning materials, while 49.0% felt deprived of sufficient time for home studies. In terms of parental monitoring, 47.9% indicated a lack of such oversight. These findings suggest that parental involvement significantly influences students' attitudes toward learning mathematics in the Savelugu municipality of Ghana.

### *Effects of teacher competence/attitude on students' attitude towards mathematics*

This section investigates how teachers' attitudes and skills influence students' attitudes towards mathematics learning. In general, the researcher analyses effect of teachers' attitudes and competence on students' attitudes towards mathematics learning. The findings indicating the influence of teacher competence/attitude on students' attitudes towards mathematics learning are summarized in **Table 3**.

**Table 3** highlights that 93.0% of respondents strongly agreed that their mathematicsteachers consistently encourage and motivate them, with only 7.0% in disagreement. This underscores the positive impact of teacher encouragement on students' attitudes toward learning mathematics. An overwhelming 94.6% of participants agreed that their mathematics teachers possess knowledge and simplify learning, indicating the crucial role of teacher competence in fostering a positive learning environment. The majority (over 85.0%) endorsed the statement that daily summaries by mathematicsteachers enhance understanding, while 88.3% agreed that approachable teachers positively influence their willingness to seek clarification. Furthermore, 85.4% acknowledged that teacher praise for correct answers and encouragement for mistakes promotes active class participation. About 86% of respondents affirmed that teachers promptly mark exercises and offer corrections, contributing to a supportive learning atmosphere. Additionally, 86.6% agreed that teachers dedicate ample time to revision, ensuring students' comprehension. Most students (83.2%) expressed comfort during mathematics lessons, while 60.9% admitted feeling scared when teachers bring canes to class. These findings collectively illustrate how teachers' attitudes and competence significantly shape students' perspectives on mathematics learning.

### *Effect of classroom instructions/climate on students' attitude towards learning mathematics*

This section investigated how classroom activities or atmosphere influenced students' attitudes towards mathematics learning. To this end, the respondents were given a list of items believed to influence their attitude towards learning mathematics in the classroom.

**Table 4** indicates that a significant 95.2% of respondents strongly agreed that their teachers employ questioning to ensure understanding, with only 4.8% in disagreement. Furthermore, 89.3% of students acknowledged that using real-life examples to solve mathematics problems would simplify the subject and boost their interest in learning, contrasting with 10.7% who disagreed. The majority (90.2%) agreed that teachers allow students to explain answers during mathematics class, indicating a positive and interactive learning environment. For the statement "if I do not understand something, my mathematicsteacher explains it in a way that helps me understand," 87.6% concurred, emphasizing the importance of effective teaching strategies. The affirmation that "my mathematicsteacher values my ideas and suggestions, making me eager to participate in class" resonated

**Table 4.** Effects of classroom instructions/climate on students' attitude towards learning mathematics (Field Data, 2022)

| Variable | SA (%) | A (%) | D (%) | SD (%) | M | SD |
|---|---|---|---|---|---|---|
| My teacher asks questions to ensure that we understand what he/she is teaching. | 64.1 | 31.1 | 4.1 | 0.6 | 3.58 | 0.60 |
| Using real-world examples to assist us in solving mathematicsquestions will help me see mathematicsas simple, which will increase my desire to learn math. | 55.6 | 33.7 | 7.90 | 2.9 | 3.41 | 0.75 |
| During mathematicsclass, my mathematicsteacher allows us to explain our answers or ideas. | 49.2 | 41.0 | 8.3 | 1.6 | 3.37 | 0.70 |
| If I do not understand something, my mathematicsteacher explains it to me in a way to enable my understanding. | 49.2 | 38.4 | 8.3 | 4.1 | 3.32 | 0.79 |
| My mathematicsteacher values my ideas and suggestions, so I am always eager to answer questions in his class. | 42.5 | 41.6 | 12.7 | 3.2 | 3.23 | 0.79 |
| My mathematicsteacher asks students to explain more about the answers they give. | 39.0 | 46.7 | 12.1 | 2.2 | 3.22 | 0.74 |
| I have generally, enjoyed mathematicslessons in school. | 41.0 | 43.5 | 10.5 | 5.1 | 3.20 | 0.82 |
| In mathematics class, I prefer working in groups to working alone. | 40.3 | 38.7 | 14.9 | 6.0 | 3.13 | 0.88 |
| In mathematicsclass, I frequently get confused. | 25.7 | 31.1 | 25.1 | 18.1 | 2.64 | 1.05 |
| Means of mean score | | | | | 3.23 | 0.79 |

Note. SA: Strongly agree; A: Agree; D: Disagree; SD: Strongly disagree; M: Mean; & SD: Standard deviation

**Table 5.** Students' attitude towards mathematics (Field Data, 2022)

| Variable | SA (%) | A (%) | D (%) | SD (%) | M | SD |
|---|---|---|---|---|---|---|
| Mathematics helps to develop the mind and teaches people to think critically. | 63.5 | 29.5 | 5.1 | 1.9 | 3.54 | 0.68 |
| Mathematics is an important subject that people should learn. | 58.4 | 34.0 | 6.3 | 1.3 | 3.49 | 0.67 |
| I believe I will perform well in mathematics examinations. | 58.7 | 33.3 | 5.7 | 2.3 | 3.48 | 0.70 |
| I hope to study mathematics shortly. | 48.6 | 40.6 | 8.3 | 2.5 | 3.35 | 0.73 |
| I believe that studying mathematics assist me in solving problems in other subjects. | 47.6 | 39.4 | 10.8 | 2.2 | 3.32 | 0.75 |
| I like/enjoy studying mathematics . | 44.4 | 42.2 | 10.2 | 3.2 | 3.28 | 0.77 |
| I am very confident in learning mathematics. | 44.8 | 42.2 | 8.6 | 4.4 | 3.27 | 0.79 |
| I get a lot of satisfaction from solving mathematics problems. | 39.4 | 43.5 | 14.6 | 2.5 | 3.19 | 0.77 |
| I am always nervous in mathematicsclass. | 24.1 | 38.7 | 21.1 | 13.0 | 2.73 | 0.96 |
| Means of mean score | | | | | 3.40 | 0.75 |

Note. SA: Strongly agree; A: Agree; D: Disagree; SD: Strongly disagree; M: Mean; & SD: Standard deviation

with 83.1% of respondents, highlighting the impact of teacher-student engagement. Additionally, 84.5% generally enjoyed mathematics lessons, while 79.0% preferred group work over individual study. However, a notable 56.8% admitted frequent confusion during mathematics class, while 43.2% disagreed. In conclusion, **Table 4** underscores the profound influence of classroom instruction and climate on students' attitudes toward learning mathematics.

