UNIVERSITY OF EDUCATION, WINNEBA

A STUDY OF STUDENTS' ATTITUDES AND MATHEMATICS TEACHERS' SELF- EFFICACY IN TEACHING AND THEIR RELATIONSHIPS ON STUDENTS' ACHIEVEMENT IN DADIESO SENIOR HIGH SCHOOL

JOSEPH ANDOH FORDJOUR

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JOSEPH ANDOH FORDJOUR

(8180110001)

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of the requirements for the awards of the degree of Master of Philosophy (Mathematics Education) in the University of Education, Winneba

NOVEMBER, 2021

DECLARATION

STUDENT'S DECLARATION

I, JOSEPH ANDOH FORDJOUR, declare that this thesis, with the exception of quotations and references contained in published works which have all been identified and duly acknowledged, is entirely my own original work, and it has not been submitted, either in part or whole, for another degree in this institution or elsewhere.

Signature: ……..

Date: ……..……

SUPERVISOR'S DECLARATION

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

NAME OF SUPERVISOR: Prof. Michael J. Nabie

SIGNATURE: ……

DATE: ……

DEDICATION

I dedicate this dissertation to my beloved father, Paul.

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ABSTRACT

The study examined students‟ attitudes and mathematics teacher self- efficacy in teaching and their relationships on students‟ achievement in Dadieso Senior High School. Correlational design was employed in the study. Purposive and Stratified Random Sampling techniques were used to sample 225 respondents made up of 7 Form three (F3) mathematics teachers (6 males, 1 female) and 218 Form three (F3) students (123 male, 95 female). Attitude towards Mathematics Inventory was used to collect data on students‟ attitudes whereas data on their achievement was obtained through an Achievement Test. Teacher self- Efficacy Scale was used to collect data teacher‟s efficacy in teaching mathematics. Frequencies, percentages, Pearson‟s product-moment correlation and independent samples t- test were used for data analyses. The study revealed that most respondents had positive attitude towards mathematics in terms of its value and their confidence but also indicated anxiety towards learning mathematics. A significant positive medium correlation between students‟ attitudes and their mathematics achievement was established. The study also revealed significant small positive relationship between teacher self-efficacy and students mathematics achievement. Significant gender differences were specified on mathematics achievement. Male students performed better than female students in Mathematics with medium effect size. Recommendations were made to enhance students‟ positive attitudes and build higher level efficacy beliefs of teachers during in-service training.

CHAPTER ONE

INTRODUCTION

1.0 Overview

This chapter presents the background of the problem, the statement of the problem and purpose of the study. It also provides the research objectives, questions, hypotheses designed for the study. Additionally, significance, delimitation, limitation of the study, definition of terms and organization of the study are presented in this chapter.

1.1 Background of the Problem

Mathematics as a subject affects all aspects of human life. Mathematics is seen as the foundation for scientific technological advancement and is vital for socioeconomic development of a nation. Competencies gained in the study of mathematics are widely used in all spheres of human life. In the era of rapid change in societal development fuelled by technological advancement, the demand for mathematical knowledge and skills are growing.

Mathematical skills in solving everyday problems and making inferences are increasingly becoming part of the requirement for both the university access and labour market (Ampofo, 2019). This justifies the study of the subject by all students who go through basic and secondary education in most countries such as Ghana. Mathematics is so important for today‟s students that good performance in the subject is a yardstick on ones progress in educational ladder. The Ghanaian government has made the subject compulsory at the basic and Senior High School level. This is aimed at ensuring the inculcation of mathematical literacy and the associated equipment with logical and abstract thinking needed for living, problem solving and educational

furtherance (Asante, 2010). For full realization of this laudable objective of mathematics education, high teacher self- efficacy, favorable attitude and demonstrated achievement should be evenly distributed across gender.

In recent times, concerns have been raised by stakeholders of education with respect to the persistent poor performance of students in mathematics. The poor performance of students in mathematics denies them entry into the higher educational institution. Stakeholders try as much as they can to address certain factors that influence the performance of students in mathematics, such as motivating teachers for quality lesson delivery.

Research (Ahmed, Khan & Rehman, 2015; Ampofo, 2019) indicate that mathematics teacher self-efficacy influence students‟ performance in mathematics and as such should be looked at. Teacher efficacy is the teachers‟ confidence in the ability to promote students learning (Gonzalez & Maxwell, 2018). It‟s been established that a good classroom strategy requires full interest and support from teachers. If a teacher appears not interested or careful about a particular subject or student, he/she will be unable to foster a supportive leaning environment. Once this is the case, students begin to lose interest in the subject and learning in general, which ultimately affects their academic performance negatively in the subject. Poor performance of students in academic subjects has raised the attention of education stakeholders like government to intervene in teachers‟ efficacy to improve the student performance.

Successive governments embark on a lot of activities to improve mathematics teacher efficacy in teaching. Government annually organizes teachers‟ day where the efforts of teachers are recognized. Hardworking teachers in different discipline are awarded across each district in the country. These awards such as cash prizes motivate teachers

in lesson delivery. Teachers‟ efficacy is also improved by government through scholarship such as Ghana National Petroleum Corporation (GNPC) scholarship and District Level Government of Ghana scholarship to teachers to further their education in different discipline including mathematics. This professional development is key in quality contents delivery in the classroom.

It‟s been established that a professional development in education is of utmost importance in order to keep up with the demands of more rigorous math standards (Chapman, 2015). Teachers who are not professionally developed find it difficult to respond to questions of their students in ways that foster a supportive learning environment. Based on this, numerous workshops were organized for mathematics teachers of the various schools across the nation. Recently, the World Bank in collaboration with the Ghana Education Service organized workshops under the Secondary Education Improvement Project (SEIP) where experienced educationist and examiners in mathematics meet teachers to share knowledge on some challenging topics for the professional development. This was to boost teachers‟ academic capacity since professional development helps teachers to acquire new teaching strategies to implement the curriculum content more effectively. Stakeholders have also done their best by motivating teachers through cash prizes to implement content more effectively, providing adequate teaching and learning materials to enhance students understanding and many more measure all to improve the teacher‟s efficacy in teaching. As the performance of students is used to measure the efficacy of teachers, factors that influence the performance of students are of great concern. One such factor is student‟s attitude towards learning.

Attitude is defined as the cognitive, sensory and behavioral positive or negative inclinations of an individual that are directed towards events, people, objects, thought systems and institutions within the limits of one‟s perceptional realm (Yasar, 2016). Most often teacher effort will be in vain when students have negative attitude towards mathematics. The influence of student‟s attitude on achievement is well document in Ghana (Asante, 2010; Mensah, Okyere & Kuranchie, 2013; Enu, Agyeman & Nkum, 2015). These studies have found a positive relationship between students‟ attitude and their performance in mathematics. Student‟s attitude towards Learning of the subject should therefore be taken very serious at the secondary school. Parents, school administrators and to large extent government should engage in practices that motivate learning to address negative attitude towards mathematics for improved performance.

Administrators of schools ensure that students attitude toward studies are favourable. Students undergo orientation where teachers are introduced to them on arrival in the new environment before class begins. Teachers performing special responsibility such as the counselors are also introduced to new students for them to attend to them when they have problem in the course of their study that requires counseling. Again, Administrators of schools issue rules and regulations to students concerning academic work on their first day of admission. Mathematics self-efficacy, anxiety and interest in mathematics are issues that are addressed daily by teachers in school programmes through enforcement of rules and regulations to enhance academic work, encouraging students to develop confidence in doing mathematics, and educating students on key attitudinal variables and values of mathematics in the 21st century. Actions by administrators and teachers collectively are to ensure academic excellence in mathematics for nation building.

1.2 Statement of the Problem

Government policies to improve performance of students such as organizing workshops for teachers to develop their professional capacity, motivating teachers through the awards scheme and the provision of teaching and learning materials to enhance students understanding. Government efforts at developing teacher capacity to have a positive influence on students‟ performance have not yielded the desired results. Many senior high school students continue to struggle with mathematics and perform abysmally in their mathematics examinations (Bawuah, Yakubu & Seyram 2014; Enu, Agyeman & Nkum, 2015; Ampofo, 2019). Studies in Ghana (Asante, 2012; Mensah, Okyere & Kuranchie, 2013; Enu, Agyeman & Nkum, 2015) on student‟s achievements in mathematics have pointed to student attitudes as a major contributor. Other studies (Ahmed, Khan & Rehman, 2015; Chang, 2015; Ampofo, 2019) indicate that mathematics teacher‟s self- efficacy in teaching influence students‟ mathematics achievement but have received very little attention. The effect of teacher efficacy and students attitude can be the cause of the consistent poor performance of Dadieso Senior high student‟s West African Senior School Certificate Examinations (WASSCE) where 56.62%, 60.78% and 56.17% students who sat for the 2015, 2016 and 2017 examinations respectively did not qualify for higher educational institution (see Appendix A).

Research on the impact of student‟s attitude and mathematics teacher self-efficacy on student‟s achievement have been inconclusive due to contradictory results (Alrefaei, 2015; Gulistan, Hussain & Mushtaq, 2017; Karjanto, 2017; Andamon & Tan, 2018). This study was therefore designed to investigate student‟s attitudes and mathematics teacher self-efficacy in teaching and their relationships on student‟s mathematics achievement in the Ghanaian setting.

1.3 Purpose of the Study

The purpose of the study was to examine students‟ attitudes towards learning mathematics, mathematics teachers‟ self- efficacy in teaching and their relationships on students‟ achievement in mathematics. The study was also to examine students‟ relationship in mathematics achievement by gender.

1.4 Research Objectives

The study was designed to:

1. explore students‟ attitudes towards learning mathematics in Dadieso Senior High School.
2. examine the relationship between students‟ attitudes towards learning mathematics and students‟ achievement in mathematics in Dadieso Senior High School.
3. examine the relationship between mathematics teachers‟ self-efficacy in teaching and students‟ achievement in mathematics in Dadieso Senior High School.
4. explore gender differences in students‟ mathematics achievement in Dadieso Senior High School.

1.5 Research Questions.

The following research questions were designed to guide the study:

1. What are students‟ attitudes towards learning mathematics in Dadieso Senior High School?
2. What is the relationship between students‟ attitudes towards learning mathematics and their achievement in mathematics in Dadieso Senior High School?
3. What is the relationship between teacher‟s self- efficacy in teaching mathematics and student‟s achievement in mathematics in Dadieso Senior High School?
4. What is the difference in students‟ mathematics achievement score by gender in Dadieso Senior High School?

1.6 Hypotheses

The following hypotheses 1, 2 and 3 were formulated for research question 2, 3 and 4 respectively.

1. H_O: There is no statistical significant relationship between students‟ attitudes towards learning mathematics and their mathematics achievement in Dadieso Senior High School.
2. H_O: There is no statistical significant relationship between teachers‟ self–efficacy in teaching mathematics and students‟ mathematics achievement in Dadieso Senior High School.
3. H_0: There is no statistical significant difference between means achievement score of male and female students in Dadieso Senior High School.

1.7 Significance of the Study

The findings of this study on students‟ attitude towards learning mathematics and the mathematics teacher self - efficacy in teaching and their relationships on mathematics achievement in Dadieso SHS will contribute to knowledge in the field that is relevant to educational practitioners, policy makers and academics.

For educational practitioners like the mathematics teacher, the findings of the study will enable teachers to understand the relationship between student‟s attitude towards learning and their mathematics achievement which serves as a guide for them to teach mathematics in a way that will inculcate positive attitude in the student towards mathematics and to make them adaptable to mathematics learning consistently (Simegn &Asfaw, 2017). Additionally, it will help mathematics teachers to create conditions in which students learn mathematics with motivation, confidence and enjoyment.

For policy makers, the findings will enable them to formulate policies that promote the developments of students‟ positive attitude to learning mathematics for better academic performance. Based on the findings, workshops/ seminars/ conferences in mathematics teaching and learning may be held to share highly expert mathematics teacher‟s knowledge and skills for mathematics to strengthen their efficacy beliefs. An improvement in teacher efficacy beliefs will improve student‟s academic performance in mathematics since teacher self-efficacy has a direct link to student‟s mathematics achievement (Gulistan, Hussain & Mushtaq, 2017).

For academics, the results of study will be useful to other researchers in supplementing the existing literature on the same study area and will also provide a rich ground for further research based on the gap left out by this study (Ampofo & Osei-Owusu, 2015).

1.8 Delimitation of the Study

Delimitation has to do with the scope or boundaries of the research. The study was conducted in Suaman district in the Western North Region of Ghana. The study focused specifically on Dadieso Senior High School. The students‟ attitudes towards learning mathematics were of key interest in the study as well as their mathematics achievement. Additionally, mathematics teachers‟ self–efficacy in teaching was investigated in this study.

1.9 Limitation of the Study

Limitations are those conditions beyond the control of the researcher that will place restrictions on the conclusions of the study and their application to other situations (Kusi, 2012). The study was conducted among students and mathematics teachers of Dadieso senior high school in the Western North Region of Ghana. Based on this, the study was limited in sample size constraining the generalization of its findings. In addition, the nature of the study established associations or relationships between variables but does explain casual effects between and among variables which is a limitation to this study because one cannot conclude that a particular variable is a cause or an effect of change in another variable.

1.10 Definition of Terms

There are several definitions of the following terms, however the terms as used in this study are explained in the context of the study as below;

Achievement tests: Achievement tests are designed to measure the knowledge and skills students learned in school or to determine the academic progress they made over a period of time (Paulpandi &Govindharaj, 2017).

Attitude: Attitude is the cognitive, sensory and behavioral positive or negative inclinations of an individual directed towards events, people, objects, thought systems and institutions within the limits of one‟s perceptional realm (Yasar, 2016).

Teacher Efficacy: teacher efficacy is the teachers‟ confidence in their ability to promote students learning (Gonzalez & Maxwell, 2018).

1.11 Organization of the Study

The study is organized and presented into five chapters. The first chapter presents the background, statement and purpose of the study. It also provides the research objectives, questions, hypotheses designed for the study. Additionally, the significance, delimitation, limitation of the study, definition of terms and organization of the study are presented in this chapter. Chapter two presents the review of related literature on student‟s attitude towards mathematics and learning, students‟ attitude and mathematics achievement, teacher efficacy and student‟s mathematics achievement, gender and mathematics achievement. The chapter ends with the summary of literature and conceptual framework of the study. Chapter three presents the research design, population, sample and sample techniques. It also provides research instruments; validity and reliability of the instruments, the data collection procedure and the analysis of data. Chapter four presents results and discussions of

the study. Chapter five presents a summary of findings, conclusions and recommendations as well as suggestions for further research.

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CHAPTER TWO

LITERATURE REVIEW

2.0 Overview

This chapter presents related literature to the study. The review of related literature permits comparison of findings of this study to similar studies to provide a basis for confirming or disproving earlier judgment made. Literature reviewed in areas that include: student‟s attitude towards mathematics and learning, students‟ attitude and mathematics achievement, teacher efficacy and students mathematics achievement, gender and mathematics achievement. This chapter also presents summary of literature and conceptual framework designed to guide the study.

