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ANALYSIS OF JHS STUDENTS' ATTITUDES TOWARD MATHEMATICS AND ITS EFFECT ON THE ACADEMIC ACHIEVEMENT: THE CASE OF ASUNAFO SOUTH DISTRICT

BY

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DECLARATION

I hereby declare that, this study is my original work and that references to other people's work have been duly acknowledged. It has never been presented either in part or completely for another degree in this Institution or elsewhere.

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Date…….....

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Dr. Paul Butakor (Co- Supervisor)

Date……

DEDICATION

This work is dedicated to my four boys Ohene, Paa-Kwasi, Osofo and Maseda. It is also dedicated to Oforiwaah, my lovely girl at Agona SDA SHS.

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My sincere gratitude and thanks go to the Almighty God for His protection, mercies and love shown me all this while.

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ABSTRACT

The aim of the study was to assess the attitude of Junior High School students with regard to mathematics and its impact on their academic performance, a case of Asunafo South District. Thus, the study examined the relationship between attitude of students towards mathematics and their achievement in mathematics. The study investigated whether or not there is a connection between attitudes and learning experiences of JHS students in mathematics. Finally, it also examined differences between the gender and its impact on students' mathematical performance.

The study consisted of 360 students from 24 Junior High Schools in the Asunafo South District using the triangulation mixed method approach. The quantitative data from semi-structured questionnaires and their individual test scores were analyzed using descriptive and inferential statistics while the qualitative data from the interviews conducted were analyzed thematically.

The results of the study showed that students have a positive attitude towards mathematics learning in the selected schools and that reflected in a strong positive correlation between attitude and mathematics performance in their field of study. The study demonstrated also that the students' environment, in respect to the attitudes of mathematics teachers and their colleagues, has a greater impact on their math scores. The results again showed that there is no gender difference in respect to the study of mathematics and that both boys and girls performed same mathematically.

The study recommends the development of positive attitude of students through motivational packages for performance and establishment of mathematical centres.

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LIST OF ABBREVIATIONS

JHS	-	Junior High School
CRDD	-	Curriculum Research and Development Division
BECE	-	Basic Education Certificate Examination
WAEC	-	West African Examination Council
TIMSS	-	Trends in International Mathematics and Science Studies
ATMI	-	Attitude towards Mathematics Inventory
PBL	-	Problem-based Learning
GES	-	Ghana Education Service
SPSS	-	Statistical Package for Social Sciences

CHAPTER ONE

INTRODUCTION

1.1 Personal Reflections

My experience as a mathematics teacher at Junior High School over the last decade has been interesting, educative, motivating and acquisition of experiences. Why do I say this? Many at times I have listened to statements like these from my students: “as for mathematics it is difficult “o”, Sir as for me, I don’t like mathematics at all, please, I don’t want to do Science at the SHS, yes because of the mathematics associated with science”, their response any time I have asked from them. Those and similar comments from my students have continued to be a worrying situation for me and therefore I keep asking myself why students would have such attitudes toward the subject I have liked all my school years, enjoyed so well and have become habituated.

As I listen to those comments from students, the zeal developed in me to research into the reasons that have necessitated such comments, thus the topic “analysis of junior high school (JHS) students’ attitudes toward mathematics and its effect on their academic achievement: the case of Asunafo south district.”

1.2 Background to the Study

Mathematics has mastered virtually every area of human activity, especially in the era of science and technology. Mathematics is therefore a key element of the curriculum (Mahanta and Islam, 2012). Mathematics to the best of Morali, Köroğlu and Çelik (2004) is a thought, a way of life and, in fact, a globally accepted language that is considered as essential in the rapidly changing world, and is a key area for individuals, society,

technological advancement and scientific research community. To this end, Keith (2000) firmly stated that mathematics is considered a critical issue both by itself and through its important relationships with various fields, such as social science, natural science, medicine, engineering among others. Reasoning along with the same pattern, Usman (2002) considers that mathematics is a problem that permeates all aspects of human endeavor and is considered as the lifeline of several disciplines. Anthony and Walshaw (2009) contribute to the discourse by viewing mathematics as a key international curriculum subject that makes a critical input to all aspects of life in the private, social and urban spheres. That is, almost all subjects/areas of study/ life centres on mathematics education. Mathematics is, therefore, a global subject of study, and as such play, a critical role in all countries school curricular, especially the beginning stages.

Mathematics education in Ghana like in many other developing countries was keen even in the colonial era, a time when religious education was most considered in schools. Annabelle-Addo (1980) as cited in Serebour (2013) expounds on colonial era history to mathematics education, where arithmetic was taught as part of the curriculum to improve commercial activities. It is therefore not surprising that in Ghana mathematics is considered a core subject in the basic school (primary and junior high school) and secondary school curricular and an integral part of the school placement system in Ghana. A student must have a pass in mathematics, which is a core subject for entry into Senior High Schools in Ghana. Consequently, a Ghanaian student is required to pass three core subjects before he/she gains admission to Colleges or any Tertiary institutions.