### *Students' attitude towards learning mathematics*

This section investigated students' attitudes towards mathematics learning and how they affect their performance. In this part, the researchers examine how students' positive attitudes towards mathematics impact their studies and performance in mathematics. **Table 5** shows students' responses to questions concerning their attitudes towards mathematics. **Table 5** reveals that a resounding 93.0% of respondents strongly agreed that mathematics fosters critical thinking and mind development, with only 7.0% in disagreement. Similarly, 92.4% deemed mathematics important for learning. Regarding confidence in mathematics examinations, 92.0% of respondents expressed optimism about their performance, contrasting with 8.0% who disagreed. Approximately 90.0% affirmed a willingness to learn mathematics in the future, while 87.0% believed that studying mathematics enhances problem-solving skills in other subjects. Furthermore, 86.6% admitted enjoying studying mathematics, while 13.0% disagreed. In terms of confidence in learning mathematics, the majority (87.0%) felt highly confident, with 13.0% expressing doubt. However, a concerning 62.8% admitted nervousness in mathematicsclass, suggesting potential teacher-related anxieties. Despite this, 82.9% derived satisfaction from solving mathematics problems, highlighting the positive impact of successful problem-solving on students' attitudes. Overall, **Table 5** indicates predominantly positive attitudes toward mathematics among the surveyed students, although a subset may harbor fears that necessitate targeted interventions, particularly related to classroom dynamics and teacher demeanor.

## Results of t-Test & Correlation Analysis

### *Research question one: What influence does students' attitude towards mathematics have on their mathematics performance?*

In this section, research participants were questioned about their attitudes towards mathematics and how such views impact their overall performance in the subject. In this regard, an independent t-test was performed to examine the effect of attitudes towards mathematics on achievement. For convenience of analysis, learners who scored 50.0% or greater were classified as above average, while those who scored less than 50.0% were classified as below average. The findings of the independent t-test between students' attitudes towards mathematics and their performance are presented in **Table 6**.

**Table 6** demonstrates that learners with a positive attitude towards mathematics perform better in the subject (mean [M]=3.36, standard deviation [SD]=0.319) than students who have a negative attitude (M=2.54, SD=0.428), ($t[313]=10.354$, $p=0.000$). Overall, there's a statistically significant difference between people with above average and below average performances, this

**Table 6.** Independent sample t-test outcome among students' performance & their attitude towards mathematics (Field Data, 2022)

| Attitude*performance | n | Mean | Standard deviation | df | t | p-value |
|---|---|---|---|---|---|---|
| Above average | 297 | 3.36 | 0.319 | 313 | 10.354 | 0.000 |
| Below average | 18 | 2.54 | 0.428 | | | |

Note. p<0.05

**Table 7.** Difference between boys' & girls' attitudes towards mathematics (Field Data, 2022)

| Variable | Boys (189) | | Girls (126) | | p-value |
|---|---|---|---|---|---|
| | M | SD | M | SD | |
| I am very confident in learning mathematics. | 3.58 | 0.79 | 3.57 | 0.71 | 0.976 |
| I like/enjoy studying mathematics. | 3.62 | 0.60 | 3.43 | 0.74 | 0.012 |
| I hope to study mathematics shortly. | 3.56 | 0.69 | 3.55 | 0.63 | 0.946 |
| I got a lot of satisfaction from solving mathematicsproblems. | 3.51 | 0.69 | 3.47 | 0.70 | 0.599 |
| Mathematics helps me to develop the mind and teaches people to think critically. | 3.71 | 0.52 | 3.53 | 0.68 | 0.009 |
| Mathematics is important that people should learn. | 3.60 | 0.64 | 3.59 | 0.71 | 0.864 |
| I'm always nervous in mathematicsclass. | 1.43 | 0.62 | 1.53 | 0.66 | 0.154 |
| I believe that studying mathematics assists me in solving problems in other subjects. | 3.52 | 0.69 | 3.50 | 0.72 | 0.845 |
| I believe I will perform well in the mathematics examination. | 3.62 | 0.74 | 3.66 | 0.59 | 0.640 |
| Overall | 3.35 | 0.66 | 3.31 | 0.68 | 0.550 |

Note. M: Mean & SD: Standard deviation

**Table 8.** Relationship between attitude towards mathematics & mathematics achievement (Field Data, 2022)

| Correlated variable | | Mean | Standard deviation | Students attitude | Mathematics scores |
|---|---|---|---|---|---|
| Student's attitude | Pearson correlation | 3.31 | 0.433 | 1 | .229** |
| | Sig. (2-tailed) | | | | .000** |
| | n | | | 315 | 315 |
| Mathematics scores | Pearson correlation | 3.31 | 0.433 | .229** | 1 |
| | Sig. (2-tailed) | | | | .000** |
| | n | | | 315 | 315 |

Note. **Correlation is significant at 0.01 level (2-tailed) (n=315)

suggests that a person's attitude towards mathematics influences their performance. Therefore, it is imperative to keep in mind that a person having an optimistic attitude on mathematics is more likely to advance in their mathematical achievement.

### *Research question two: Is there any significant difference between the attitudes of junior high school girls and boys towards mathematics*

This section investigated whether or not there is a considerable variation in JHS girls and boys towards mathematics. To determine their attitude towards mathematics, the respondents were given a list of items that they were allowed to agree or disagree to. On the basis of their responses and also to acquire empirical evidence, the researchers found a substantial correlation between junior high boys' and girls' attitudes towards mathematics in Ghana (see **Table 7**).

**Table 7** shows the mean attitudes of students boys and girls in JHSs in the Savelugu Municipality in Ghana's Northern Region across all nine subscales (I am very confident in learning math, I enjoy learning math, I hope to study mathematicsin the future, I get satisfaction for solving mathematicsquestions, mathematicshelp in the development of the mind and teaches people to think critically, mathematicsis an important subject, I am always nervous in mathematicsclass, mathematicshelp me to solve problems) demonstrates that both boys and girls had positive attitudes towards mathematics. The boys' overall mean attitudes towards mathematics (M=3.35, SD=0.66) were marginally statistically different from the females' (M=3.31, SD=0.68). Additionally, the overall attitude means scores' p-value (0.55) showed that boys and girls did not differ significantly from one another concerning their attitude towards mathematics at p=0.05. This suggests that JHS boys and girls in the Savelugu Municipality had similar attitudes regarding mathematics in general.

### *Research question 3: Examine the connection between junior high school students' attitudes and mathematical achievement*

In this section, the investigators examined the relationship between the respondents' attitudes towards the study of mathematics as a topic and how it affects their mathematical achievement. Hence, PPMCC test was used to determine the type and degree of correlation that exists between the two variables, attitude and achievement (see **Table 8**). From **Table 8**, correlation coefficient (r) between students' attitudes towards mathematics and their mathematics scores is 0.229. This indicates a positive correlation, meaning that as students' attitudes towards mathematics improve, their mathematics scores tend to increase as well.

## Analysis of Research Hypotheses

### *First hypothesis*

1. **$H_0$.** There is no significant relationship between parental involvement/support and JHS students' attitudes towards mathematics.