2.1 Students' Attitudes towards Mathematics and Learning

Attitude is the cognitive, sensory and behavioural positive or negative inclinations of an individual, and is directed towards the events, people, objects, thought systems and institutions within the limits of one‟s perceptional realm (Yasar, 2016). Some authorities regard attitude towards Mathematics as just a like or dislike for Mathematics, while others extend the meaning to embrace beliefs, ability, and usefulness of Mathematics. For others, attitude towards Mathematics is just a positive or negative emotional disposition towards Mathematics. Considering attitude towards Mathematics from multidimensional perspectives, it interprets students attitude towards Mathematics as a more complex scenario characterized by the emotions that one associates with Mathematics, ones beliefs about Mathematics and how one behaves towards Mathematics. This attitude if negative is reflected by the fact that students may shy away and would always try to avoid mathematics tasks. A positive attitude towards the subject is an important educational outcome that should be

nurtured regardless of the achievement level of the learners who should be helped in order to bring out their best abilities. Most of these researchers have found the attitude of students and how whether being positive attitude or negative attitude relates with their achievement in mathematics.

Yee (2010) published records of nine hundred and eighty-four (984) students on attitude towards mathematics and the relationship between attitude and achievement in mathematics. Exploratory factor and correlation analyses were performed on data collected. Result showed that achievement correlated positively with all the domain of attitude thus self-confidence, value, enjoyment and general motivation. In addition, achievement correlated negatively with anxiety. The study indicated that in general, participant have positive attitude towards mathematics. The test failed to show a statistical reliable difference between males and females in mathematics achievement.

In the same way, Espinosa, Mercado and Mendoza (2012) conducted a study to evaluate students‟ attitude towards the learning of mathematics. The study was conducted with eighty-eight (88) students who study mathematics. Students responded to items relating to their attitude on usefulness of mathematics and their anxiety towards mathematics. Analysis of result indicated that students perceive mathematics as a useful but difficult discipline. In addition, they manifested an attitude of distrust towards the study of mathematics. However, students indicated anxiety in the situation that involved the use of mathematics.

The relationship between performance in mathematics problem solving and students attitude towards mathematics was explored by Duque Jr. and Tan (2018). The study that employed Descriptive- correlation methods and descriptive -case study involved 127 respondents. Confidence in learning mathematics was positively correlated, while

mathematics anxiety was negatively correlated with performance in mathematics problem solving. The correlation was significant. It was also found that there was a positive correlation between motivation, usefulness of mathematics and performance in mathematics but was not significant. Over-all, the correlation score between performance in mathematics problem solving and mathematics attitude was generally positive but was not significant.

Capuno, Necesario, Etcuban, Espina, Padillo and Manguilimotan (2019) used a descriptive-correlation design to determine the relationship of the attitude, study habit and performance of 177 grade 9 students in mathematics. The study revealed that there was a negligible positive correlation between the attitude and academic performance of the respondents in terms of their self- confidence, enjoyment and motivation while there was a weak positive correlation between the value of math and their academic performance in math. Generally, the data showed a weak positive correlation between the attitude of the respondents and their academic performance. The study concluded that the attitude and study habits of the respondents are significant factors that affect students‟ performance in mathematics.

Finally, Chávez, García and Kramer (2019) conducted a study to check whether the variables motivation, usefulness, anxiety, confidence and liking are determining the attitudes of students towards mathematics. The quantitative study involved 362 students. The test attitude towards mathematics scale, which consisted of 25 items, was used to ascertain the information on student‟s attitude towards mathematics. The objectives of the research was achieved as it was found that the variable motivation, usefulness, anxiety, confidence and liking are determined in students attitudes, although it is true that they show a positive attitude (liking), they also admit that it

causes anxiety. The review of the literature also indicated that only a few studies were made in Ghana. This justifies the need to adapt an instrument to measure attitudes toward mathematics in the current place of study. It is believed that such instrument can be useful to measure the current state of the student‟s attitudes.

2.2 Students' Attitudes and Mathematics Achievement

Mathematics achievement is the competency shown by the students in the subject mathematics (Paulpandi & Govindharaj, 2017). Its measure is the score on an achievement test in mathematics. Attitude is the cognitive, sensory and behavioral positive or negative inclinations of an individual directed towards events, people, objects, thought systems and institutions within the limits of one‟s perceptional realm (Yasar, 2016). The relationship between these variables thus; students attitudes and mathematics achievement has been of interest to researchers for many years. There are studies conducted in different countries using varied sample sizes, different measures of assessment and students with varied characteristics but most of them reporting positive correlation between the variable attitude and achievement in mathematics.

The study conducted by Mensah, Okyere and Kuranchie (2013) to extend the discussion to the influence of teacher attitude on student attitude adopted descriptive survey design. Purposive and random sample techniques was used to sample four (4) mathematics teachers and one (100) Senior high schools students respectively. Two sets of questionnaire and students end of term examination were the sources of data for the study. Pearson Product Moment Correlation showed a positive and significant correlation between student attitude and student performance in mathematics.

In the same context, a study was conducted by Bhowmik and Banerjee (Roy) (2016) to investigate high school student‟s attitude towards mathematics and achievement in mathematics. Self-constructed standardized achievement test and attitude towards mathematics questionnaire was given to 394 secondary (class ten) students from six different high schools for data collection. Analysis indicated that there was a significant difference in mathematics achievement between boys and girls. They also found that there was a positive and significant correlation between attitude towards mathematics and achievement in mathematics.

The purpose of the study by Karjanto (2017) was to investigate the attitude of the 108 students in mathematics who are enrolled in Nazarbayev University using the attitudes towards mathematics inventory (ATMI) by Tapia and Marsh (2004). Result revealed that students have positive attitude towards mathematics. Also, the study indicated that there was a significant positive correlation between the achievement in mathematics and the attitude of students but effect size was medium.

Moreover, Simegn and Asfaw (2017) conducted a study to investigate the influence of attitude towards mathematics on the achievement of female students in comparison with their male counterparts and also to examine the relationship between attitude and mathematics achievement. Attitude towards mathematics inventory and mathematics achievement test was used to elicit information from 367 students. The three components of attitude toward mathematics scale enjoyment, motivation and confidence have significant contribution to the achievement of students in mathematics. No significant gender differences were shown in attitude towards mathematics. However, significant gender differences were specified on achievement.

They also found that there was a positive and significant correlation between attitude towards mathematics and achievement in mathematics.

A study which is more related to the current study was conducted by Andamon and Tan (2018) to investigate the conceptual understanding, attitude and performance in mathematics. The study adopted Descriptive- correlational research design approached since the study was interested in the relationship between students‟ attitude and their mathematics performance. The study involved two hundred and twenty-five (225) grade 7 students. Pearson‟s product-moment correlation coefficient (r) was computed on data collected. The result revealed that students attitude has significant positive relationship to the performance in mathematics but negligible.

A study conducted by Mazana, Montero and Casmir (2019) to investigate student‟s attitudes towards learning mathematics among a sample of 869 students in Tanzania adopted a parallel convergent mixed research approach. Mathematics enjoyment and attitude significantly predicted students‟ performance in the data collected. However, the relationship between mathematics anxiety and performance was not significant. A significant positive weak correlation between student‟s attitude and performance was established. Flowing from the preceding findings, studies in different cultural settings are eminent to realize the influence of student attitude towards Mathematics on student learning outcomes in the subject.

2.3 Teacher Efficacy and Student Mathematics Achievement

Teacher efficacy is teachers confidence in their ability to promote students learning (Gonzalez & Maxwell, 2018). A number of researchers have called for more evidence on the links between teacher‟s self-efficacy and students learning outcome at the classroom level (Wyatt, 2014; Zee & Koomen, 2016). Most of the researches done

tried to establish the relationship between teachers efficacy and student mathematics achievement. They found that teacher‟s self-efficacy significantly impacts students‟ achievement. Teachers having high sense of personal teaching efficacy are more likely to show great level of planning leading to high student‟s efficacy and high academic achievement. On the other hand, low teacher efficacy leads to low students‟ efficacy and low academic achievement (Gulistan, Hussain & Mushtaq, 2017).

Khan (2011) investigated the correlation between teacher‟s efficacy and secondary school student‟s achievement. For the purposes of data analysis, students‟ performance in mathematics was collected. Information was also elicited from teachers for their sense of efficacy. After collecting data from both students and teachers and analyzing data using Pearson product-moment correlation, it was revealed that there was a positive relationship between teacher‟s sense of efficacy and students‟ performance.

Shaukat and Iqbal (2012) conducted a study on Teacher Self-Efficacy as a function of Student Engagement, Instructional Strategies and Classroom Management. Teachers‟ Sense of Efficacy Beliefs scale (Tschannen-Moran & Hoy, 2001) was administered to 198 students. The researchers found that the teachers with higher education have higher sense of self-efficacy. It was also found in the study that the elementary teachers expressed significantly better classroom management than secondary teachers. The overall findings of the particular research suggested that TSE has positive impact on the learning and achievement of the students.

Tai, Hu, Wang and Chen (2012) carried out a study with five different hypotheses. The researchers related TSE with student learning satisfaction, student learning outcome, student learning satisfaction with teaching process and student learning

outcomes with teaching process. The researchers found that TSE and the teaching process have a strong association with the learning satisfaction of students. The overall findings suggest that TSE beliefs do have positive and significant influence on students‟ learning, satisfaction and achievement.

Moreover, Chang (2015) designed a study to examine the fifth-grade mathematics teachers‟ efficacy on their students‟ mathematics self-efficacy and mathematics achievement in the classroom. Two mathematics efficacy instrument thus, mathematics teacher‟s efficacy and students self-efficacy were administered to 58 mathematics teachers and 1244 students respectively for data collection as well as collecting students mathematics achievement score from the school. Participants were selected using stratified random sampling method. A simple regression analysis revealed that mathematics teacher efficacy significantly predicted students‟ mathematics achievement.

A further study was conducted by Alrefaei (2015) on Teachers sense of efficacy: Examining the relationship of teacher efficacy and students achievement. The survey involved sixty two (62) teachers and three hundred and fifty-eight (358) students. Three hundred and fifty- eight (358) fifth grade Students‟ scores on the Arkansas Benchmark test were collected from the office of Accountability and Research in each district. Teachers‟ efficacy was measured with The Teacher Sense of Efficacy Scale by Tschannen-Moran and Hoy (2001). Pearson correlation coefficient was conducted and the result showed that there was no significant relationship between teachers efficacy and students achievement.

In the same context, Shahzad and Naureen (2017) carried out a study with three different hypotheses. The researcher related students‟ academic achievement with teacher self- efficacy, teacher self –efficacy belief regarding students engagement and teacher self- efficacy belief regarding instructional strategies. Sixty (60) secondary school teachers and hundred (100) secondary school students were randomly selected for the study. To collect data, teacher self- efficacy questionnaire for teachers was used and to measure students achievement a test was developed. The overall findings indicated that students‟ academic achievement have a positive and significant correlation with teacher self-efficacy, students engagement and instruction strategies.

Gulistan, Hussain and Mushtaq (2017) gathered data from 576 respondents in order to measure the self-efficacy beliefs of mathematics teachers at secondary school level and its relationship with student‟s achievement in mathematics and to determine gender differences in mathematics teaching efficacy and mathematics achievement. The findings of the study reflected a strong positive correlation between teachers score and students‟ academic achievement score in mathematics. There is no significant difference between male and female students in terms of their mathematics achievement.

Ampofo (2019) also designed a study to explore the relationship between pre-service teachers perceived self- efficacy in teaching mathematics and their mathematics achievement. It was a descriptive study which involved forty (40) students. Data was collected through mathematics self- efficacy (MSES) questionnaire and mathematics achievement test (MAT). It was revealed in the study that there was a strong positive relationship between the pre- service teachers‟ self-efficacy in mathematics and their mathematics achievement. Research on linking teachers‟ sense of efficacy with

student outcome is “modest” according to Klassen, Tze, Betts, and Gordon (2011). Therefore, trying to predict the relation between teachers‟ sense of efficacy and student achievement will add to the body of knowledge.

2.4 Gender and Mathematics Achievement

Over the last decades, psychologists have grappled with the nature and the origin of sex differences in behavior and cognition (Asante, 2010). Research on sex differences on mathematics achievement is not only academic interest but concerns general academic policy. This has generated a lot of researches into this issue and how best to bridge the gap since a nation‟s development depends on both male and female citizens (Larbi & Okyere, 2014). Moved by this desire, studies have been conducted.

The study conducted by Asante (2010) on 182 students was to examine whether the performance of males in mathematics differ in any significant way from their females counterpart. The study adopted a field based survey. Mathematics performance was assessed using their classroom marks. The result indicated that there was a significant difference between mathematics performance of boys and girls. High school males in their study outperformed females in mathematics with large effect size.

Similarly, Kyei, Apam and Nokoe (2011) conducted a study to examine the expected causes of gender differences in the performance of mathematics among boys and girls missed senior high schools in Upper East Region of Ghana. Questionnaire and interviews were used to collect data from 250 students. Result indicated that there was gender difference in the outcome of mathematics examination. Specifically, the investigation revealed that there was gender difference with boys performing better than girls.

Abdul-Raheem (2012) studied the influence of gender on secondary schools students‟ academic performance in South African, Nigeria. The result of 2,305 students of the 2003/2004 and 2007/2008 West African School Certificate Examination (WASCE) were collected on mathematics from 10 secondary schools selected from 5 states in Nigeria. Chi-square cal (83.000) was greater than Chi-square table (3.84) at 0.05 level of significance. Therefore the null hypothesis which states “there is no significant difference between the performance of male and female students in mathematics” was rejected. This indicated that there was a significant difference in the performance of male and female students in mathematics with males performing better than female students in mathematics.

Further studies was conducted by Choudhury and Das (2012) to examine the influence of attitudes and study habit to the academic achievement of the pupils in mathematics. A sample of 500 students of standard IX from secondary school of South Kamrup District, Assam, participated in the study. The result showed that attitude and study habit related to the students mathematics achievement. However, there was no significant difference in the students‟ mathematics achievement as to their gender and medium of study.

Moreover, a survey was conducted by Enu, Agyeman and Nkum (2015) to determine factors influencing student‟s mathematics performance in some selected colleges of education in Ghana. Independent t-test was used in the analysis of data and there was no evidence to suggest that significant difference existed between males and females students in mathematics performance.

Additionally, a study conducted by Ajisuksmo and Saputri (2017) to investigate the influence of attitudes towards mathematics and metacognitive awareness on mathematics achievement on high school students adopted a quantitative approach. The study involved one hundred and three (103) students. It was revealed in the study that there was a positive significant correlation between student‟s attitude towards mathematics and student‟s mathematics. There was no significant difference in students mathematics achievement based on gender as indicated by the independent t-test.

Recber, Isiksa and Koç (2018) investigated the relationship among seventh grade student‟s mathematics self-efficacy, mathematics anxiety and attitudes towards mathematics, mathematics achievement, gender and school type using casual-comparative and correlational research designs. Two way ANOVA, multiple regression and correlation analysis were performed on the data collected from nine hundred and thirty four (934) seventh grade students. Findings indicated that there was significant mean difference in mathematics achievement scores of male and female but effect size was relatively small. The study in addition revealed that self-efficacy, anxiety and attitude significantly predicted the achievement score. Moreover, self-efficacy, anxiety and attitude had moderate part correlation coefficient.

Larbi (2019) investigated student‟s attitude towards the study of statistics and its possible implication on their academic achievement in this subject with particular reference to determining plausible differences between male and female students. A purposive sample of two hundred and sixty (260) students was involved in the study. Data were collected using a questionnaire developed by the researcher and end of

semester test. Data obtained were analyzed using linear regression model and MONOVA. Analysis of the result revealed that student‟s attitude has a significant effect on their learning outcome. There was no difference with regard to academic achievement in the statistics course. There was probably little research that proves otherwise on the performance difference between male and female students especially among secondary school level students. Thus, this study will use this advantage to explore this research gap.

2.5 Conceptual Framework

The study explored student attitudes and mathematics teacher‟s self-efficacy in teaching and their relationships on student‟s achievement. There were two independent variables namely student attitude and teacher efficacy whereas students achievement was the dependent variable. The relationships between the independent variables and dependent variable were reviewed and based on the literature; a conceptual framework was designed to guide the study as presented in Figure 2.1.

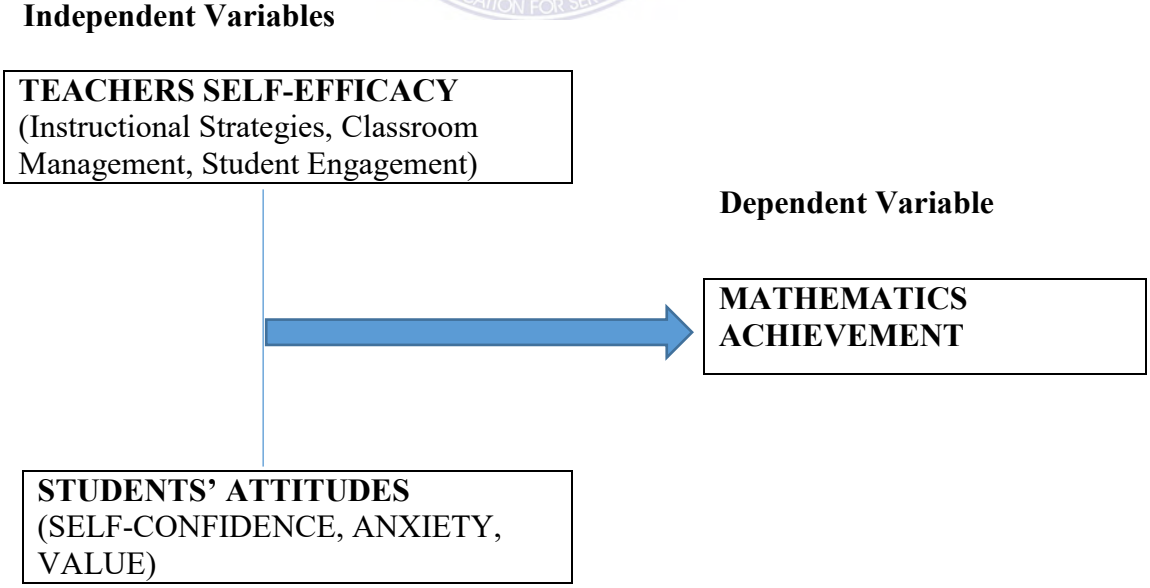


Figure 1: Conceptual Framework of the study

Source: Adapted from Gichuru and Ongus (2016, p.246).

Figure 1 present the conceptual framework that describes how students attitude and teachers self-efficacy are linked to students mathematics achievement. Several studies have been conducted in different countries to determine the factors that influence the student‟s achievement in mathematics (Capuno, Necesario, Etcuban, Espina, Padillo & Manguilimotan, 2019). Of all factors that have been studied, student‟s attitude towards mathematics had been consistently studied because many researchers found a positive relationship between students attitude and their achievement in mathematics. Attitude is the cognitive, sensory and behavioral positive or negative inclinations of an individual directed towards events, people, objects, thought systems and institutions within the limits of one‟s perceptional realm (Yasar, 2016). Several instrument such as Tapia and Marsh II (2004) has been used to find students attitude towards the study of mathematics. Such instruments have been used across different countries with different sample of students of all levels in the education institution. Most instrument have found students attitude to includes; self-confidence, enjoyment, value and anxiety. Each attitude of students has been identified to have a relation whether positives or negative relationship with student achievement in mathematics. For instance, anxiety as students‟ attitude has been found to have a negative relationship with student mathematics achievement (Yee, 2010). This implies a student who is anxious of mathematics is likely to perform abysmal. However, generally the positive perception of students in learning mathematics in terms of these attitudinal variables thus confidence, enjoyment and value would have positive attitude towards mathematics, which will have a positive relationship with student‟s achievement in mathematics. In contrast, the negative perception of students on attitudinal variables would also contribute to low performance of students in mathematics.

Furthermore, teacher self- efficacy is one of the factors that could also influence student‟s achievement in mathematics. If this is not given attention by stakeholders, its effect would become more damaging to students achievement in mathematics since students achievement reflect their teachers worth (Tschannen-Moran & Hoy, 2001). A number of studies have elaborated about the influence of self-efficacy beliefs on children‟s achievement and success at school (Shahzad & Naureen 2017). Teacher efficacy is a teachers‟ confidence in their ability to promote students learning (Gonzalez & Maxwell, 2018). Teacher self-efficacy of teaching mathematics has been measured most often using instrument developed by Tschannen-Moran & Hoy, 2001. From these instruments used, several domains have been identified. The domain includes; Instructional Strategies, Classroom Management and Student Engagement. Each of these efficacy domains has indicated a relation with student achievement in mathematics. Teachers having high sense of personal teaching efficacy are more likely to show great level of planning leading to high student‟s efficacy and high academic achievement. On the other hand, low teacher efficacy leads to low students‟ efficacy and low academic achievement (Gulistan, Hussain &Mushtaq, 2017). In sum, this conceptual framework describes how students attitude and teachers self-efficacy are linked to students mathematics achievement.

2.6 Summary of Literature Reviewed

Most research on attitude have pointed to the fact that attitude played a crucial role in learning mathematics hence determines the students success in the subject. Based on this, several instruments including Tapia and Marsh II (2004) have been used to measure student‟s attitude towards the learning of mathematics. Studies have found student to have positive attitude (confidence, enjoyment, value) and negative attitude (anxiety) towards the study of mathematics (Yee, 2010; Espinosa, Mercado &

Mendoza, 2012). Positive attitude has been identified as having a positive effect on student‟s mathematics achievement whereas negative attitude has a negative effect on student‟s achievement. The literature has also revealed that student‟s attitude in general have a significant positive relationship to student mathematics achievement. However, others studies have indicated no significant relationship between students attitude and their mathematics achievement. Taking cognizance of the fact that students achievement is used to measure the worth of their teachers, researchers have shown interest in teacher‟s efficacy in teaching. Several instruments have been validated to measure teacher‟s efficacy in different discipline. Teachers efficacy domain includes instructional strategies, classroom management and student engagement. Most research has indicated a significant relationship between teachers‟ efficacy and student‟s mathematics achievement (Khan, 2011; Shaukat &Iqbal, 2012; Shahzad & Naureen, 2017; Ampofo, 2019). Research also supported the fact that a positive attitude and high teacher‟s efficacy are important educational outcome that should be constantly nurtured regardless of the achievement level of the learners. It has also been established in the related literature reviewed that there is a significant gender differences on mathematics achievement with males performing better than female (Asante, 2010; Kyei, Apam & Nokoe, 2011; Bhowmik & Banerjee, 2016). Interestingly, other studies have indicated no significant difference in their achievement. Even though literature has revealed on the historical development of students attitude, the influence of students attitude and teachers efficacy on students achievement and gender differences on mathematics achievement, there has been a contradictory findings hence the study was designed to investigate student‟s attitude and mathematics teacher self-efficacy in teaching and their relationships on student‟s mathematics achievement in the Ghanaian setting.

CHAPTER THREE

METHODOLOGY

3.0 Overview

This chapter presents the research design, population, sample and sample techniques. It also describes the research instruments, validity and reliability of the instruments. Additionally, data collection and analysis procedure are presented in the chapter.

3.1 Research Design

It is commonly held by most people who engage in research that the first issue that challenges a researcher is the choice and justification of appropriate methodology especially the research design to study their particular problem. The purpose of a research design is to specify a plan for generating empirical evidence that will be used to answer research questions (McMillan & Schumacher, 2014). This is a quantitative study which explores students‟ attitude towards mathematics and teachers‟ self-efficacy in teaching mathematics and their relationships to students‟ mathematics achievement in Dadieso Senior High School. Specifically, a descriptive-correlational research design was employed to examine the relationship between students‟ attitude towards learning mathematics and their mathematic achievement in Dadieso Senior high school. Also, the design was employed to determine the relationship between mathematics teacher self-efficacy in teaching and students mathematics achievement in Dadieso senior high school. Correlational design is concerned with assessing relationship between two or more phenomena (McMillan & Schumacher, 2014). The researcher has therefore opted for the correlational design because taking the purpose of the study into consideration; correlational design is the appropriate design that can lead the researcher in drawing the most valid, credible conclusions from the answers

to the research questions. In selecting a method to conduct the descriptive correlational study, a survey method was chosen to collect data from students and mathematics teachers. Survey method was best because it is used frequently in educational research to describe attitudes, beliefs, opinions and other types of information (McMillan & Schumacher, 2014).

3.2 Population

The population size of the study was four hundred and eighty-six (486) from Dadieso Senior High School. This consisted of four hundred and seventy-nine (479) Form three (F3) students and seven (7) Form three (F3) mathematics teachers. These students were made up of two hundred and nine (209) female and two hundred and seventy (270) male. This category of students was selected on the assumption that they have been in the school for at least more than a year and therefore stood the better chance to form independent opinions in relation to their attitudes towards the study of mathematics (Ampofo & Osei-Owusu, 2015; Ampofo, 2019). Also, these students could respond to the achievement test since it comprised topics within their domain. Furthermore, this number of teachers was chosen because they have taught for at least more than one year and stood the better chance to respond to items relating to their idea about effective control over Instructional Strategies, Classroom management and Student engagement.

3.3 Sample and Sampling Techniques

This study was carried out with a sample of two hundred and twenty-five (225) respondents. There were two hundred and eighteen (218) students and seven (7) mathematics teachers. The students sample size was calculated employing sample determination formula (Yamane, 1967) n = $\frac{N}{1+N(e)^2}$, where, n is the sample size, N is

the population size and e is the level of precision (5%). Using the formula, the sample size was determined as: $n=\frac{479}{1+479(0.05)2}$ =217.975. Since we are dealing with human and not figures, the sample size n=218, which is the integer after 217.975. Moreover, the two hundred and eighteen (218) students were made up of one hundred and twenty-three (123) male and ninety-five (95) female (see Appendix B).

Stratified Random Sampling procedure was used to select male and female Form three (F3) students for the study. The Form three (F3) students‟ population was divided into two subgroups or strata of male and female. Proportional samples were drawn randomly from each subgroup by labeling on pieces of paper, yes or no, for each group. These pieces of papers were folded, placed in a basket and were thoroughly mixed. Each student in each stratum randomly picked one piece of folded paper in the basket. All students that picked yes from each group were put together to make the required sample for the research. Stratified random sampling process resulted in less sampling error and also allowed the researcher to compare subgroup results (McMillan & Schumacher, 2014). The purposive sampling technique was also used to select seven (7) Form three (F3) mathematics teachers (6 male, 1 female) for the study. These teachers and students on the basis of the researcher‟s knowledge of the population provided the best information for the purpose of the research (McMillan & Schumacher, 2014).

3.4 Research Instruments

Two set of instruments were used for data collection namely the questionnaire and an achievement test. A questionnaire is a self-reported data collecting instrument that each research participants fill out as part of a research study (Johnson & Christensen, 2012). Questionnaires were used because the population was literate (McMillan &

Schumacher, 2014). Again, the popularity of questionnaires was based on some advantages among which are its low cost in terms of both money and time involved (McMillan & Schumacher, 2014). Achievement tests are designed to measure the knowledge and skills students learned in school or to determine the academic progress they made over a period of time (Paulpandi & Govindharaj, 2017). Achievement Test was used in the study because it has more restricted coverage, more tied to school subject and measured more recent learning (McMillan & Schumacher, 2014).

3.4.1 Questionnaire for the study

Two set of questionnaires namely Attitude towards Mathematics Inventory (ATMI) and Teacher Self- Efficacy Scale (TSES) were used to gather data for the study. The Attitude towards Mathematics Inventory elicited information about the student‟s attitudes towards learning mathematics whereas the Teacher Self- Efficacy Scale questionnaire was used to gather information about the mathematics teachers‟ self-efficacy in teaching.

a) The Attitude towards Mathematics Inventory

The first set of questionnaire tagged “Attitude towards Mathematics Inventory” elicited information about the students attitudes towards learning mathematics (See Appendix C). This instrument consisted of 26 items grouped into two sections, A and B. Section A had 3 items for data on the respondent‟s profile such as gender, age and class. Section B consisted of 20 items (4-23) designed to measure students attitude towards learning mathematics. These 20 items consisted of fourteen (14) positively and six (6) negatively worded statements about attitudes towards learning mathematics. The positively worded statements measured students attitudes on two attitudinal variables namely students self-confidence towards the learning of

mathematics and their value of mathematics. The negatively worded statements measured students‟ anxiety attitudes exhibited towards learning of mathematics.

Ten (10) items were designed to measure student self-confidence in mathematics. They include items such as “I get a great deal of satisfaction out of solving a mathematics problem” and “I am happier in mathematics class than any other class”. The value of mathematics to students in this study was measured with four (4) items in the questionnaire. Such items include “Mathematics is important in everyday life” and “mathematics helps develop the mind and teaches a person to think”. The six (6) negatively worded statements which included “Mathematics is dull and boring” and” I am always under a terrible strain in a mathematics class” measured students‟ anxiety for mathematics. The twenty (20) Attitudes towards Mathematics Inventory items (both positive and negative items) were in a 4-point scale ranging from “Strongly Agree” to “Strongly Disagree. Respondents were to indicate their level of agreement with each statement by making a tick (√) in the appropriate space provided. The final 3 items in section B, namely items 24, 25 and 26 of the questionnaire were open statement created for the students to make recommendation regarding their attitude towards learning mathematics.

Over the years, several attitudinal scales have been developed and used to measure students‟ attitude. However, in this study the attitude questionnaire was adapted from Attitude towards Mathematics Inventory (ATMI), an instrument developed by Tapia and Marsh II (2004). This instrument was considered to be one of the best instruments to gauge students‟ attitude because it is a standardized instrument and has been used in many different research studies of the same nature (Mohamed & Waheed, 2011). Attitude towards Mathematics Inventory (ATMI) questionnaires were also used

because the population was literate (McMillan & Schumacher, 2014). Again, the popularity of questionnaires was based on some advantages among which are its low cost in terms of both money and time involved (McMillan & Schumacher, 2014).

b) Teacher self-efficacy scale

The second set of questionnaire was tagged Teacher Self- Efficacy Scale (See Appendix D). The teacher self-efficacy scale (TSES) was used to gather information about mathematics teacher self- efficacy in teaching. The instrument gathered information on the mathematics self -efficacy in three domains: instructional strategies, classroom management and student engagement. The TSES questionnaire was made of 17 items organized into two sections, A and B. Section A consisted of four (4) items which captured the demographic profile of teachers such as gender, age, academic qualification and class/form they teach. Section B consisted of 13 items. Item 5 to item 16 (12 items) measured the efficacy of the mathematics teacher in the three domains. Specifically, the twelve (12) items collected data on teachers‟ ideas about effective control over instructional strategies, classroom management and student engagement. The items include: “To what extent can you use a variety of assessment strategies?” “How much can you do to control disruptive behaviour in the classroom?” and “How much can you do to get students to believe they can do well in schoolwork?” These items were structured on a 4-point Likert response type scale and the responses were anchored with descriptors: nothing, very little, quite a bit and a great deal. Recommendations were made by teachers in response to item 17. The teacher self- efficacy scale (TSES) questionnaire was adapted from Teacher Efficacy Scale (TES), an instrument developed by Tschannen-Moran & Hoy (2001).