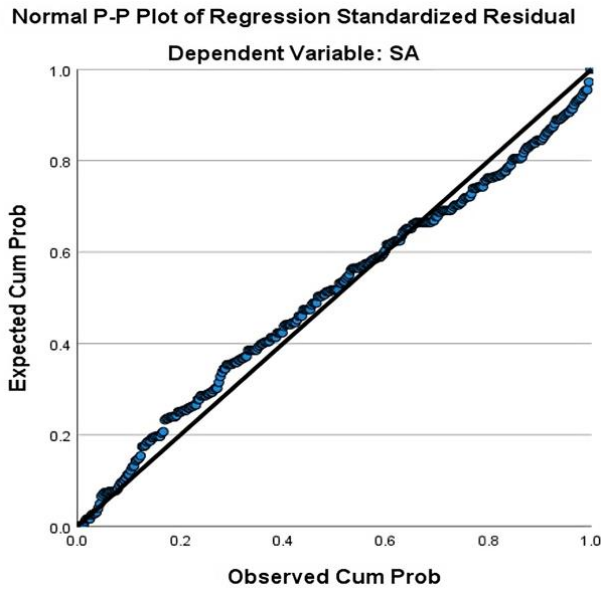


**Figure 1.** Homoscedasticity normality assumption of parental involvement/support (PIS) & students' attitude towards mathematics (SA) (Source: Authors' own elaboration)

**Table 9.** Correlations coefficients result between parental involvement/support (PIS) & student's attitude towards mathematics (SA) (Field Data, 2022)

| Correlated variable | | Mean | Standard deviation | Parental involvement/ support | Student attitudes towards mathematics |
|---|---|---|---|---|---|
| Parental involvement/ support | Pearson correlation | 3.20 | 0.456 | 1 | .225** |
| | Sig. (2-tailed) | | | | .000** |
| | n | | | 315 | 315 |
| Student attitudes towards mathematics | Pearson correlation | 3.20 | 0.456 | .225** | 1 |
| | Sig. (2-tailed) | | | | .000** |
| | n | | | 315 | 315 |

Note. **Correlation is significant at 0.01 level (2-tailed) (n=315)

**$H_1$.** There is a significant relationship between parental involvement/support and JHS students' attitudes towards mathematics.

The literature suggests that, depending on the student's environment and cultural background, there may be a link between parental engagement and support and student attitudes towards learning mathematics. Due to this, the researchers chose to investigate whether there was a strong relationship between parental involvement and support and improved children's attitudes towards mathematics. To analyze the connection between parents' support and students' achievement in mathematics, PPMCC was employed for the analysis. With the assumption that all variables were measured continuously, PPMCC was utilized. The degree and direction of the link between the two variables were assessed using r coefficient in the analysis: parental involvement/support (PIS) and students' attitudes towards mathematics (SA). The relationship was investigated at a 0.01 level of confidence, two-tailed. Using SPSS program (version 27.0), all of the questionnaire items evaluating these variables were combined into a single item to generate scores for PIS and children's attitudes towards mathematics (SA). The homoscedasticity assumption was checked before completing PPMCC analysis (see **Figure 1**). It is clear from **Figure 1** that variables were grouped around the diagonal line, which is what led to the assumption that the data was normal and allowed for the usage of PPMCC.

**Table 9** presents the hypothesis's standard deviation, means and correlation coefficients between the variables (parental involvement/support and student attitudes towards mathematics). **Table 9** demonstrates a significant but moderately positive relationship between parental involvement/support and student attitudes towards mathematics. The following are the results: r=.225**, M=3.20, SD=.456, sig.=0.000**, $p<0.05$, n=315. The variance of the two variables (parental involvement/support and student attitudes towards mathematics) was .225 (22.0%). This suggests that the variables predict themselves, at a rate of 22.0%. The results generally imply parents support and involvement in their children's education have a beneficial impact on their attitude towards learning mathematics. To put it another way, family members who are more concerned with or encouraging of their kids' education are more likely to see their children develop a positive attitude towards learning mathematics, which may lead to higher academic achievement, and vice versa.

### *Second hypothesis*

2. **$H_0$.** There is no significant relationship between teacher competence/attitude and JHS students' attitude towards mathematics.

   **$H_1$.** There is a significant relationship between teacher competence/attitude and junior school students' attitude towards mathematics.

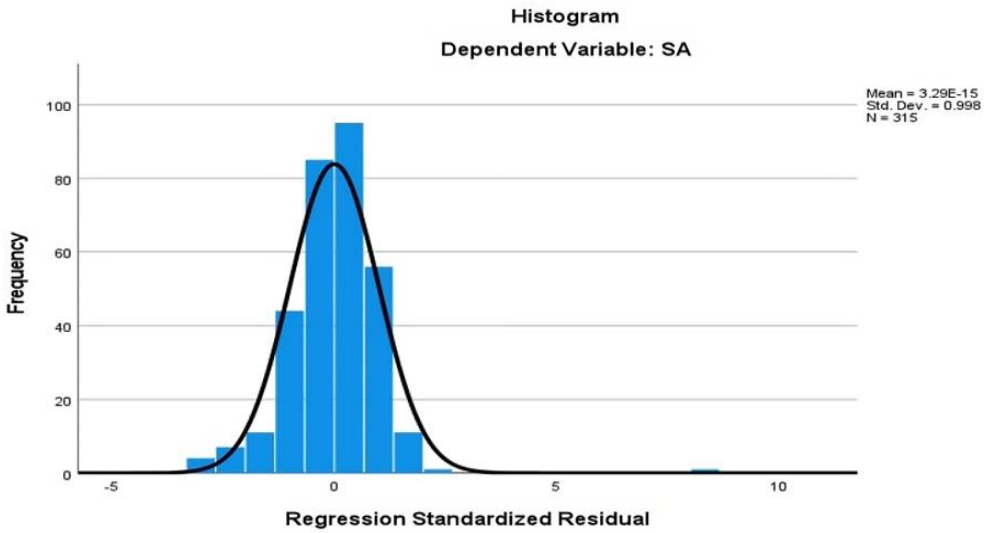


**Figure 2.** Homoscedasticity normality assumption of teacher competence/attitude (TA) & attitude of students towards mathematics (SA) (Source: Authors' own elaboration)

**Table 10.** Correlation coefficients results between teacher competence/attitude (TA) & students' attitudes towards mathematics (SA) (Field Data, 2022)

| Correlated variable | | Mean | Standard deviation | Teacher competence/ attitude | Student attitudes towards mathematics |
|---|---|---|---|---|---|
| Teacher competence/ attitude | Pearson correlation | 3.27 | 0.637 | 1 | .244** |
| | Sig. (2-tailed) | | | | .000** |
| | n | | | 315 | 315 |
| Student attitudes towards mathematics | Pearson correlation | 3.27 | 0.637 | .244** | 1 |
| | Sig. (2-tailed) | | | | .000** |
| | n | | | 315 | 315 |

Note. **Correlation is significant at 0.01 level (2-tailed) (n=315)

Previous research suggests that a teacher's competence (skill) level or attitude may have a direct effect on the attitudes of students towards mathematics. Nonetheless, most research, particularly in Ghana, lacks this topic matter or premise. As a result, no one is certain if teacher competence/attitude has effects on pupils' attitudes towards mathematics. This prompted the researchers to investigate whether there was a significant relationship between teacher competence/attitude and students' attitudes towards mathematics in Ghana. To accomplish this, PPMCC was used again employed. PPMCC was used with the understanding that all variables (teacher competence/attitude and students' attitudes towards mathematics) would be measured on a continuous scale. The strength and direction of the relationship between the two variables (teacher competence/attitude and students' attitudes towards mathematics) were determined using r analysis. The correlation was investigated using a two-tailed 0.01 significance level of confidence. To generate the scores for teacher competence/attitude (TA) and students' attitudes towards mathematics (SA), the SPSS software was used to combine all of the statements on the questionnaire measuring these variables into a single item (version, 27.0). During PPMCC analysis, the homoscedasticity assumption was tested, and findings shown in **Figure 2**. The concentration of variables around the mean in **Figure 2** indicates that the data were assumed to be normal, allowing PPMCC to be calculated.