Despite the fact that the short form of Teacher Self- Efficacy Scale (TSES) was developed years ago, it continues to be the most commonly used instrument in the studies on teacher efficacy and has been examined for cross validation using teacher samples from diverse settings (Scherer, Jansen, Nilsen, Areepattamannil & Marsh, 2016). Again, the short form of Teacher Efficacy Scale (TES) instrument developed by Tschannen-Moran & Hoy (2001) was considered to be the best instruments to gauge teacher self-efficacy because it is a standardized instrument and has been used in many different researches of the same nature (Shahzad & Naureen, 2017). Questionnaires were used because the population was literate. Again, the popularity of questionnaires was based on some advantages among which are its low cost in terms of both money and time involved (McMillan & Schumacher, 2014).

3.4.2 Mathematics achievement test

In addition to the two set of questionnaire used to gather data in this study was the Mathematics Achievement Test (See Appendix E). The Achievement Test had twenty-five (25) multiple choice items developed to ascertain the mathematics achievement of students. Each item was followed by four options lettered A to D. Students were to indicate the correct option for each item by circling the option on the question paper. The Mathematics Achievement Test was based on the Mathematics Teaching Syllabus for Senior High Schools of the Ghana Education Service. Items covered sets and operations on set, surds, number bases, relations and functions, plane geometry, linear equations and inequalities, statistics 1 and simultaneous linear equation. Achievement Test was used because it has more restricted coverage, more tied to school subject and measured more recent learning (McMillan & Schumacher, 2014). In addition, the researcher was concerned with achievement in a specific

school subject hence achievement test was the best to use (McMillan & Schumacher, 2014).

3.5 Validity and Reliability

Validity is defined as the extent to which an instrument measures what it purports to measure (Kimberlin & Winterstein 2008). The instruments for data collection were subjected to content analysis. Validity of the two set of questionnaire (Student‟s Attitude toward Mathematics Inventory and Teacher Self-Efficacy Scale) was obtained by presenting them to the researcher‟s supervisor to evaluate the questionnaire for content, construct and face validity. Some valuable comments were given and slight modifications were made to the items. Also, the validity of the achievement test items was obtained through scrutiny by two mathematics teachers‟ who were examiners for the West African Senior Secondary Certificate Examination (WASSCE). The instruments were piloted in Nana Brentu SHS under the same condition as the real survey. The students did not indicate any problems with the clarity of the direction and understanding of the items. This school was selected because it was found in the same geographical precinct and therefore shares similar characteristics with the current place of the study (Amponsah, Milledzi, Ampofo & Gyambrah, 2018). The Cronbach‟s alpha was computed to determine the reliability of the Student‟s Attitude toward Mathematics Inventory (ATMI) and Teacher Self-Efficacy Scale (TSES). The reliability coefficients were found to be .835 and .921 for Student‟s Attitude toward Mathematics Inventory (ATMI) and Teacher Self-Efficacy Scale (TSES) respectively.

3.6 Data Collection Procedures

With regard to ethical measures, an introductory letter was sought from the Department of Mathematics Education of the University of Education, Winneba by the researcher to the District Director of Education of the Suaman District seeking for his permission to conduct the research (see Appendix F). Ethical clearance to conduct the research was obtained (see Appendix G). The researcher upon the permission of the district went to introduce himself to the head teacher of the school. The researcher was then introduced to the teachers of the school. The researcher talked to the teachers about the research. Teachers were briefed on the objectives of the study. Teachers then set the classes for the researcher to talk to students on the research. This was to ensure that students and teachers who were the main participants in the study have the information they need to decide whether or not to participate (McMillan & Schumacher, 2014). The researcher also assured both students and teachers of confidentiality of the data furnished by each participant (McMillan & Schumacher, 2014).

On the second visit of the researcher to the school, Attitude towards Mathematics Inventory and Mathematics Achievement Test were administered. The administration and collection of the data was done by the researcher with the help of two colleague teachers. The Attitude towards Mathematics Inventory questionnaires and mathematics achievement test were administered simultaneously to enable easy match of students achievement score against their attitude. Students in a relax atmosphere in the school‟s assembly hall were given sixty (60) munities, thus thirty (30) minutes for each instrument. In this study two hundred and eighteen (218) instruments (Attitude towards Mathematics Inventory and Mathematics Achievement Test) were administered to students however, 209 were returned for analysis indicating 96%

return rate. The instruments were administered under the supervision of the researcher and two colleague teachers to ensure students do not share ideals on the items for accurate measure of students‟ attitude towards learning mathematics and their achievement in mathematics. The presence of the researcher also offered the respondents the opportunity to seek for clarification about issue relating to the items and increased return rate of the research instruments (Kusi, 2012). Arrangement was made for the researcher to visit the school to administer the teacher self-efficacy scale questionnaire.

The researcher administered the teacher self-efficacy scale questionnaire on his third visit to the school. The teacher participants individually completed the teacher self-efficacy scale questionnaire in a peaceful atmosphere in the presence of the researcher within (30) minutes. Teachers were approached personally to ensure that each teacher provides information that reflects his or her self- efficacy in teaching mathematics. The researcher was also there to help teachers address any difficulty while filling the questionnaire which ensured 100% return rate of instruments (Kusi, 2012).

3.7 Data Analysis Procedure

Data on student‟s attitudes towards learning mathematics, mathematics teacher self-efficacy in teaching and student‟s achievement in mathematics were collected in this study. Student‟s responds to Attitude towards Mathematics Inventory (ATMI) were coded. These twenty (20) Attitude towards Mathematics Inventory (ATMI) items comprised of 14 positive statements and 6 negative statements. For positive statements, strongly agree, agree, disagree and strongly disagree were assigned values 4, 3, 2 and 1 respectively whereas negative statements, strongly agree, agree, disagree and strongly disagree were assigned values 1, 2, 3 and 4 respectively. Again, students

responded to an achievement test of 25 multiple choice giving a total mark of 50 thus; 2 marks for each question. Teachers responded to teacher self- efficacy scale (TSES) questionnaire of 12 items. The 12 items, teacher self- efficacy scale (TSES) used a 4-point response scale and the responses were coded as 1-nothing, 2-very little, 3-quite a bit, and 4-a great deal. Taking cognizance of Creswell‟s view, the likert data both Attitude towards Mathematics Inventory (ATMI) and Teacher Self- efficacy Scale (TSES) coded 1 to 4 was converted to continuous data by summing the responses. These codes yielded a minimum of 20 and a maximum of 80 score for Attitude towards Mathematics Inventory (ATMI) whereas Teacher Self-efficacy Scale (TSES) code yielded a minimum and maximum of 12 and 48 score respectively. This implies that the three instruments yielded quantitative data for the purpose of data analyses. Each student‟s attitudinal mean score was matched against his/ her achievement score in mathematics. Teachers efficacy mean score was also matched to their students score in the mathematics achievement test. Using the Statistical Product for Service Solutions (SPSS) the researcher computed frequencies, percentages, Pearson‟s product-moment correlation and independent samples t- test on the data collected.

To find the students attitude towards learning mathematics, student responses to the attitude towards mathematic inventory were analyzed. This data was computed to ascertain student‟s attitude towards mathematic on three attitudinal variables. The three attitudinal variables of students towards mathematics measured were self-confidence, anxiety and value. In order to cross check the estimate of reliability of each of the scales and the whole instrument, Cronbach‟s alpha measure of internal consistency was employed. The Cronbach‟s Alpha reliability coefficients were accepted at the level above 0.6 (Field, 2005). Frequencies and its corresponding percentages of student who responded to each of the items were computed. Students

responses to items such as strongly agree and agree were combined for discussion and were considered as agree to the items whereas strongly disagree and disagree were considered as disagree to items. The overall frequencies and percentages were used to make final conclusion to students‟ self- confidence, anxiety and value of mathematics.

To find the relationship between students‟ attitudes towards learning mathematics and students‟ mathematics achievement and also mathematics teacher self-efficacy in teaching and students mathematics achievement, Pearson‟s product-moment correlation coefficient (r) was computed on data collected. Student attitudinal mean score was matched against their mathematics achievement in mathematics whereas Teachers efficacy mean score was also matched to their students score in the mathematics achievement test since Pearson correlation coefficient measures the linear association between two scale variable (Field ,2005). The assumption of linearity and outliers was not violated as indicated by scatter plot. A correlation coefficient (r) indicates both the type of correlation and the strength of the relationship. The numerical size of a correlation co-efficient indicates the strength of the relationship while the sign (positive or negative) indicates the direction of the relationship. If there is a relationship between two variables, it means that a person‟s relative position on one variable bears a relation to his or her relative on the other variables (Field, 2005; McMillan, & Schumacher, 2014). The range of the coefficient is between -1 and +1. As suggested by Cohen (1992), the correlation coefficient with values r = .10 to .29 were considered small, values between r = .30 and .49, inclusive were considered medium and values of r = .50 to 1.00 were considered large. The correlations coefficient squared (coefficient of determination, R^2) was used to measure the amount of variability in Students achievement in mathematics that is explained by students attitude towards learning mathematics and mathematics teacher

self- efficacy in teaching mathematics (Field 2005). The test was a two- tailed test since the researcher‟s hypotheses was non- directional. In judging the statistical significance of the computed statistic, any statistic, whose p-value was greater than .05 was not accepted as being statistically significant.

To examine whether there was a significant difference in the mean achievement score of male and female students in mathematics, student‟s responded to an achievement test. Scores of students on the test gave a quantitative data. Students‟ scores were subjected to an independent samples t- test. Independent samples t-test is a parametric test, so the assumptions; the assumptions; homogeneity of variance and normal distribution was tenable. Levenes test was used to test for the assumption of homogeneity of variance. Levenes test was non-significant at $p > 0.05$. This means that there is no enough evidence to reject the null hypothesis hence the difference between the variance was zero- the variance are roughly equal and the assumption was tenable. Kolmogorov- smirnov was also used to test the assumption of normality. Kolmogorov- smirnov test the null hypothesis that the distribution of the sample is not significantly different from a normal distribution, thus probably normal. A $p > 0.05$ clearly showed that the distribution of the sample was not significant since there is no enough evidence to reject the null hypothesis. In judging the statistical significance of the computed statistic, any statistic, whose p-value was greater than .05 was not accepted as being statistically significant. The researcher used .05 as the standard criterion of probability since is the most important criteria in social sciences (Field, 2005). Since the researcher‟s hypotheses were non- directional, the test was two-tailed (Creswell, 2009). To discover whether the effect was substantive, the researcher computed for the effect size. Effect size according to Field (2005) and Creswell (2009) is simply an objective and standardized measure of the magnitude of the

observed effect and one of the most commonly used is Cohen‟s d. Cohen‟s effect size d was calculated as the difference between the mean scores of boys and girls, divided by the standard deviation. Effect size interpretation were based on Cohen„s (1992) conventions which states that effect size (d) of < 0.2, $0.2 < d < 0.8$ and $d > 0.8$ respectively indicate small, medium and large mean difference.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.0 Overview

The study was designed to explore students‟ attitude and mathematics teachers‟ self-efficacy in teaching and their relationships on students‟ achievement in Dadieso SHS. The following questions were designed to guide the study: What are students‟ attitudes towards learning mathematics in Dadieso Senoir High School? What is the relationship between student‟s attitude towards learning mathematics and their achievement in mathematics in Dadieso Senoir High School? What is the relationship between teacher‟s self- efficacy in teaching mathematics and student‟s achievement in mathematics in Dadieso Senoir High School? What is the difference in students‟ mathematics achievement score by gender in Dadieso Senoir High School? Attitude towards Mathematics Inventory, Teacher self-efficacy scale and Achievement Test were the instruments used for data collection. The data collected was checked with the use of the Statistical Product for Service Solutions (SPSS). The data were analysed using frequencies tables and percentages, Pearson product-moment correlation and independent sample t-test. This chapter presents and discusses the results of the study. Results are presented in tables based on the background information of participants, students‟ attitudes towards learning mathematics, students‟ performance in mathematics Achievement Test, the relationship between student‟s attitude towards learning mathematics and their mathematics achievement, teacher efficacy score, the relationship between teacher‟s self- efficacy in teaching mathematics and student‟s achievement in mathematics and finally the difference in students‟ mathematics achievement score by gender.

4.1 Background Information of participants

The sample in this study consisted of 209 Form three (F3) students. One hundred and nineteen (119) students representing 56.9% were males and 90 students representing 43.1% were females. Of the 209 students, 30 students representing 14.4% aged between 10-14 years. Again 169 students representing 80.9 % were 15-19 years and 10 students representing 4.8% were 20-24 years. The study involved seven (7) Form three (F3) mathematics teachers. There were six (6) males representing 85.7 % and a female representing 14.3%. All the seven (7) mathematics teachers were degree holders.

4.2 Students' Attitudes towards Learning Mathematics

One key objective of the study was to find students attitude towards the study of mathematics. Students were sampled to respond to Attitude toward Mathematics Inventory (ATMI) questionnaire of twenty (20) items on a 4-point scale ranging from "Strongly Agree" to "Strongly Disagree. These items was used to collect students data on their confidence towards mathematics, their anxiety towards mathematic and the value of mathematics. Descriptive statistics such as frequencies and percentages were used for the analyses.

4.2.1 Students' attitudes towards learning mathematics on self- confidence variables

Students were asked to indicate their level of agreement on items relating to their self-confidence towards learning mathematics. . For items measuring students" confidence towards mathematics strongly agree, agree, disagree and strongly disagree were assigned values 4, 3, 2 and 1 respectively. Frequencies and percentages were used for analyses and the result is presented in Table 4.1.

Table 4.1: The frequencies and percentages of student's responses on self-confidence variables (n=209)

	SA F (%)	A F (%)	D F (%)	SD F (%)
4. I get a great deal of satisfaction out of solving a mathematics problem.	36(17.2)	69 (33.0)	56(26.8)	48(23.0)
5. I am happier in mathematics class than any other class	54(25.8)	75(35.9)	54(25.8)	26(12.4)
6. I am able to solve mathematics problem without too much difficulty	32(15.3)	100(47.8	52(24.9)	25(12.0)
7. I like to solve new problems in mathematics.	45(21.5)	84(40.2)	49(23.4)	31(14.8)
8. I plan to take as much mathematics as i can during my education	46(22.0)	68(32.5)	63(30.1)	32(15.3)
9. I am comfortable expressing my own ideas on how to look for solutions to a difficult problem in mathematics	48(23.0)	77(36.8)	59(28.2)	25(12.0)
10. It would not bother me at all to take more math course.	62(29.7)	70(33.5)	52(24.9)	25(12.0)
11. I have usually been at ease during math test or course.	48(23.0)	72(34.4)	61(29.2)	28(13.4)
12. I learn mathematics easily	41(19.6)	84(40.2)	43(20.6)	41(19.6)
13. I have lot self-confidence when it comes to mathematics.	32(15.3)	78(37.3)	62(29.7)	37(17.7)
Total	**444(21.2**	**777(37.2**	**551(26.4**	**318(15.2**

Table 4.1 shows students responses to their self-confidence attitude towards learning mathematics. There were (10) items (4-13) which helped in detecting the kind of attitude students had formed towards the subject regarding their confidence. From Table 4.1, one hundred and five students (105) representing 50.2% agreed to gets a great deal of satisfaction out of solving mathematics problem. For 61.7% of the respondents, they reported to be happier in mathematics class than any other class. The happiness students gets in mathematics class is a contributing factor to positive attitude towards mathematics learning and performance among the students. Again,

63.1% of the students agreed to solve mathematics problem without too much difficulty compared to 36.9% who felt otherwise. It is therefore not surprising that 61.7% of the respondents agreed to solve new problems in mathematics. The study also revealed that 54.5% agreed to take as much mathematics as they can during their education while 59.8% reported to be comfortable expressing their own ideas on how to look for solutions to a difficult problem in mathematics. This attitude of students is a recipe for mathematics students to perform better. Students who exhibit such attitude are motivated and encouraged to learning the subject. It is also a good direction of students since mathematical skills such as problem solving is increasingly becoming part of the requirement for both the university access and labour market (Ampofo, 2019). A proportion of 63.2% of the respondents indicated that it would not bother them at all to take more mathematics course. It is therefore not surprising for most students to continue their education by taking more mathematics course or mathematics related course in the university or higher institution. More than half of the students thus 57.4% reported to be at ease during mathematics test or course. There were 59.8 % of the students who reported to learn mathematics easily while 52.6% of the students have a lot of self-confidence when it comes to mathematics. The result is evidence that most students are at ease in mathematics class, learn easily and have self- confidence as far as mathematics is concern. It can be noted that students have a positive attitude towards mathematics and therefore expected to perform better. In general, the study revealed that majority (58.4%) of the student‟s sampled for the study in Dadieso Senior High school student had confidence in dealing with mathematics. Students with high confidence believe in their abilities that they can be successful in learning, thus overcoming the fear of failing. These students

are ready to take mathematical challenge which in turn increases their academic achievement.

4.2.2 Students' attitudes towards learning mathematics on anxiety variables

Students were asked to indicate their level of agreement on items relating to their anxiety towards learning mathematics. . For items measuring students‟ anxiety towards mathematics strongly agree, agree, disagree and strongly disagree were assigned values 1, 2, 3 and 4 respectively. Frequencies and percentages were used for analyses and the result is presented in Table 4.2.

Table 4.2: The frequencies and percentages of student's responses on anxiety variables (n=209)

Item	SA F (%)	A F (%)	D F (%)	SD F (%)
14. Mathematics is dull and boring.	31 (14.8)	76 (36.4)	54 (25.8)	48 (23.0)
15. I am always under a terrible strain in a mathematics class.	32 (15.3)	86 (41.1)	62 (29.7)	29 (13.9)
16. I am always confused in my mathematics class.	38 (18.2)	70 (33.5)	55 (26.3)	46 (22.0)
17. Mathematics makes me feel uneasy and uncomfortable.	32 (15.3)	83 (39.7)	77 (36.8)	17 (8.1)
18. I get a sinking feeling when I think of trying hard mathematics problem.	33 (15.8)	77 (36.8)	61 (29.2)	38 (18.2)
19. My mind goes blank and I am unable to think clearly when working mathematics.	31 (14.8)	62 (29.7)	68 (32.5)	48 (23.0)
Total	**197(15.7)**	**454(36.2)**	**377(30.1)**	**226(18.0)**

Table 4.2 shows frequencies and percentages of student‟s responses on anxiety domain. There were 6 items (14-19) used to measure student‟s anxiety towards the study of mathematics. The table shows that majority of students 51.2% agreed that mathematics is dull and boring compared to 48.8% who felt otherwise. This attitude of students discourages students from learning mathematics leading to poor

performance. One hundred and eighteen students (118) representing 56.4% agreed that they are always under a terrible strain in a mathematics class. It is therefore not surprising that 51.7% of students reported to be confused in mathematics class. A student under terrible strain and confused in mathematics class is less motivated to learn thereby making it difficult to perform better in mathematics examination. Majority of the students 55% also agreed that mathematics makes them feel uneasy and uncomfortable compared to 45% who felt otherwise. A proportion of 52.6% of the respondents reported that they get a sinking feeling when they think of trying hard mathematics problem. Being uneasy and uncomfortable in mathematics class discourages mastery and application of such knowledge in examination and beyond. It will not be strange if such students who exhibit such negative attitude perform poorly in mathematics examination and subsequently find it difficult in its application in their everyday life. Interesting however, 55.5% of the students disagreed that their mind goes blank and they are unable to think clearly when working mathematics. This gives an indication that most students think clearly when working mathematics. Mathematics involves a lot of calculation which require students to be able to think when working. It will not be strange when such student performing well in mathematics. In general, majority thus 51.9% of the student‟s sampled for the study indicated that they are anxious of mathematics. Mathematics anxiety is believed to have an impact on motivation to learn mathematics, consequently on student‟s achievement.

4.2.3 Students' attitudes towards learning mathematics on value variables

Students were asked to indicate their level of agreement on items relating to the value of mathematics. For items measuring the value of mathematics strongly agree, agree, disagree and strongly disagree were assigned values 4, 3, 2 and 1 respectively. Frequencies and percentages were used for analyses and the result is presented in Table 4.3.

Table 4.3: The frequencies and percentages of student's responses on value variable (n=209)

Item	SA F (%)	A F (%)	D F (%)	SD F (%)
20. Mathematics is important in everyday life.	123(58.9)	60(28.7)	20(9.6)	6(2.9)
21.Mathematics helps develop the mind and teaches a person to think	116(55.5)	66(31.6)	20(9.6)	7(3.3)
22.Mathematics is one of the most important subjects for people to study	121(57.9)	66(31.6)	16(7.7)	6(2.9)
23. Mathematics is a very worthwhile and necessary subject.	137(65.6)	65(31.1)	4(1.9)	3(1.4)
Total	**497(59.4)**	**257(30.7)**	**60(7.2)**	**22(2.6)**

Table 4.3 above illustrates the frequencies and percentages of student"s responses to the value of mathematics to them. There were four (4) items (20-23) used to measure the value of mathematics to students. One hundred and eighty three (183) students representing 87.6% reported to the fact that mathematics is important in their everyday life. The implication is that most students see mathematics to be important but few disregard the fact that mathematics is important in their everyday life. The importance of mathematic to student encourages them to learn to perform better in the subject. Confirmation of the responses to this item can be derived from the earlier statement of Mohamed & Waheed (2011) that mathematics is important in everyday life. One hundred and eighty- two students (182) representing 87.1% accepted that

mathematics helps develop the mind and teaches a person to think compared to 27 students representing 12.9% who felt otherwise. This means majority of the students appreciate that mathematics helps develop their mind and teaches them to think. It is therefore not surprising that 187 out of 209 students agreed to the statement that mathematics is one of the most important subjects for people to study as against 22 students who disagreed. Two hundred and two (202) students indicated that Mathematics is a very worthwhile and necessary subject and 7 students disagreed. Students attach all seriousness to subject they feel important, worthwhile and necessary thereby performing better in such subject. The responses affirm the reasons for which mathematics was made a compulsory subject for all students in the secondary school. In general, 90.1% of the student‟s sampled for the study in Dadieso Senior High school felt mathematics has a great value to them. If students recognize the value of mathematics in their lives, they will become motivated to study, practice and learn.

4.3 Students Performance in Mathematics Achievement Test

Students responded to twenty-five (25) multiple choice items. Each item was followed by four options lettered A to D. Two (2) marks were awarded to a correct answer. Students‟ performance in achievement test is presented in Table 4.4.

Table 4.4: Students performance in achievement test

Performance level	Marks	Frequencies(N)	Percentages (%)
Did not meet expectation	0-10	17	8.1
Fair satisfactory	11-20	35	16.7
Satisfactory	21-30	60	28.7
Very satisfactory	31-40	62	29.7
Outstanding	41-50	35	16.7
Average	29.7		

Table 4.4 indicates student‟s score on mathematics achievement test. There were 25 multiple choice items in all. Two (2) marks was awarded to a correct answer, this implies a total score of 50 marks for all correct answers. From the Table 4.4, 17 students scored within 0-10, while 35 students scored within 11-20. Sixty (60) students scored within 21-30 whereas Ninety seven (97) students representing 46.4% scored above 30 marks. These data suggest that the performance of the students need to be improved because a significant number of students scored below the average marks of 29.7. It is essential to minimize the activities or factors that would distract students focus and enhance those that will help improve their performance.

4.4 The relationship between Student's attitude towards Learning Mathematics and their Mathematics Achievement.

The relationship between student‟s attitude and their mathematics achievement were investigated using data from students on Attitude towards Mathematics Inventory (ATMI) questionnaire and their score on Achievement Test. The independent and dependent variable were students‟ attitude and students‟ mathematic achievement respectively. Pearson- product moment correlation coefficient measures the linear association between the two scale variable. The linearity between the variables was represented by a scatter plot in Figure 2.

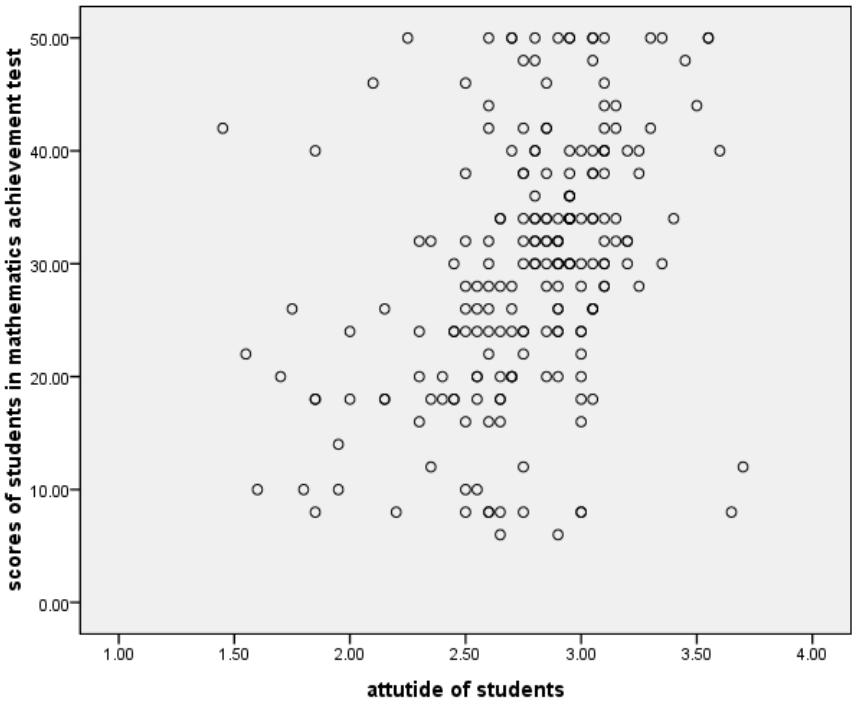


Figure 2: Graph of Achievement in Mathematics against Students Attitudes.

Figure 2 indicated a scatter plot of student"s mathematics achievement plotted against student attitudes. There seems to be some general trend in the data such that higher levels of attitude are associated with higher mathematics achievement and low levels of attitude are almost always associated with low level of mathematics achievement. Also, there were no obvious outliers in that most points seem to fall within the vicinity of other points. However, the graph could not show the strength of the relationship so to determine the strength of the relationship hence Pearson- product moment correlation was used and the result is presented in Table 4.5

Table 4.5: Relationships between students Attitudes and their Mathematics achievement

Variables	Pearson r	Strength	p-Value	Results
Mathematics achievement and				
A. Self-Confidence	.616**	Large	.000	Significant
B. Anxiety	-.559**	Large	.000	Significant
C. Value	.396**	Medium	.000	Significant
D. Attitude	.386**	Medium	.000	Significant

Note: Significant at p<0.05 (two-tailed)

Table 4.5 presents the test on the relationship between students‟ attitudes and their mathematics achievement**.** As shown in the table, the relationship between student‟s self-confidence towards learning and their mathematics achievement was found to be significant. The computed p- value is less than the critical value of 0.05 at two-tailed. It implies that increasing the students‟ self-confidence could improve their achievement in mathematics. As suggested by Cohen (1992) the correlation coefficient with values r = .10 to .29 were considered small, values between r = .30 and .49 were considered medium and values of r = .50 to 1.00 were considered large. The result as shown in Table 4.5 gave a correlation coefficient (r) of .616 between students‟ self-confidence and their mathematics achievement which indicates large positive relationship between the variables. From Table 4.5 there was also a negative significant (r = -.559, n = 209, p < .05) relationship between student‟s anxiety and their mathematics achievement**.** It implies that less anxiety towards mathematics could improve student‟s achievement in the subject. Taking cognizance of Cohen (1992) classification of the correlation coefficient, there was a large negative relationship between students‟ anxiety and their mathematics achievement. A positive significant relationship between the value of mathematics to students and their mathematics achievement was established. As to the value of mathematics, the result

implies that if the respondents perceived a higher value for mathematics, the better they perform in the subject. The relationship between the variables was medium. The result as shown in Table 4.5 gave a correlation coefficient (r) of .389 between students attitude in general and mathematics achievement which indicates medium positive relationship between the variables ($r = .386$, $n = 209$, $p < .05$). The correlation coefficient (r=.386) was tested at 5% significant level, the result revealed that it was statistically significant since the computed p-values was less than the critical values of 0.05 at two-tailed. This implies that the null hypothesis which states that "there is no significant relationship between students" attitude and student"s mathematics achievement in Dadieso Senior High School" was rejected. Coefficient of determination (R^2) was computed to measure the amount of variability in student"s mathematics achievement explained by students" attitude. The two variables had a correlation of .386 and so the value of coefficient of determination (R^2) was 0.149. This values when converted to percentage (multiple by 100) was 14.9%. This implies students" attitude explained 14.9% of the variation in students" mathematics achievement and that suggests that other factors were responsible for the remaining variance of 85.1%.

4.5 Teacher Efficacy Score

Teachers responded to Teacher Self-efficacy Scale (TSES) questionnaire of twelve (12) items which were further divided into three sub-scales: Instructional Strategies (4 items), Classroom Management (4 items) and Student Engagement (4 items). The 12 items teacher self- efficacy scale (TSES) used a 4-point response scale and the responses were anchored with the descriptors 1-nothing, 2-very little, 3-quite a bit, and 4 -a great deal. Mean and standard deviation were used to analyze the data and result is presented in Table 4.6.