The means and standard deviation of the hypothesis as well as the variable correlation coefficients are presented in **Table 10**. **Table 10** reveals a moderately significant but positive relationship between teacher competence/attitude and students' attitudes towards mathematics in the Ghanaian context. r=.244**, M=3.27, SD=.0.637, sig.=.000** p=0.01, n=315, 2-tailed. The difference between the two variables (teacher competence/attitude and student attitudes towards mathematics) is. 244. In terms of percentages, it is translated as 24.4%. This implies that the variables predict themselves at a rate of 24.4%, which explains why teacher competence/attitude at the junior high level is most likely to influence the development of positive students' attitudes towards mathematics. This simply means that a teacher who is highly competent (skills-oriented) and possess an optimistic attitude towards the subject are more likely to instill a positive attitude in his students.

### *Third hypothesis*

3. **$H_0$.** There is no significant classroom instructions/climate and JHS students' attitude towards learning mathematics.

   **$H_1$.** There is a significant relationship between classroom instructions/climate and JHS students' attitudes towards learning mathematics.

According to the researcher's hypothesis, the teacher/learning environment in the classroom may aid students in developing positive attitudes towards mathematics. To collect empirical evidence, the researchers sought the possibility or otherwise of correlation between Ghanaian students attitude towards mathematics and classroom instruction/climate. PPMCC was used with the assumption that all variables (classroom instructions/climate and student attitudes towards mathematics) were computed

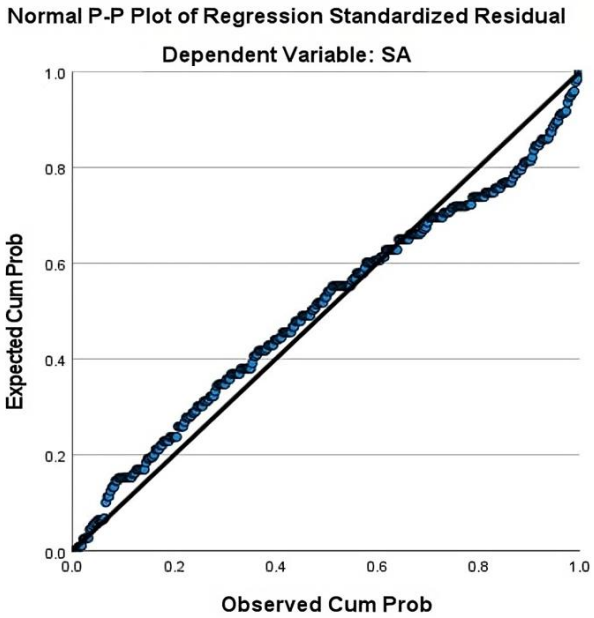


**Figure 3.** Homoscedasticity normality assumption of classroom instructions/climate (CIC) & student attitudes towards mathematics (SA) (Source: Authors' own elaboration)

**Table 11.** Correlation of classroom instruction/climate (CIC) & students' attitude towards mathematics (SA) (Field Data, 2022)

| Correlated variable | | Mean | Standard deviation | Classroom instruction/ climate | Student attitudes towards mathematics |
|---|---|---|---|---|---|
| Classroom instruction/ climate | Pearson correlation | 3.24 | 0.402 | 1 | . 416** |
| | Sig. (2-tailed) | | | | .000** |
| | n | | | 315 | 315 |
| Student attitudes towards mathematics | Pearson correlation | 3.24 | 0.402 | . 416** | 1 |
| | Sig. (2-tailed) | | | | .000** |
| | n | | | 315 | 315 |

Note. **Correlation is significant at 0.01 level (2-tailed) (n=315)

on a continuous scale (Likert scale questionnaire). This study employed r to analyse the degree and direction of the relationship between the two correlated variables (instructions/climate (CI) and student attitudes towards mathematics (SA). Correlation r was tested at a two-tailed significance level of 0.01. The assumption of homoscedasticity was tested using PPMCC analysis.

**Figure 3** depicts the normality assumption outcome. Based on the findings of the homoscedasticity normality assumption test displayed in **Figure 3**, where the variables clustered around the diagonal line, it can be inferred that the data can be assumed to follow a normal distribution. Consequently, the analysis utilized PPMCC.

The means, standard deviations, and correlation coefficients between variables, specifically classroom instructions/climate (CI) and student attitudes towards mathematics (SA), are presented in **Table 11** of the hypothesis. **Table 11** demonstrates a moderately significant and positive relationship between classroom instruction/climate and student attitude towards mathematics in the Ghanaian context. r=.416**, M=3.24, SD=.402, sig.=.000** p=0.01, n=315, 2-tailed. The difference between the two variables (classroom instruction/climate and students' attitudes towards mathematics) is 416 points, which translates to 41.6% in terms of percentage. Thus, the variables are self-predicting at 41.6%, which effectually explains why classroom instruction/climate is likely to influence students' attitudes towards mathematics learning at the Junior High level. It can be concluded that a conducive classroom climate coupled with students centered instructional method may positively affect the attitude students towards mathematics learning and performance.

## Results Summary

In this section, the researchers examined the research questions and hypotheses that were used in the investigation. Both research questions and research hypotheses were analyzed using SPSS software (Version 27.0). The analysis was based on the respondents' demographic data, which included their form/class, gender, age, educational background of their parents or guardians, as well as place of residence. The analysis of research questions was completed in the second phase, and it covered: Characteristics/ factors that influence the positive attitude of students towards learning mathematics. What influence might the attitude of students towards mathematics have on their mathematics performance? Is there any significant difference between the attitudes of JHS girls and boys towards mathematics? To examine the connection between the attitudes and achievement of JHS students in mathematics. Tables were created to present the results of the research questions, which were analyzed using percentages means, and standard deviations. The researchers used PPMCC to compute the hypothesis.

## DISCUSSION

The findings from the research are discussed in this section. Because a quantitative method of design was used for the study, the researchers intend to run PPMCC and t-test to measure the cause and effect, degree of significance as well as the relationship between the various variables in the study (Ali, 2021; Mereku, 1995). To help readers examine how each theme reflects the interpretation used during data analysis, Ali (2021) affirms that the discussion of findings should be done separately. The primary purpose of the research is to determine the significance of association between students' attitudes towards learning and achievement in mathematics education in rural Ghanaian schools. The findings are discussed in the following subsections.

### Characteristics/Factors That Influence Positive Attitude of Students Towards Learning Mathematics

In this part, the study on characteristics or elements that influences students' attitude positively towards learning mathematics are discussed and findings justified.

#### *Influence of parents' support/involvement on students' attitudes towards mathematics*

This section underscores the influential role of parental involvement and support in shaping children's attitudes toward mathematics. Drawing on existing literature, it is evident that active parental support correlates with positive attitudes, higher academic achievements, and enrollment in advanced programs. The study's findings align with this, as a substantial percentage of respondents acknowledged the positive impact of their parents' encouragement and provision of mathematics learning materials on their attitude toward learning mathematics. Specifically, the statement, "I would be able to overcome my fear of learning mathematics if my parents provide me with my needs and demands as well as the assistance I require from them," received significant agreement, indicating that parental support influences students' attitudes and subsequent performance in Savelugu Municipal JHSs.