Table 4.6: Mean and standard deviation on teachers efficacy

Self-efficacy	Mean score	Standard Deviation
Instructional Strategies	3.1071	.83986
Classroom Management	3.2143	.30375
Student Engagement	3.2500	.50000
Overall teacher efficacy.	3.1667	.52264

Table 4.6 highlights the mean score of teacher efficacy regarding the three domains; Instructional Strategies, Classroom Management and Student Engagement. The mean score of teachers efficacy in terms of their instructional strategies was 3.1071(SD= .83986) while that of classroom management was 3.2143(SD=.30375). Again, teachers‟ efficacy in their student engagement was 3.1667(SD=.50000). Teachers have high efficacy in each of the three efficacy domain since a mean value above 2.5 was considered as high. The overall teacher efficacy was 3.1667 which indicated a high level of teacher‟s efficacy since the mean value was above 2.5. The standard deviation associated with instructional strategies shows more variation compared to the two other domains; classroom management and student engagement. Mathematics teachers have indicated a high level of efficacy in teaching the subject however, there is the need to improve instructional strategies, classroom management and student engagement strategies of the mathematics teacher to improve achievement of students since several studies (Gulistan, Hussain & Mushtaq, 2017; Ampofo, 2019) have found a significant positive relationship between mathematics teachers self-efficacy in teaching and students mathematics achievement.

4.6 The relationship between Teacher's Self- Efficacy in Teaching Mathematics and Student's Achievement in Mathematics

Teachers responded to the teacher efficacy scale questionnaire whereas students‟ performance was ascertained through the achievement test. Pearson- product moment correlation was computed on these data. Pearson- product moment correlation coefficient measures the linear association between the two scale variable. The independent and dependent variable were teachers‟ efficacy and students‟ mathematic achievement respectively. The linearity between the variables was represented by a scatter plot in Figure 3.

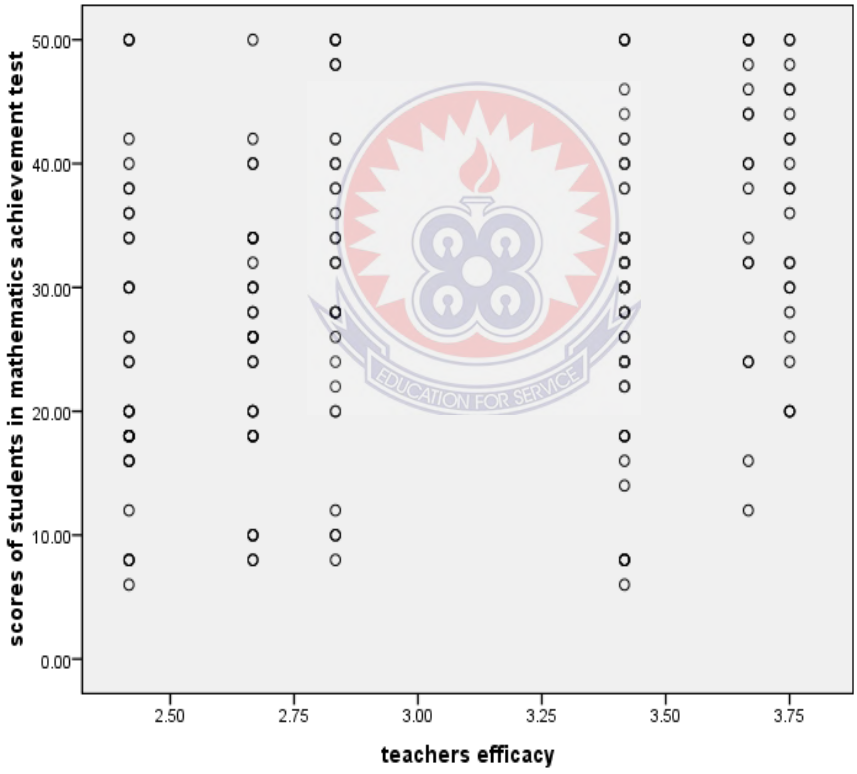


Figure 3: Graph of Achievement in Mathematics against teachers' efficacy.

Figure 3 indicated a scatter plot of student‟s mathematics achievement plotted against teachers‟ efficacy. There seems to be some general trend in the data such that higher levels of efficacy are associated with higher mathematics achievement and low levels

of efficacy are almost always associated with low level of mathematics achievement. Also, there were no obvious outliers in that most points seem to fall within the vicinity of other points. However, the graph could not show the strength of the relationship so to determine the strength of the relationship the Pearson- product moment correlation was used and the result is presented in Table 4.7.

Table 4.7: Correlation between teacher efficacy and students mathematics achievement

		Instructional Strategies	Classroom Management	Student Engagement	Teacher efficacy
Students mathematics achievement	Pearson Correlation	.217**	.288**	.216**	.265**
	Sig.(2 tailed	.002	.000	.002	.000

**. Correlation is significant at the 0.05 level (2-tailed).

Table 4.7 reveals the result of the relationship between teacher efficacy and students mathematics achievement. It can be observed that there were significant relationships between all teacher efficacy domain and students mathematics achievement. As to instructional strategies, there was a small positive correlation between instructional strategies and students mathematics achievement with the computed r- value of .217 and a p- value <0.05. The coefficient of determination was found to be .047 which implies instructional strategies explains 4.7% of the variation in students‟ achievement. On the other hand , the computed r- value of .288 between classroom management and students mathematics achievement means that there is a small positive correlation between these variables and the p- value <0.05 implies that there is a significant relationship between these variables. The coefficient of determination was found to be .083 which implies classroom management explains 8.3% of the variation in students‟ achievement. Whereas, the computed r- value of .216 between

student engagement and students mathematics achievement implies that there was a weak positive correlation between these variables and a p-value <0.05 suggests that there is a significant relationship between these variables. The coefficient of determination was found to be .047 which implies student engagement explains 4.7% of the variation in students‟ achievement. Teacher efficacy in general indicated a small positive correlation with students mathematics achievement with the computed r- value of .265 taking cognizance of Cohen (1992) classification of correlation coefficient; r = .10 to .29 were considered small, values between r = .30 and .49 were considered medium and values of r = .50 to 1.00 were considered large. The correlation coefficient (r=.265) was tested at 5% significant level, the result revealed that it was statistically significant since the p-values was less than the critical values of 0.05 at two-tailed. This implies that the null hypothesis which states that "there is no significant relationship between teacher‟s efficacy and student‟s mathematics achievement in Dadieso Senior High School" was rejected. To determine the amount of variation in student‟s mathematics achievement explained by teacher‟s efficacy, the coefficient of determination (R^2) was calculated as $(.265)^2$ and was .070. This implies teacher‟s efficacy explained 7% of the variation in students‟ achievement and that suggests that other factors were responsible for the remaining variance of 93%.

4.7 The difference in Students' Mathematics Achievement Score by Gender

To explore difference in students‟ mathematics achievement score by gender, independent sample t-test was computed on data collected. Independent sample t-test was the best since the procedure compares means for two groups of cases (Field, 2005). The assumptions; homogeneity of variance and normal distribution was tenable.

Table 4.8: The levene's test of variances homogeneity

	F	Sig
Equal variances assumed	.365	.547

Table 4.8 indicated the levene"s test of variances homogeneity. Levenes test tests the null hypothesis that the variances in the groups are equal thus the difference between the variances is zero (Field, 2005). The table gave the data about the students' math achievement based on gender with its p-value = .547 > .05. This means that there is no enough evidence to reject the null hypothesis hence the difference between the variance was zero- the variance are roughly equal and the assumption was tenable

Table 4.9: Tests of Normality

Kolmogorov-Smirnov	Gender	Sig
Achievement in mathematics	Male	.186
	Female	.200

Table 4.9 is the results of the normality test on achievement in mathematics using the Kolmogorov-Smirnov test to male students with p-value = .186 > .05, and female students also using Kolmogorov-Smirnov test with p-value = .200 > .05. These significant values in the column labelled Sig. in the table above are greater than .05 which indicated that the data was normally distributed. Preliminary analyses showed that the data meet the necessary assumption for Independent sample t-test. Therefore, Independent sample t-test was performed. Independent sample t-test was computed on the students score at 5% significant level, two tailed and the result is presented in Table 4.10

Table 4.10: Independent sample T-Test of male and female students' achievement in Mathematics

Gender	N	Mean	Std Deviation	t-value	df	p-value
Male	119	31.1429	11.11594			
				2.128	207	.035
Female	90	27.7778	11.58629			

** Significant at p=.05, 2-tailed

Table 4.10 shows independent sample t-test of male and female students" mathematics achievement. There were 119 males students and 90 females students. The result shows that male students had a mean score of 31.1429 and female students had a mean score of 27.7778 which indicated that male students performed better than female students in the mathematics achievement test. The result also shows that there was a lower variability in male student"s achievement (SD=11.11594) than the achievement of female students (SD=11.58629). Independent samples t-test at 5% significant level, two-tailed, the result revealed a statistical significant difference between the mean mathematics achievement of male and female students since the computed p-values was less than the critical values of .05 (t =2.128, p =.035). This suggested that the null hypothesis which states that "There is no significant difference between means achievement score of male and female students in Dadieso Senior High School" was rejected. This implies that there is significant difference between means achievement score of male and female students in Dadieso Senior High School. In addition, the researcher computed for the effect size. Cohen"s effect size "d" was calculated as the difference between the mean scores of boys and girls, divided by the standard deviation which resulted in 0.303. This indicated a medium effect size taking cognizance of Cohen (1992) effect size classification thus; < 0.2, 0.2 < d < 0.8 and d > 0.8 respectively indicated small, medium and large mean difference.

4.8 Discussion

This part of the study discusses the result of the study. The purpose of the study was to examine students‟ attitudes and mathematics teacher self- efficacy in teaching and their relationships on students‟ achievement. Also in this section, the findings are discussed in view of theoretical aspects, previous related studies and the research questions.

The first research question of the study required to establish the student‟s attitude towards learning mathematics. The students‟ attitude was measured with reference to students self-confidence in learning mathematics, the anxiety students had towards mathematics and the value of mathematics to students. As indicated in Table 4.1: majority of the students agreed to item measuring their confidence towards mathematics which includes; I get a great deal of satisfaction out of solving a mathematics problem, I am happier in mathematics class than any other class and I have usually been at ease during math test or course. These attitudes of students are a positive attitude which is a recipe for mathematics students to perform better. Most of the students responded to have self-confidence in learning mathematics. This is in line with other studies (Yee, 2010; Simegn & Asfaw, 2017; Duque Jr. & Tan, 2018) that revealed that students have confidence in learning mathematics. As to items relating to student anxiety to mathematics as indicated in Table 4.2, most students agreed that Mathematics is dull, boring and that they are always under a terrible strain in a mathematics class. The responses of students evidenced that most students are anxious of mathematics since students agree to the entire items measuring their anxiety towards mathematics. It is worrying in the sense that negative attitude of students towards mathematics creates avenues for poor performance of students in the subject. The result is supported by earlier research (Yee, 2010; Duque Jr. & Tan,

2018) that find out that students are anxious of mathematics. Students responded to four (4) items to measure the value of mathematics and result was presented in Table 4.3. Interestingly majority of students indicated that Mathematics is important in everyday life and that it helps develop the mind and teaches a person to think. Majority of the students felt that mathematics has great value to them which is evidenced in their responses to all the items measuring the value of mathematics. The value of mathematics to students motivates them to study the subject thereby performing better in the subject. This is in line with the work of Espinosa, Mercado and Mendoza (2012), Chávez, García and Kramer (2019) who found that despite negative emotions, students valued mathematics in their present lives and in future.

The study also revealed that students perform better in the mathematics achievement however there is the need for improvement in the performance of students. Table 4.5 indicated the relationships between students Attitudes in the three attitudinal variables (self-confidence, anxiety and value) and their Mathematics achievement. Pearson-product moment correlation was conducted between the variables and the result was presented in Table 4.5. Pearson- product moment correlation showed a significant positive correlation between students‟ mathematics achievement and the two attitudinal variables that is confidence and value but the result showed a large and medium correlation coefficient for confidence and value respectively. It implies that increasing the students‟ self-confidence could improve their achievement in mathematics. As to the value of mathematics, the result implies that if the respondents perceived a higher value for mathematics, the better they perform in the subject. There was also a negative significant correlation between anxiety and mathematic achievement. It implies that less anxiety towards mathematics could improve student‟s achievement in the subject. In general there was a positive

significant relationship between student‟s attitude and their mathematics achievement. This implies the higher the attitude is, the higher the performance in mathematics and the lower the attitude is, the poorer the performance in mathematics. Students‟ attitude accounted for 14.9% of the variation in mathematics achievement. This means that 85.1% of the variation in mathematics achievement is accounted for by other variable unexplained by the data. This finding supports the assertion of some researchers (Mensah, Okyere & Kuranchie, 2013; Bhowmik &Banerjee (Roy), 2016; Larbi, 2019) and other study findings in which students‟ attitude was found to contribute significantly to their mathematics achievement. Attitude therefore is a crucial component of students learning. It is a driving force behind the extent of students‟ engagement in learning.

Teacher responses to the Teacher self- Efficacy Scale indicated that teachers have high level of efficacy however there was the need to improve their efficacy in teaching mathematics. Pearson‟s product-moment correlation coefficient (r) was computed on teacher efficacy and students mathematics achievement. Table 4.7 indicated the result that there was a statistically significant relationship between teacher efficacy and students mathematics achievement. A small significant positive relationship between teacher efficacy and students mathematics achievement (r=. 265, $p<0.000$) was found and further, it was revealed that each domain of teacher efficacy (Instructional Strategies, Classroom Management and Student Engagement) were significantly and positively related to student mathematics achievement. Thereby, it is confirmed that either form of teacher efficacy increases students mathematics achievement. Again, it can be inferred that the higher the level of teacher self-efficacy, the higher the students achievement and the lower the level of teacher self-efficacy, the lower the students achievement. The results of this study support the

findings of the previous researches suggesting a significant correlation between teacher efficacy and students mathematics achievement (Khan, 2011; Shaukat &Iqbal, 2012; Shahzad & Naureen, 2017; Ampofo, 2019).

The fourth objective of this study was to explore gender differences in students‟ mathematics achievement in Dadieso Senior High School. Independent samples t-test was conducted on students achievement in mathematics. The result revealed in Table 4.10 that there was a significant mean difference between male and female regarding their mathematics achievement favouring male. Cohen‟s effect size “d” was medium. This finding supports the assertion of some researchers (Asante, 2010; Kyei, Apam & Nokoe; 2011; Bhowmik &Banerjee (2016) and other study findings which found gender difference in students mathematics achievement. The findings on the other hand opposes the works of Enu, Agyeman and Nkum (2015), Ajisuksmo and Saputri (2017) and that of Larbi (2019) which found no significant difference in students mathematics achievement based on gender. This difference might be a reflection of the stereotype that males are better than female in mathematics.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.0 Overview

This chapter presents a summary of the findings, draws conclusions and makes recommendations and suggestions for further research.

5.1 Summary of Findings

The study was designed to explore students‟ attitude and mathematics teachers‟ self-efficacy in teaching and their relationships on students‟ achievement in Dadieso SHS. The study was guided by four main research questions; what are students‟ attitudes towards learning mathematics in Dadieso Senoir High School? What is the relationship between student‟s attitude towards learning mathematics and their achievement in mathematics in Dadieso Senoir High School? What is the relationship between teacher‟s self- efficacy in teaching mathematics and student‟s achievement in mathematics in Dadieso Senoir High School? What is the difference in students‟ mathematics achievement score by gender in Dadieso Senoir High School? Attitude towards Mathematics Inventory (ATMI) and Mathematics Achievement Test (MAT) were administered to two hundred and eighteen (218) students and seven (7) mathematics teachers responded to Teacher Self- Efficacy Scale (TSES) questionnaire for data collection. Frequencies, percentages, Pearson product moment correlation and independent sample t– test were computed on these data and the following were the findings;

1. The study shows that most of the students agreed to have confidence towards learning mathematics, anxious of mathematics and felt mathematics had a great value to them.

2. Pearson‟s product-moment correlation indicated a significant positive correlation between the two attitudinal variables (confidence, value) and mathematics achievement. There was also a significant negative correlation between anxiety and mathematics achievement. In general there was a significant positive correlation between students‟ attitude and their mathematics achievement. Attitude explained 14.9% of the variation in students‟ mathematics achievement as indicated by the coefficient of determination (R^2).
3. The study also brought to light the relationship between teachers self-efficacy and students mathematics achievement. It was observed that there were significant positive relationships between all teacher efficacy domains (instructional strategies, classroom management, and student engagement) and students‟ mathematics achievement. A significant positive correlation between teacher self-efficacy and students mathematics achievement was established.
4. Again students‟ achievement in mathematics was analyzed to find the significant difference among boys and girls. Independence sample t- test indicated that there was a significance difference among boys and girls with boys performing better that girls, however, the effect size was medium.

5.2 Conclusions

Student‟s attitude towards mathematics, teachers‟ self-efficacy and students‟ mathematics achievements are closely related variables that play important role in the learning of the subject. Favourable students‟ attitude and high teacher efficacy are necessary condition for good performance of students in mathematics. From the findings of this study the researcher arrived at the following conclusions:

1. Students had positive attitude towards the learning of mathematics in terms of the value of mathematics and students confidence towards learning mathematics. Students are also anxious towards mathematics learning.
2. Mathematics achievement, teacher‟s efficacy and students‟ attitudes are closely related variables that play important role in students learning of mathematics.
3. There was a significant positive correlation between students‟ attitude and their mathematics achievement.
4. There was a significant positive correlation between teachers self-efficacy and students mathematics achievement.
5. There was a significance difference in mathematics achievement among boys and girls with boys performing better than girls.

5.3 Recommendations

The study examined students‟ attitudes and mathematics teacher self- efficacy in teaching and their relationships on students‟ achievement in Dadieso Senior High School. Attitude towards Mathematics Inventory was used to collect data on students‟ attitude whereas data on their achievement was obtained through an Achievement Test. Teacher self- Efficacy Scale was used to collect data teacher‟s efficacy in teaching mathematics. Frequencies, percentages, Pearson‟s product-moment correlation and independent samples t- test were used for data analyses. The study

revealed that most respondents had positive attitude towards mathematics in terms of its value and their confidence but also indicated anxiety towards learning mathematics. A significant positive medium correlation between students‟ attitude and their mathematics achievement was established ($r = .386$, $p < .05$). The study also revealed significant small positive relationship between teacher self-efficacy and students mathematics achievement ($r = .216$, $p < .05$). Significant gender differences were specified on mathematics achievement with male students performed better than female students. Based on the findings established above, the following recommendations were made:

1. Positive attitudes towards mathematics are necessary ingredients in Senior High School mathematics education. There is the need for teachers to enhance these positive attitudes in students.
2. Workshops/seminars/conferences/ in-service training in mathematics teaching and learning should be held to share highly expert math teachers‟ knowledge and skills in the area of mathematics. It may strengthen mathematics teachers‟ efficacy beliefs.
3. Teachers with the requisite qualification should be assigned to handle the subject.

5.4 Suggestions for Further Research

Based on the findings and the scope of this study, the researcher recommends further studies to be carried out in the following areas:

1. Similar studies should be carried out in more schools in the country to gather adequate information on the subject to be able to generalize thus; there should be a relatively increased in the sample size for similar study.

2. Student‟s attitudes were of key interest in the study. However, factors that influence the attitude of students was not investigated. Based on this, the researcher recommends research on the factors that influence the attitude of students.
3. A research study to be carried out to determine teacher personality factors like attitude and how it affects students‟ performance.

REFERENCES

Abdu-Raheem B. O. (2012). The influence of gender on secondary school students‟ academic performance in south-west, *Nigeria. J Soc Sci, 31*(1), 93-98.

Ahmad, R., Khan, S. & Rehman, S. (2015). Comparative study to investigate the sense of teacher efficacy between male and female teachers. *Asian Journal of Management Sciences and Education*, *4*(2), 29-35.

Ajisuksmo, C. R. P., & Saputri, G. R. (2017). The influence of attitudes towards mathematics, and metacognitive awareness on mathematics achievements. *Creative Education, 8,* 486-497. https://doi.org/10.4236/ce.2017.83037.

Alrefaei, N. A. (2015). *Teachers' sense of efficacy: Examining the relationship of teacher efficacy and student achievement*. Theses and Dissertations. http://scholarworks.uark.edu/etd/1192.

Ampofo, C. B. (2019). Relationship between pre-service teachers‟ mathematics self-efficacy and their mathematics achievement. *African Journal of Educational Studies in Mathematics and Sciences, 15*, 23-36. DOI: https://dx.doi.org/10.4314/ajesms.v15i1.3.

Ampofo, E. T. & Osei-Owusu, B. (2015). Determinants of academic performance among senior high school (shs) students in the Ashanti Mampong municipality of Ghana. *European Journal of Research and Reflection in Educational Sciences, 3*(3), 33- 48.

Amponsah, M. O., Milledzi, E. Y., Ampofo E. T. & Gyambrah, M. (2018). Relationship between parental involvement and academic performance of senior high school students: The Case of Ashanti Mampong Municipality of Ghana. *American Journal of Educational Research, 6*(1), 1-8. DOI: 10.12691/education-6-1-1.

Andamon J. C. & Tan D. A. (2018). Conceptual understanding, attitude and performance in mathematics of grade 7 students. *International Journal of Scientific & Technology Research, 7*(8), 96- 105.

Asante, K. O. (2010). Sex differences in mathematics performance among senior high school students in Ghana. *Gender & Behaviour*; *8* (2), 3279-3289.

Bandura, A. (1977). *Social learning theory*. Englewood Cliffs, NJ: Prentice-Hall.

Bawuah, B., Yakubu, A.S. & Seyram, P.K. (2014). What perceived practices of teachers contribute to students‟ mathematics learning and achievement at the SHS level? A case study in the Central region of Ghana. *Journal of Education and Practice, 5*(8), 139 – 148.

Bhowmik, M. & Banerjee (Roy), B. (2016). A study on relationship between achievement in mathematics and attitude towards mathematics of secondary school students". *IRA International Journal of Education and Multidisciplinary Studies, 4*(3), 402-408. doi:http://dx.doi.org/ 10.21013/ jems. v4.n3.p7.

Capuno R., Necesario R., Etcuban J. O., Espina R., Padillo G. & Manguilimotan R. (2019). Attitudes, study habits, and academic performance of junior high school students in mathematics. *International Electronic Journal of Mathematics Education, 14*(3), 547-561. https://doi.org/10.29333/iejme/5768.

Chang, Y. L. (2015). Examining relationships among elementary mathematics teachers' efficacy and their students' mathematics self-efficacy and achievement. *Eurasia Journal of Mathematics, Science & Technology Education*, *11*(6), 1307-1320. doi: 10.12973/eurasia.2015.1387a.

Chapman, O. (2015). Reflective awareness in mathematics teachers" learning and teaching. *Eurasia Journal of Mathematics, Science & Technology Education, 11*(2), 313-324.

Chávez, M. E. E., García, E. M. & Kramer C. A. R. (2019). Confirmatory model to measure attitude towards mathematics in higher education students: Study case in SLP Mexico. *International Electronic Journal of Mathematics Education, 14*(1), 163-168. https://doi.org/10.29333/iejme/3984.

Choudhury, R., & Das, D. (2012). Influence of attitude towards mathematics and study habit on the achievement in mathematics at the secondary stage. *International Journal of Engineering Research and Applications (IJERA), 2*(6), 192-196.

Cohen, J. (1992). A power primer. *Psychological Bulletin*, *112*(1), 155-159.

Creswell, J. W. (2009). *Research design: Qualitative, quantitative and mixed approaches* (3rd Ed.). London: Sage Publication.

Duque Jr, C. A., & Tan, D. A. (2018). Students „mathematics attitudes and metacognitive processes in mathematical problem solving. *European Journal of Education Studies, 4* (11), doi: 10.5281/zenodo.1318320.

Enu, J., Agyeman, O. K & Nkum D. (2015). Factors influencing students" mathematics performance in some selected colleges of education in Ghana. *International Journal of Education Learning and Development, 3*(3), 68-74.

Espinosa, E.O.C., Mercado, M.T.C., & Mendoza, J.R.R. (2012). Attitudes towards the mathematics of graduate students in administration: a diagnostic study. *REXE Journal of Studies and Experiences in Education, 11* (22), 81-98.

Field, A. (2005). *Discovering statistics using IBM SPSS statistics*. sage.

Gichuru, L. M. & Ongus, R. W. (2016). Effect of teacher quality on student performance in mathematics in primary 6 national examination: a survey of private primary schools in Gasabo District, Kigali City, Rwanda. *International Journal of Education and Research, 4* (2), 237- 260.

Gonzalez, K. & Maxwell, G. M. (2018). Mathematics teachers' efficacy, experience, certification and their impact on student achievement. *Journal of Instructional Pedagogies*, *21*.

Gulistan, M., & Hussain, A. (2017). Relationship between mathematics teachers' self-efficacy and students' academic achievement at secondary level. *Bulletin of Education and Research, 39*(3), 171-182.

Johnson, R. B. & Christensen, L. B. (2012). Education research: Quantitative, qualitative and mixed approaches (5th ed.). Boston, MA: Ally and Bacon.

Karjanto, N. (2017). Attitude toward mathematics among the students at Nazarbayev University Foundation Year Programme. *International Journal of Mathematical Education in Science and Technology, 48*(6), 849-863. https://doi.org/10.1080/0020739X.2017.1285060.

Khan, A. S. (2011). Teacher efficacy-a tool to enhance academic achievement of secondary schools. *Language in India, 11*(6), 235-247

Kimberlin, C. L. & Winterstein, A. G. (2008). Validity and reliability of measurement instruments used in research. *American Journal of Health-System Pharmacy*, *65*(23), 2276-2284.

Klassen, R., Tze, V., Betts, S., & Gordon, K. (2011). Teacher efficacy research 1998–2009: Signs of progress or unfulfilled promise? *Educational Psychology Review, 23*(1), 21–43.

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

Kyei, L., Apam, B. & Nokoe K. S. (2011). Some gender differences in performance in senior high mathematics examinations in mixed high schools. *American Journal of Social and Management Sciences, 2*(4), doi:10.5251/ajsms. 2011.2.4.348.355.

Larbi E. (2019). An investigation into undergraduate students‟ attitude towards statistics: A case of a university in Ghana. *Integrity Journal of Education and Training, 3*(1), 14-21. https://doi.org/10.31248/IJET2019.033.

Larbi, E., & Okyere, M. (2014). Algebra tiles manipulative and gender differences in learning and achievement in mathematics: A case of Sunyani west municipality. *Journal of Education and Practice, 5*(38), 1-7.

Mazana, Y. M., Montero, C S., & Casmir R. O. (2019). Investigating Students' Attitude towards Learning Mathematics. *International Electronic Journal of Mathematics Education, 14*(1) 207-231. http://dx.doi.org/10.29333/iejme/3997

McMillan, J. & Schumacher, S. (2014). *Research in education* (7th ed.). Harlow: Pearson Education Limited.

Mensah, J. K., Okyere, M. & Kuranchie, A. (2013). Student attitude towards mathematics and performance: Does the teacher attitude matter? *Journal of Education and Practice, 4*(3), 132-139.

Mohamed, L. & Waheed, H. (2011). Secondary students‟ attitude towards mathematics in a selected school of Maldives. *International Journal of Humanities and Social Science, 1* (15), 277- 281.

Paulpandi, B. & Govindharaj, P (2017). Academic achievement in mathematics subject among secondary school students in Madurai, Tamil Nadu. *International Journal of Indian Psychology*.

Recber S., Isiksal M. & Koç Y (2018). Investigating self-efficacy, anxiety, attitudes and mathematics achievement regarding gender and school type. *Anales De Psicología, 34*(1), 41-51. http://dx.doi.org/10.6018/analesps.34.1.229571

Scherer, R., Jansen, M., Nilsen, T., Areepattamannil, S., & Marsh, H. W. (2016). The quest for comparability: Studying the invariance of the teachers‟ sense of self-efficacy (TSES) measure across countries. *PLOS One, 11*(3), 1–29.

Shahzad K. & Naureen, S. (2017). Impact of teacher self-efficacy on secondary school students‟ academic achievement. *Journal of Education and Educational Development, 4*(1), 48- 72.

Shaukat, S., & Iqbal, H. M. (2012). Teacher self-efficacy as a function of student engagement, instructional strategies and classroom management. *Pakistan Journal of Social & Clinical Psychology, 9*(3), 82-85.

Simegn, E. M., Asfaw Z.G. (2017). Assessing the influence of attitude towards mathematics on achievement of grade 10 and 12 female students in comparison with their male counterparts: Wolkite, Ethiopia. *International Journal of Secondary Education. 5*(5), 56-69. doi: 10.11648/ j.ijsedu. 20170505.11.

Tai, D. W. S., Hu, Y. C., Wang, R., & Chen, J. L. (2012). What is the impact of teacher self-efficacy on the student learning outcome. *Networking in Engineering and Technology Education*, 77.

Tapia, M. & Marsh, G. E. II (2004). An instrument to measure mathematics attitudes. *Academic Exchange Quarterly, 8,* 16-21.

Tschannen-Moran, M. & Hoy, W. A. (2001). Teacher efficacy: Capturing and elusive construct. *Teaching and Teacher Education, 17*, 783-805.

Wyatt, M. (2014). Towards a re-conceptualization of teachers‟ self-efficacy beliefs: Tackling enduring problems with the quantitative research and moving on. *International Journal of Research and Method in Education, 37*(2), 166–189

Yamane, T. (1967). *Statistics, an introductory analysis* (2nd ed). New York: Harper and Row.

Yasar, M. (2016). High school students' attitudes towards mathematics. *Eurasia Journal of Mathematics, Science & Technology Education*, *12*(4), 931-945. doi: 10.12973/eurasia.2016.1571a

Yee, L. S. (2010). Mathematics Attitudes and Achievement of Junior College Students in Singapore. *Mathematics Education Research Group of Australasia, 30*(1), 239-245.

Zee, M. & Koomen, H. (2016). Teacher self-efficacy and its effects on classroom processes, student academic adjustment, and teacher well-being: A synthesis of 40 years of research. *Review of Educational Research, 86*, 981–1015

APPENDICES

APPENDIX A

STUDENTS PERFORMANCE IN WASSCE

Year	A1-C6	D7-F9
2015	43.38%	56.62%
2016	39.22%	60.78%
2017	43.83%	56.17%
2018	51.8%	48.2%

APPENDIX B

SAMPLE DETERMINATION FORMULA

University of Education, Winneba

Department of Mathematics Education

Formula Used to Determine Sample Size.