Moreover, the research underscores the correlation between proactive parental involvement and students' positive attitudes and focus on mathematics studies. These findings validate earlier observations by Nenty et al. (2016) that parents' support significantly influences students' attitudes toward mathematics. The study emphasizes that students with supportive and involved parents are more likely to exhibit positive attitudes, perform better, and collaborate with teachers to enhance their mathematics education. The research aligns with Tahiru et al.'s (2024) assertion that parental involvement is linked to intrinsic motivation and positive attitudes in JHS students, ultimately impacting academic performance. Finally, the quantitative data substantiates the hypothesis that parental involvement is a crucial determinant of junior high students' positive attitudes toward mathematics in Ghana. The findings echo existing research indicating that active parental participation fosters students' effort, focus, attentiveness, and perceived competence, contributing to positive attitudes and academic success in mathematics and other subjects (Lee et al., 2019).

#### *Influence of teacher competence/attitude on students' attitude towards mathematics*

This segment delves into the impact of teacher competence in mathematics on students' attitudes toward mathematics learning. Leveraging relevant literature, the research underscores the crucial role of teachers in encouraging, motivating, and possessing a sound understanding of the subject's content. The study found that teachers who dedicate additional time to summarizing lessons contribute to improved student comprehension, fostering joy and confidence in learning the subject. Furthermore, teacher approachability and friendliness motivate students to seek clarifications, enhancing their confidence in approaching mathematical topics. Empirical research by Mishiwo (2022) and Slavin (2019) supports these findings, highlighting a statistically robust correlation between teacher mathematical competence and positive student attitudes toward math. The quantitative data affirms that timely marking of exercises, assistance with corrections, and increased revision time positively influence students' attitudes toward mathematics by enhancing their understanding. The study establishes that teacher competence and attitude significantly impact students' attitudes toward mathematics, aligning with Mishiwo's (2022) assertion that a teacher's perspective and delivery style play pivotal roles in effective mathematics teaching and learning. Similarly, Slavin's (2019) findings emphasize the substantial influence of a teacher's competency or attitude on students' attitudes and learning outcomes in mathematics.

The research hypothesis is corroborated by statistical analysis, indicating a moderate positive relationship ($r=.244^{**}$) between teacher competence/attitude and student attitudes toward mathematics learning in the Ghanaian context. The results suggest that a highly competent and positively inclined teacher is more likely to instill a positive attitude in students, supporting the idea that teachers' confidence during mathematicslessons inspires learners to excel in the subject (Hartwig & Schwabe, 2018). Overall, this research reinforces the pivotal role of teacher competence and attitude in shaping students' attitudes toward mathematics.

#### *Influence of classroom instructions/climate on students' attitude & achievement in mathematics*

This section investigates the influence of increased classroom instruction/climate on students' attitudes toward mathematics learning, drawing support from existing literature on the impact of classroom instruction/climate on students' attitudes and achievements in mathematics. The study underscores the significance of positive classroom instructions/climate in shaping students' behaviors and attitudes toward learning mathematics. Findings indicate that the use of real-world examples in lessons enhances students' attitudes, fostering confidence and enjoyment in learning the subject. Additionally, when teachers encourage student questions during class, addressing concerns enhances understanding and increases interest in the subject. Teachers who employ diverse approaches to explain concepts and allow students to share opinions are perceived positively, with responses reaching 90.2% and 87.6%, respectively.

Statistical analysis supports the research hypothesis, revealing a substantial positive association between classroom instruction/climate and students' attitudes toward studying mathematics in Ghana (r=.416**). This suggests that a conducive classroom environment correlates with a higher likelihood of students developing positive attitudes toward the subject. These results align with prior studies emphasizing that students engage more in learning when the classroom climate is perceived as supportive and respectful (Strayer, 2012). The preference for group work in mathematics class, supported by 80.0% of responses, further echoes research findings suggesting that interactive and collaborative learning enhances student engagement (Fisher et al., 2020).

Moreover, the reported mean score of 3.20 (SD=0.82) for the statement "I have generally enjoyed mathematics lessons in school" supports the idea that a positive classroom environment contributes to students' enjoyment of the subject. Allen et al. (2013) contend that the classroom environment is shaped by teachers' choices, pedagogical methods, interactions, and teaching style. The preference for group work and the positive responses to statements about enjoying mathematics lessons underline the importance of an encouraging and interactive classroom climate in promoting positive attitudes and engagement among students.

### *Mathematics learning attitudes among students*

This section investigated the attitudes of students towards mathematics learning and how they influence their performance. It was discovered that learners with a positive attitude towards mathematics are more likely to prioritize their study of the subject because they enjoy it, understand its importance, and have faith in it (Kiwanuka et al., 2022; Mullis et al., 2020), which could lead to excellent performance in the subject (Eccles & Wigfield, 2020; Guo et al., 2015; Pekrun, 2019). Data from **Table 5** shows that students believed that mathematics was an important subject for all students, as it yielded a value of 93.0% of the replies recorded. Again, it was confirmed from the responses of the students that mathematics helps to develop the mind and teaches people to think critically, this statement yielded a text value of about 90.0%. Furthermore, students were confident and optimistic that they would perform well in mathematics examinations, indicating that they would study advanced mathematics in the near future, yielding a percentage of about 89.0%.

A good number of respondents agreed that "I believe that studying mathematics assists me in solving problems in other subjects". Also, most students endorsed the statement, "I get a lot of satisfaction from solving mathematics problems" since it recorded about 83.0%. Finally, the findings in **Table 5** indicate the attitudes of students towards mathematics do indeed have an effect on their performance in the subject. Mullis et al. (2020) contended that, students who have a positive attitude towards mathematics, for example, enjoy it, see it as a subject, and are confident in their ability to participate in it and therefore put in more time and effort in their mathematicsstudies. Such learners tend to act and think in ways that match their attitude hence should be encouraged to develop good attitudes to mathematics. The researchers believe that encouraging students in junior high to have a positive attitude towards mathematics will motivate and encourage them to learn the subject and achieve higher grades.

### Limitations

The research only included public schools from a single region in northern Ghana. The schools were drawn from both rural and suburban locations. As a result, the sample may not represent students from private schools or from metropolitan regions. Future research should examine both private and public schools. Despite its limitations, the study's findings contribute to the body of research by providing actual data in support of current trends indicating that students' views towards mathematics are not favorable. The findings of this study offer insights for future research as well as motivating improvements in teaching practices that would increase enthusiasm and good attitudes towards mathematics and so improve students' performance.

## CONCLUSIONS

The study yielded the following conclusions: The study concluded that parental engagement and support had a substantial influence on students' attitudes towards studying mathematics, especially at home. The study found that teachers' competence/attitude towards teaching mathematics significantly influenced students' attitudes towards mathematics learning. Students, on the other hand, claimed that competent and well-behaved teachers inspire and motivate them to emulate them. The study found that a positive classroom environment or instructions significantly impacted students' attitudes towards mathematics learning. The study discovered that the attitudes of students towards mathematics significantly impacted their performance in the subject. However, the study found that students with a positive attitude towards mathematics outperformed those with a negative attitude. The study discovered that both JHS boys and girls had positive attitudes towards mathematics.

**Author contributions: IA:** data curation, validation, writing–reviewing & editing; **A-WT:** conceptualization, methodology, investigation, writing–original draft preparation, validation, & writing–reviewing & editing; & **RT:** methodology, investigation, writing–reviewing & editing. All authors have agreed with the results and conclusions.

**Funding:** No funding source is reported for this study.

**Acknowledgements:** The authors would like to thank everyone who has contributed to improving the quality of this study.

**Ethical statement:** The authors stated that since the aim of this study was to explore student attitude, parental involvement and teacher competence on mathematics performance in selected schools in northern Ghana, a formal letter was written to the C K Tedam University of Technology and Applied Sciences School of Science, Mathematics and Technology Education's ethical review board for introductory letter accompanied with a brief proposal of the aim and the purpose of the research. A consent form was also developed for the schools where the data was to be collected. Authors further stated that all the appropriate quarters for approval and consent at each level directed by the headquarters were also given, a detailed explanation and the aim of the study was given before the data was collected. The consent form was

filled in by all the heads of the junior high schools involved in the study. A letter was written to thank all the quarters who approved of the data collection, and they also requested a briefing of the findings which was noted.

**Declaration of interest:** No conflict of interest is declared by the authors.

**Data sharing statement:** Data supporting the findings and conclusions are available upon request from the corresponding author.

## REFERENCES

Abreh, M. K., Owusu, K. A., & Amedahe, F. K. (2018). Trends in performance of WASSCE candidates in the science and mathematics in Ghana: Perceived contributing factors and the way forward. *Journal of Education, 198*(1), 113-123. https://doi.org/10.1177/0022057418800950

Agyekum, B. (2023). Challenges of learning environments experienced by distance-learning higher education students in Ghana. *International Review of Education, 1-2*, 51-72. https://doi.org/10.1007/s11159-023-09991-z

Ali, C. A. (2021). Ghanaian indigenous conception of real mathematics education in teaching and learning of mathematics. *Indonesian Journal of Science and Mathematics Education, 4*(1), 37-47. https://doi.org/10.24042/ijsme.v4i1.7382

Allen, J., Gregory, A., Mikami, A., Lun, J., Hamre, B., & Pianta, R. (2013). Observations of effective teacher–student interactions in secondary school classrooms: Predicting student achievement with the classroom assessment scoring system–Secondary. *School Psychology Review, 42*(1), 76-98. https://doi.org/10.1080/02796015.2013.12087492

Bernacki, M. L., Vosicka, L., Utz, J. C., & Warren, C. B. (2021). Effects of digital learning skill training on the academic performance of undergraduates in science and mathematics. *Journal of Educational Psychology, 113*(6), 1107. https://doi.org/10.1037/edu0000485

Castillo-Montoya, M. (2019). Professors' pedagogical strategies for teaching through diversity. *The Review of Higher Education, 42*(5), 199-226. https://doi.org/10.1353/rhe.2019.0050

Chen, S., Jiang, W., Li, X., & Gao, H. (2021). Effect of employees' perceived green HRM on their workplace green behaviors in oil and mining industries: Based on cognitive-affective system theory. *International Journal of Environmental Research and Public Health, 18*(8), 4056. https://doi.org/10.3390/ijerph18084056

Creswell, J. W., & Creswell, J. D. (2017). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th edn.). SAGE Publications Ltd. https://doi.org/10.1177/1558689807306

Curtis, E. A., Comiskey, C., & Dempsey, O. (2016). Importance and use of correlational research. *Nurse Researcher, 23*(6), 20-25. https://doi.org/10.7748/nr.2016.e1382

Eccles, J. S., & Wigfield, A. (2020). From expectancy-value theory to situated expectancy-value theory: A developmental, social cognitive, and sociocultural perspective on motivation. *Contemporary Educational Psychology, 61*, 101859. https://doi.org/10.1016/j.cedpsych.2020.101859

Ercikan, K., McCreith, T., & Lapointe, V. (2005). Factors associated with mathematics achievement and participation in advanced mathematics courses: An examination of gender differences from an international perspective. *School Science and Mathematics, 105*(1), 5-14. https://doi.org/10.1111/j.1949-8594.2005.tb18031.x

Erdogan, A., & Yemenli, E. (2019). Gifted students' attitudes towards mathematics: A qualitative multidimensional analysis. *Asia Pacific Education Review, 20*, 37-52. https://doi.org/10.1007/s12564-018-9562-5

Ezer, F., & Aksut, S. (2021). Opinions of graduate students of social studies education about qualitative research method. *International Education Studies, 14*(3), 15-32. https://doi.org/10.5539/ies.v14n3p15

Fisher, D., Frey, N., & Hattie, J. (2020). *The distance learning playbook, grades K-12: Teaching for engagement and impact in any setting*. Corwin Press.

Guo, J., Marsh, H. W., Parker, P. D., Morin, A. J. S., & Yeung, A. S. (2015). Expectancy-value in mathematics, gender and socioeconomic background as predictors of achievement and aspirations: A multi-cohort study. *Learning and Individual Differences, 37*, 161-168. https://doi.org/10.1016/j.lindif.2015.01.008

Hartwig, S. J., & Schwabe, F. (2018). Teacher attitudes and motivation as mediators between teacher training, collaboration, and differentiated instruction. *Journal for Educational Research Online, 10*(1), 100-122.

Heale, R., & Twycross, A. (2015). Validity and reliability in quantitative studies. *Evidence-Based Nursing, 18*(3), 66-67. https://doi.org/10.1136/eb-2015-102129

Iwu, C. G., Opute, P. A., Nchu, R., Eresia-Eke, C., Tengeh, R. K., Jaiyeoba, O., & Aliyu, O. A. (2021). Entrepreneurship education, curriculum and lecturer-competency as antecedents of student entrepreneurial intention. *The International Journal of Management Education, 19*(1), 100295. https://doi.org/10.1016/j.ijme.2019.03.007

Jiang, Y., Kim, S. I., & Bong, M. (2020). The role of cost in adolescent students' maladaptive academic outcomes. *Journal of School Psychology, 83*, 1-24. https://doi.org/10.1016/j.jsp.2020.08.004

Kees, J., Berry, C., Burton, S., & Sheehan, K. (2017). An analysis of data quality: Professional panels, student subject pools, and Amazon's Mechanical Turk. *Journal of Advertising, 46*(1), 141-155. https://doi.org/10.1080/00913367.2016.1269304

Kiwanuka, H. N., Van Damme, J., Van den Noortgate, W., & Reynolds, C. (2022). Temporal relationship between attitude toward mathematics and mathematics achievement. *International Journal of Mathematical Education in Science and Technology, 53*(6), 1546-1570. https://doi.org/10.1080/0020739X.2020.1832268

Kusi, H. (2012). *Doing qualitative research: A guide for researchers*. Emmpong Press.

Lee, K., Choi, H., & Cho, Y. H. (2019). Becoming a competent self: A developmental process of adult distance learning. *The Internet and Higher Education, 41*, 25-33. https://doi.org/10.1016/j.iheduc.2018.12.001

Majoko, T. (2013). *Challenges in school guidance and counselling services provisions for children with disabilities in Zimbabwean inclusive primary schools* [Doctoral dissertation, University of South Africa].