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

$n=\frac{479}{1+479(0.05)2}$

n=218

Where n……sample size

N……accessible population

e…….the desired level or precision is 0.05

According to Yamane (1967), the portion allocation formula to determine sample size for each item is given by:

Sample for male students = $n\ (\frac{N_m}{N})$

Sample for male = $218(\frac{270}{479})$

Sample for male=123

Where N_m……total number of male students.

Sample of female students =$n\ (\frac{N_f}{N})$

Sample of female students=$218(\frac{209}{479})$

Sample of female students=95

Where N_f……..total number of female students.

APPENDIX C

ATTITUDES TOWARD MATHEMATICS INVENTORY

UNIVERSITY OF EDUCATION, WINNEBA

DEPARTMENT OF MATHEMATICS EDUCATION

ATTITUDES TOWARD MATHEMATICS INVENTORY

This questionnaire is designed to help the researcher to find out Student‟s attitude towards learning mathematics in Dadieso SHS. Please respond to the items below as honestly as is possible. This study is purely for academic purposes and all information given shall be treated confidentially.

SECTION A: General information about the student.

Instruction: Please read the questions below and kindly give the appropriate response by either ticking in the bracket [√] or by giving further information in the spaces provided.

1. Gender Male [ ] Female [ ]

2. Age 10-14 [ ] 15- 19 [ ] 20-24 [ ] 25-29 [ ] other specify……..……

3. Class/ form .....

SECTION B: Students attitude toward mathematics.

Directions: This inventory consists of statements about your attitude toward mathematics. There are no correct or incorrect responses. Please read the statements below and kindly give the appropriate response by either ticking [√] or by giving further information in the spaces provided.

PLEASE USE THESE RESPONSE CODES: **SA** – Strongly Agree, **A** – Agree, **D**-Disagree and **SD**- Strongly Disagree

Item number	ITEM	**SA**	**A**	**D**	**SD**
	CONFIDENCE				
4	I get a great deal of satisfaction out of solving a mathematics problem				
5	I am happier in mathematics class than any other class				
6	I am able to solve mathematics problem without too much difficulty				
7	I like to solve new problems in mathematics.				
8	I plan to take as much mathematics as i can during my education				
9	I am comfortable expressing my own ideas on how to look for solutions to a difficult problem in mathematics				
10	It would not bother me at all to take more math course.				
11	I have usually been at ease during math test or course.				
12	I learn mathematics easily				
13	I have a lot of self-confidence when it comes to mathematics.				
	ANXIETY				
14	Mathematics is dull and boring.				
15	I am always under a terrible strain in a mathematics class.				
16	I am always confused in my mathematics class.				
17	Mathematics makes me feel uneasy and uncomfortable.				
18	I get a sinking feeling when I think of trying hard				

	maths problem.				
19	My mind goes blank and I am unable to think clearly when working mathematics.				
	VALUE				
20	Mathematics is important in everyday life.				
21	mathematics helps develop the mind and teaches a person to think				
22	mathematics is one of the most important subjects for people to study				
23	Mathematics is a very worthwhile and necessary subject.				

24. According to your own opinion, do you think anything can be done to enhance your performance in the subject Yes/No (tick one)

(25) If yes (in 24 above), suggest at least two ways that you think can make you like the subject and do well in it?

……

……

(26) If no (in 24 above), give reasons why you think you cannot improve in the subject.

……

APPENDIX D

TEACHER SELF- EFFICACY SCALE

UNIVERSITY OF EDUCATION, WINNEBA

DEPARTMENT OF MATHEMATICS EDUCATION

Teacher‟s Sense of Efficacy Scale.

This questionnaire is designed to help the researcher to find out the mathematics teacher‟s self-efficacy in teaching in Dadieso SHS. Please respond to the items below as honestly as is possible. This study is purely for academic purposes and all information given shall be treated confidentially.

SECTION A: Personal background information.

Instruction: Please read the questions below and kindly give the appropriate response by either ticking in the bracket [√] or by giving further information in the spaces provided.

1. Gender Male[ ] Female [ ]

2. Age 20-24 [ ] 25-29 [ ] 30-34 [ ] 35- 39 [ ] 40-44 [ ]

   45-49 [ ] 50-54 [ ] other specify……

3. Academic Qualification of the Teachers

   Diploma/Certificate [ ]

   Bachelors [ ]

   Masters [ ]

4. Class/ form ……..

Section B: Mathematics teacher self-efficacy in teaching.

Directions: Please indicate your opinion about each of the questions below by either ticking [√] or by giving further information in the spaces provided. Use the following response scale to respond to each item: Great Deal (GD), Quite a Bit (QB), Very Little (VL), Nothing (N),

S/N	ITEM	GD	QB	VL	N
	Instructional Strategies.				
5	To what extent can you use a variety of assessment strategies?				
6	To what extent can you provide an alternative explanation or example when students are confused?				
7	To what extent can you craft good questions for your students?				
8	How well can you implement alternative strategies in your classroom?				
	Classroom Management.				
9	How much can you do to control disruptive behaviour in the classroom?				
10	How much can you do to get children to follow classroom rules?				
11	How much can you do to calm a student who is disruptive or noisy?				

12	How well can you establish a classroom management system with each group of students?				
	Student Engagement.				
13	How much can you do to get students to believe they can do well in schoolwork?				
14	How much can you do to help your students value learning				
15	How much can you do to motivate students who show low interest in schoolwork?				
16	How much can you assist families in helping their children do well in school				

17. What according to you can be done to improve the mathematics teacher self - efficacy in teaching?

.....

APPENDIX E

MATHEMATICS ACHIEVEMENT TEST

Mathematics achievement test

Dadieso Senior High School

Time allowed: 30 minutes

Direction: Attempt the following questions properly and choice the correct answer from the given alternative.

1 Evaluate $11011_2 - 101_2$

A. 10010_2

B. 10100_2

C. 10110_2

D. 10101_2

2 Simplify $\frac{\sqrt{6}+1}{\sqrt{6}}$.

A. $1 + \frac{\sqrt{6}}{6}$

B. $1 + \frac{\sqrt{6}}{3}$

C. $6 + \frac{\sqrt{6}}{6}$

D. $6 + 2\sqrt{2}$

Use the information below to answer Question 3 and 4

The set $A = \{x: 1 \leq x \leq 3\}$ and $B = \{x: x = 1,10\}$ are the subsets of $\xi = \{x: 1 \leq x \leq 10\}$, where x is an integer.

3 Find B', the complement of B.

A. $\{x: 1 < x < 10\}$

B. $\{x: 1 \leq x < 10\}$

C. $\{x: 1 < x \leq 10\}$

D. $\{x: 2 < x < 9\}$

4 Find$A \cap B$.

A. $\{1, 2, 10\}$

B. $\{1, 10\}$

C. $\{1, 2\}$

D. $\{1\}$

5 Write 37_{ten} as a number in base five

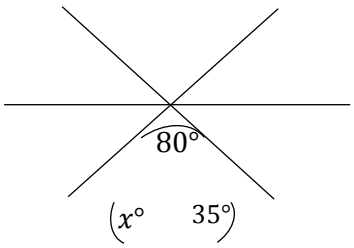
A. 22_{five}

B. 212_{five}

C. 122_{five}

D. 111_{five}

6



Find the value of x in the diagram above.

A. 35°

B. 65°

C. 80°

D. 115°

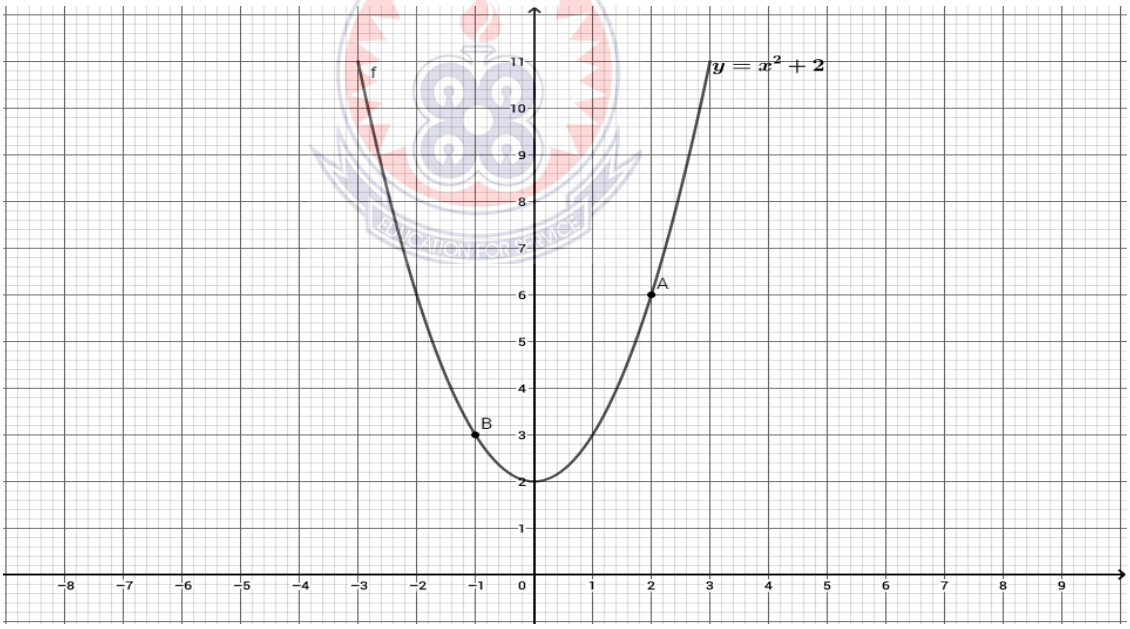
7 A function g is defined by g:$\rightarrow\frac{2x-1}{x}$, find the value of x that makes the function undefined?

A. 1

B. $\frac{1}{2}$

C. 0

D. $\frac{-1}{2}$



The diagram above is the graph of quadratic function.

Use the information to answer Questions 8 to 9.

8 What is the equation of line of symmetry of the curve?

A. $x - 2 = 0$

B. $x + 2 = 0$

C. $x^2 - 2 = 0$

D. $x = 0$

9 What is the minimum point of the graph?

A. $(0, 2)$

B. $(2, 0)$

C. $(2, 2)$

D. $(2, 1)$

10 Find the truth set of the inequality $2t + 5 < 4t - 5$

A. {t:t>0}

B. { t:t>1}

C. $\{t: t < 5\}$

D. $\{t: > 5t\ \}$

11 If P={2,4,6,8,10}, which of the following adequately define P

A. The set of even numbers

B. The set of even numbers less than 12

C. *the set* of all positive integers divisible by 12

D. The set of all positive integers less than 12

Use the table below to answer question 12 and 14.

Age	16	17	18	19	20
N of students	2	8	4	4	2

12 Calculate the mean age of the students

A. 15.3 *years*

B. 16.8 *years*

C. 17.0 *years*

D. 17.8 *years*

13 What is the model age

A. $20\ years$

B. $18\ years$

C. $17\ years$

D. $16\ years$

14 If a students is selected at random , find the probability that he is at least 18 years old

A. $\frac{7}{10}$

B. $\frac{1}{2}$

C. $\frac{3}{10}$

D. $\frac{1}{5}$

15 The fourth term of an arithmetic progression (A.P) is 37 and the first term is -20. Find the common difference.

A. 17

B. 19

C. 57

D. 63

16 If $x - y = 1$ and $5x - 2y = -1$, find the value of $x + y$

A. 2

B. 1

C. 0

D. -3

17 Simplify $(\sqrt{3}.-1)(1+\sqrt{3})$

A. $1+2\sqrt{3}$

B. $\sqrt{3}$

C. 2

D. 3

18 What is the gradient of the line joining the points P(5,6) and Q(6,4)

A. 2

B. $\frac{1}{2}$

C. $\frac{-1}{2}$

D. -2

19 If $t=p^2-3q$, calculate the value of t when p=4 and q=9

A. -11

B. -43

C. 11

D. 43

20 Arrange 132_{four},44_{seven} and 31 in ascending order of magnitude

A. 132_{four}, $44_{seven,}$ 31

B. 44_{seven}, 31, 132_{four}

C. 31, 44_{seven}, , 132_{four}

D. $132_{four,}$31, 44_{seven}

21 The sum of the interior angle of an n- sided polygon is 3420^0, find the value of n.

A. 10

B. 17

C. 19

D. 21

22 If $x = \frac{mn}{3}$ and $m = \frac{v}{y}$, express x in terms of v, y and n.

A. $x = \frac{3vy}{n}$

B. $x = \frac{vy}{3n}$

C. $x = \frac{vyn}{3}$

D. $x = \frac{vn}{3y}$

23 Calculate the distance between the point $(3, -2)$ and $(8, 10)$

A. 12 units

B. 13 units

C. 14 units

D. 15 units

24 Which of the following is a line parallel to 5x-2y=0

A. 2y= -5

B. 2x+5y= -4

C. -5x-2y=1

D. -5x+2y=6

25 The foot of a ladder is $6m$ from the base of an electric pole at a point $8m$ the ground. How long is the ladder?

A. $7m$

B. $10m$

C. $12m$

D. $14m$

APPENDIX F

INTRODUCTORY LETTER

UNIVERSITY OF EDUCATION, WINNEBA
FACULTY OF SCIENCE EDUCATION
DEPARTMENT OF MATHEMATICS EDUCATION
P.O. Box 25, Winneba, Ghana
maths@uew.edu.gh
+233 (0)20) 2041076

23 June, 2020

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

LETTER OF INTRODUCTION: JOSEPH ANDOH FORDJOUR (8180110001)

I write to introduce to you the bearer of this letter, Joseph Andor Fordjour a postgraduate student in the University of Education, Winneba. He is reading for a Master of Philosophy degree in Mathematics Education and as part of the requirements of the programme, he is undertaking a research titled – ***Students attitude and Mathematics teachers self-efficacy in teaching and its relationship to students Mathematics achievement in Dadieso SHS.***

He needs to gather information to be analysed for the said research and he has chosen to do so in your institution. I would be grateful if he is given the needed assistance to carry out this exercise.

Thank you.

Yours faithfully,

UNIVERSITY OF EDUCATION, WINNEBA
SIGN
DATE
DEPARTMENT OF MATHEMATICS EDUCATION

Prof. Michael J. Nabie
Head of Department

APPENDIX G

RESEARCH PERMIT

DADIESO SENIOR HIGH SCHOOL

Banker: G.C.B. Dadieso Branch

P. O. Box 19
Suaman-Dadieso
Email: dadiesoshs@yahoo.com
Digital Address: WU-0040-6649

Our Ref: DSHS/AL/JAF/ VOL....1/2

Your Ref: .....

16th October,2020.

RE: LETTER OF INTRODUCTION TO CONDUCT RESEARCH

JOSEPH ANDOH FORDJOUR

INDEX NUMBER:8180110001

In response to your letter dated 23rd June,2020 seeking for permission to conduct research in the school, has been granted. I am optimistic that the school would assist you to get the necessary information needed for your research work.

Kindly ensure to comply with the rules and regulations governing the school during your academic research exercise.

I wish you well in your field of study.

Thank you.

SETH BOTWEY

(ASSISTANT HEADMASTER ACADEMICS)

ASSIST. HEADMASTER
DADIESO SNR. HIGH SCH.
P. O. BOX 19
DADIESO, SUAMAN

JOSEPH ANDOH FORDJOUR

POST OFFICE BOX 19

SUAMAN-DADIESO