Mereku, K. D. (1995). *A comparison of the official primary mathematics curriculum in Ghana with the way in which it is implemented by teachers* [Doctoral dissertation, University of Leeds].

Mishiwo, M. (2022). Pre-service teachers' perceptions of college tutors' use of student-centred approach of teaching and learning mathematics. *British Journal of Education, 10*(3), 115-125. https://doi.org/10.37745/bje.2013/vol10no3pp.115-125

Mohajan, H. K. (2017). Two criteria for good measurements in research: Validity and reliability. *Annals of Spiru Haret University Economics Series, 17*(4), 59-82. https://doi.org/10.26458/1746

Mohajan, H. K. (2018). Qualitative research methodology in social sciences and related subjects. *Journal of Economic Development, Environment and People, 7*(1), 23-48. https://doi.org/10.26458/jedep.v7i1.571

Moussa, N. M., & Saali, T. (2022). Factors affecting attitude toward learning mathematics: A case of higher education institutions in the Gulf Region. *SAGE Open, 12*(3), 21582440221123023. https://doi.org/10.1177/21582440221123023

Mullis, I. V. S., Martin, M. O., Foy, P., Kelly, D. L., & Fishbein, B. (2020). TIMSS 2019 international results in mathematics and science. *Boston College, TIMSS & PIRLS International Study Center*. https://timssandpirls.bc.edu/timss2019/

Nasamu, R. A. (2021*). Influence of teaching styles and learning styles on pupils' academic performance in numeracy in Ilorin Kwara State* [Doctoral dissertation, Kwara State University].

Nenty, H. J., Kgosidialwa, K., & Moeti, B. (2016). Parental involvement and attitudes towards mathematics by junior secondary students in Gaborone. *Global Journal of Educational Research, 15*(2), 167.

Ogbeche, A. T., Ezugwu, I. J., Madu, B. C., Eze, F. B., & Asongo, S. T. (2021). Analysis of psychometric qualities of National Examinations Council (NECO) mathematics essay test using generalized partial credit model. *The International Journal of Humanities & Social Studies, 9*(12), 11-21. https://doi.org/10.24940/theijhss/2021/v9/i12/HS2112-014

Oliver, B., & de St Jorre, T. J. (2018). Graduate attributes for 2020 and beyond: Recommendations for Australian higher education providers. *Higher Education Research & Development, 37*(4), 821-836. https://doi.org/10.1080/07294360.2018.1446415

Oppong, S. H. (2013). The problem of sampling in qualitative research. *Asian Journal of Management Sciences and Education, 2*(2), 202-210.

Pekrun, R. (2019). Expectancy-value theory of anxiety: Overview and implications. In D. G. Forgays, T. Sosnowski, & K. Wrzesniewski (Eds.), *Anxiety: Recent developments in cognitive, psychophysiological, and health research* (pp. 23-41). Hemisphere Publishing Corp. https://doi.org/10.4324/9781315825199-3

Prinja, S., Brar, S., Singh, M. P., Rajsekhar, K., Sachin, O., Naik, J., Singh, M., Tomar, H., CHSI Study Collaborating Investigators, Bahuguna, P., & Guinness, L. (2020). Process evaluation of health system costing–Experience from CHSI study in India. *PLoS ONE, 15*(5), e0232873. https://doi.org/10.1371/journal.pone.0232873

Rampal, A., & Subramanian, J. (2012). Transforming the elementary mathematics curriculum: Issues and challenges. In R. Ramanujan, & K. Subramaniam (Eds.), *Mathematics education in India: Status and outlook* (pp. 63-88). Homi Bhabha Centre for Science Education, Tata Institute for Fundamental Research.

Rodriguez, E. (2023). Elite course-taking and racial disparities in STEM. *California Sociology Forum, 5*(1), 35-58.

Sanders, S., Nielsen, W. S., McPhail, C., & Forrester, P. A. (2019). Maths anxious pre-service teachers' perspectives of" doing" mathematics in a whiteboard room. *Mathematics Teacher Education and Development, 21*(1), 145-168.

Sjaastad, J. (2012). Sources of inspiration: The role of significant persons in young people's choice of science in higher education. *International Journal of Science Education, 34*(10), 1615-1636. https://doi.org/10.1080/09500693.2011.590543

Slavin, R. E. (2019). *Educational psychology: Theory and practice*. Pearson.

Strayer, J. F. (2012). How learning in an inverted classroom influences cooperation, innovation and task orientation. *Learning Environments Research, 15*(2), 171-193. https://doi.org/10.1007/s10984-012-9108-4

Tahiru, A. W., Takal, S. U., Sunkari, E. D., & Ampofo, S. (2023). A Review on Renewable Energy Scenario in Ethiopia. *Iranian (Iranica) Journal of Energy & Environment*, *14*(4), 372-384. https://doi.org/10.5829/ijee.2023.14.04.07

Tahiru, A. W., Cobbina, S. J., & Asare, W. (2023). *Unlocking The Renewable Energy Potential in Developing Countries: The Case of Ghana* [Paper presentation]. Africa International Conference on Clean Energy and Energy Storage.

Takal, S. U., Tahiru, A. W., & Owusu-Sakyere, E. (2023). The Role of Local Level Institutional Arrangements in Climate Change Adaptation of Rural Dwellers in Northern Ghana. *Iranica Journal of Energy & Environment.*

Vial, A., van der Put, C., Stams, G. J. J. M., & Assink, M. (2019). The content validity and usability of a child safety assessment instrument. *Children and Youth Services Review, 107*, 104538. https://doi.org/10.1016/j.childyouth.2019.104538

Yahaya, M. S. D. (2020). *Investigating effects of the use of active pedagogy on senior high school students' achievement in logical reasoning in West Mamprusi District* [Doctoral dissertation, University of Education, Winneba].

Živković, M., Pellizzoni, S., Mammarella, I. C., & Passolunghi, M. C. (2022). The relationship betweens mathematics anxiety and arithmetic reasoning: The mediating role of working memory and self-competence. *Current Psychology, 42*, 14506-14516. https://doi.org/10.1007/s12144-022-02765-0

## APPENDIX A: ETHICAL REVIEW EVALUATION–C. K. TEDAM UNIVERSITY OF TECHNOLOGY & APPLIED SCIENCES SCHOOL OF SCIENCE, MATHEMATICS, & TECHNOLOGY EDUCATION, NAVRONGO

RESEARCHER (S): Alorki Issaka

DEPARTMENT: Mathematics and ICT Education

TITLE OF RESEARCH: Determinants of female students' performance in mathematics.

Has the research dealt with the following ethical issues satisfactorily?

**Table A1.** Ethical issues

| Issue | Yes | No | Not applicable |
|---|---|---|---|
| Clearly stated purpose | √ | | |
| Informed consent | √ | | |
| Children | √ | | |
| Adults | √ | | |
| Special groups | | | √ |
| Deception | √ | | |
| Risks to participants | √ | | |
| Confidentiality/anonymity | √ | | |
| Selection bias | √ | | |
| Benefit sharing | √ | | |

**General comments:** ..... The candidate has elaborated enough evidence to prove strict adherence to all ethical procedures of the university and hence meets the standards of the university and other research institutions in Ghana.

# APPENDIX B: QUESTIONNAIRE–C. K. TEDAM UNIVERSITY OF TECHNOLOGY & APPLIED SCIENCES SCHOOL OF SCIENCE, MATHEMATICS, & TECHNOLOGY EDUCATION, DEPARTMENT OF MATHEMATICS & ICT EDUCATION STUDENTS QUESTIONNAIRE

Dear student,

The following questions require your responses on the *influence of positive students' attitudes towards mathematics and their effect on academic performance*. The answers you provide to the questions will be kept private EXCEPT for this research only. There is no right or wrong response. I, therefore, plead with you to give me your precious time and answer the questions for me. You may be required to supply and just mark (√) in the box you deem most appropriate. There are six sections in this questionnaire.

Thank you.

## SECTION A: Background Information

**Instruction: Supply the word(s) or phrases you deem most desirable in each of the items from 1 to 6.**

1. Name of school: ……
2. Form: Form one: ……. Form two: ……. Form three: …….
3. Gender: Male: ……. Female: …….
4. Age: 10-13: ……. 14-17: ……. 17+: …….
5. Parents/guardian educational level: Certificate: … Diploma: ... First degree: ... Master's degree: ... Others (specify): ... Not all: ...
6. I stay with my: Parents: …… Mother: …… Grandmother: …… Auntie: …… Father: …… Grandfather: …… Uncle: ……

## SECTION B: Effect of Parental Involvement/Support & Students' Attitudes Towards Learning Mathematics

**Instruction: Please, one of the empty spaces on your right-hand side corresponding to the statements on your left-hand side.**

**Please note the meaning:** SA: Strongly agree, A: Agree, D: Disagree, & SD: Strongly disagree

**Table B1.** Statements-1

| No | Statement | SA | A | D | SD |
|---|---|---|---|---|---|
| 7 | My parents showing me that they have high expectation for me to perform well in mathematicswill increase my interest in learning mathematics. | | | | |
| 8 | My parents' encouragement to set a high academic goal for myself in mathematicswill force me to develop a strong interest in learning mathematicsin order to achieve a high score. | | | | |
| 9 | My parents' discussions about importance of mathematics to me will challenge me to always have a positive attitude toward learning mathematics. | | | | |
| 10 | If my parents make me aware that, they want the best education for me and make me feel loved, it will inspire me to study hard to achieve high marks to make them proud of me. | | | | |
| 11 | My parents giving me praises and rewards when I score high marks in mathematicswill encourage me to do more. | | | | |
| 12 | My parents monitoring my studies at home would motivate me to stay focused and devote more time to my studies at home. | | | | |
| 14 | My parents' advising and counseling me even if I perform poorly in math, would motivates me learn the subject. | | | | |
| 15 | My parents' encouragement and provision of mathematicslearning materials would motivate me to learn the subject. | | | | |
| 16 | I would be able to overcome my fear of learning mathematics if my parents provided me with my needs and demands, as well as the assistance I require from them. | | | | |
| 17 | My parents motivating and encouraging me to learn mathematics even when I received low grades inspired me to develop a positive attitude toward mathematics learning. | | | | |
| 18 | My parents provide me with mathematics textbooks, pamphlets etc. for my studies. | | | | |
| 19 | My parents monitor my studies at home. | | | | |
| 20 | My parents motivate, encourage and advise me to learn. | | | | |
| 21 | My parents allow me enough time for my studies at home. | | | | |

## SECTION C: Effect of Teacher's Attitude & Competence in Teaching Mathematics & Students' Attitude Towards Learning Mathematics

**Instruction: Please, one of the empty spaces on your right-hand side corresponding to the statements on your left-hand side.**

**Please note the meaning:** SA: Strongly agree, A: Agree, D: Disagree, & SD: Strongly disagree

**Table B2.** Statements-2

| No | Statement | SA | A | D | SD |
|---|---|---|---|---|---|
| 22 | My mathematicsteacher is friendly and approachable, so I can go to him for clarification on a topic I do not understand. | | | | |
| 23 | My mathematicsteacher is knowledgeable about mathematics and makes it simple for me to learn. | | | | |
| 24 | When it comes to mathematics lessons, I feel comfortable. | | | | |
| 25 | When I see my mathematicsteacher arrive for class, I get bored and scared. | | | | |
| 26 | My mathematicsteacher marks our exercise on time and assists us with corrections. | | | | |
| 27 | Every day, my teacher takes time to summarize what we have learned, this increase our understanding on what we were thought. | | | | |
| 28 | When my mathematicsteacher walks into class with a cane, I get scared and lose concentration in class. | | | | |
| 29 | My mathematicsteacher always encourages and motivates us to learn . | | | | |
| 30 | My mathematicsteacher praises us when we give correct answers in class and encourages us when we give incorrect answers, this makes me always participate in his class. | | | | |
| 31 | My mathematicsteacher spends a lot of time revising with us and does not move on until he or she is confident that we understand what has been taught. | | | | |

## SECTION D: Effect of Classroom Influence on Students' Attitudes Towards Mathematics

**Instruction: Please, the one of the empty spaces at your right-hand side corresponding to the statements at your left had side.**

**Please note the meaning:** SA: Strongly agree, A: Agree, D: Disagree, & SD: Strongly disagree

**Table B3.** Statements-3

| No | Statement | SA | A | D | SD |
|---|---|---|---|---|---|
| 32 | Using real-world examples to assist us in solving mathematicsquestions will help me see mathematicsas simple, which will increase my desire to learn mathematics. | | | | |
| 33 | During mathematicsclass, my teacher allows us to explain our answers or ideas. | | | | |
| 34 | My teacher values my ideas and suggestions in class, so I am always eager to answer questions in his class. | | | | |
| 35 | My teacher asks students to explain more about the answers they gave. | | | | |
| 36 | In mathematics class, I prefer working in groups to working alone. | | | | |
| 37 | If I do not understand something, my teacher explains it to me in a different way. | | | | |
| 38 | My teacher asks questions to ensure that we understand what he or she is teaching. | | | | |
| 39 | In my mathematicsclass, I frequently get confused. | | | | |
| 40 | I have generally enjoyed mathematicslessons in school. | | | | |

## SECTION E: Students' Attitudes Towards Mathematics & Achievement

**Instruction: Please, the one of the empty spaces at your right hand side corresponding to the statements at your left had side.**

**Please note the meaning:** SA: Strongly agree, A: Agree, D: Disagree, & SD: Strongly disagree

**Table B4.** Statements-4

| No | Statement | SA | A | D | SD |
|---|---|---|---|---|---|
| 41 | I am very confidence in learning mathematics. | | | | |
| 42 | I like/enjoy studying mathematics. | | | | |
| 43 | I hope to study mathematics in the near future. | | | | |
| 44 | I get a lot of satisfaction from solving mathematicsproblems. | | | | |
| 45 | Mathematics helps to develop the mind and teaches people to think critically. | | | | |
| 46 | Mathematics is an important subject that people should learn. | | | | |
| 47 | I'm always nervous in mathematicsclass. | | | | |
| 48 | I believe that studying mathematics assists me in solving problems in other subjects. | | | | |
| 49 | I believe I will perform well in mathematics examinations. | | | | |

50. **General comment:** My performance in last term's examination was:

Below 30 marks: …… 30-40 marks: …… 50-60 marks: …….. 60 marks & above: ……..