It also fits why, as clearly stated in the Junior High School syllabus in Ghana, mathematics education is deemed an essential area of learning and that everyone needs to

develop mathematical concepts and skills to understand and play its role in society (CRDD, 2012). Moreover, Serebour (2013) explains that the real reason for teaching mathematics is to ensure that all Ghanaian youth acquire the skills, ideas, attitudes and mathematical values they need to succeed in their careers and their daily lives. However, mathematics performance (achievement) has become a serious threat to the educational progress and advancement of students in Ghana.

The poor performance of mathematics students has been fundamental for Ghana and the world at large, as evidenced by national and international reports. For example, the performance of BECE students over the last 18 years has been very worrying. The West African Examination Council (WAEC) reports suggesting that over 50 percent of the entire students who sat for the examination failed in mathematics and decline to about a 40-percentage point in 2000 to 2005 and 2006 to 2010 respectively. The poor performance is again evident in the school placement statistics. In 2008, for instance, out of the 338,292 candidates who took part in the BECE, only 210,282 representing 62.16 percent qualified and placed into second cycle institutions. In the following year, 395,649 students sat for the exams and only 198,642 of them accounting for 50.21 percent passed and ended up second cycle institutions. Ghana has continued to witness poor performance of BECE candidates in percentage wise thus 49.12 percent and 46.93 percent in 2010 and 2011 respectively (Okyere-Darko, 2011).

Subsequently, the Trends in International Mathematics and Science Studies (TIMSS) report of 2003 was analyzed by Anamoah-Mensah and Mereku (2005) established that Ghana, performed poorly in Mathematics at grade 8 i.e. Junior High School,form two (2). In furtherance, Anamua-Mensah, Mereku and Asabere-Ameyaw

(2005) in their TIMSS analysis, assessed a very low performance on the part of Ghanaian pupils with a low mean score of 276 as against the international average mean score of 467. Out of the 46 countries that partook in the 2003 TIMSS test, Ghana was ranked 45th. Similar performance was recorded in 2007 and 2011. The scale scores of 130 and 430 in 2007 were far below the average score of 500 and 800 (Anamuah-Mensah, Mereku and Ghartey-Ampiah, 2008). The performance of students in Mathematics is generally assessed to be poor and therefore the suggestion to help students know or understand the relevance of mathematics in the country's educational progression to drive change in pupil's attitude (Chief Examiner's Report, 2011).

The above chief examiners' statement resonates with the proposition that the learning of mathematics is not limited only to thinking and reasoning, but it also involves the learner's attitudes towards learning of the subject (Anthony and Walshaw, 2007; Grootenboer, Lomas, and Ingram, 2008; Kele and Sharma, 2014). Researchers have investigated into the topic and have come out with various views, for example, Mahanta, and Islam (2012) deduced that attitude of students and achievements are positively correlated. They further maintained that students with high attitude scores tend to obtain good scores in mathematics examinations whereas their counterparts with low attitude scores obtain bad marks or scores in mathematics examinations. Furthermore, Denis Waitley, The Winners Edge (1989) as cited in Ayob and Yasin (2017) says:

> "The winner's edge is not in a gifted birth, a high IQ, or in talent. The winner's edge is all in the attitude, not aptitude. Attitude is the criterion for success."

This clearly indicates that the attitude towards mathematics has been recognized as one of the determining factors of a person's success (Ayob and Yasin, 2017). This

confirms the conclusion of Minata and Kamada (1996) that students' mathematical results and their positive attitude towards mathematics are directly proportional. Thus, increasing student's mathematical attitude leads to increased student performance in the classroom.

Attitude is very important in teaching and learning any subject, especially in mathematics. Its impact can be either positive or negative in the achievement process. Attitude has to do with the way one conducts him/herself or react to a situation at any point in time.

1.3 Statement of the Problem

The poor performance of mathematics has become a global issue. This has resulted in many studies in the area of attitude towards mathematics. Farooq and shah (2008) studied into the topic and came up with a finding that the mathematical success of students is dependent on the attitude of the students towards mathematics. Their study was at the Senior Secondary School level, gender specific and in Pakistan. In addition, Mahanta and Islam (2012) researched into same topic but with concentration at the secondary level as well as emphasis on gender. Moreover, Yaser (2015) in Terkey and still at the secondary level has conducted a similar study. It also brought on board different categories of secondary schools. Though studies exist in the area, the researcher realized that not much have been done at the Junior High School level and most especially in the field of mathematics in Ghana.

In Ghana, Students' performance (achievement) in Mathematics over the years has become a challenging issue such that the main policy maker, the Ministry of Education and its allied agencies are making frantic efforts to curb the situation. The

WAEC report on mathematics in recent decades has identified the challenge of poor performance of students in the BECE, though, in some years, a minimal improvement was recorded. In most cases, the attitude exhibited by students by way of their approach to answering questions given to them has been an issue for discussion. More emphatically, Chief examiners report (2011) on mathematics expressed concern about the poor performance of students and thus, suggested an attitudinal change in students towards the subject.

TIMSS is an international organization that provides accurate and up-to-date data on the mathematical and scientific achievements of American students and compares that with students from other countries. In this regard, Ghana participated in the TIMSS three consecutive times thus in 2003, 2007 and 2011 with the rankings of 45th out 46 countries, 47th out of 48 and 42nd out of 42 countries, respectively.

Table 1: Rankings of the first and last five Countries in TIMSS 2003, 2007 and 2011

S/N	COUNTRY	2003		2007		2011	
		SCORE	RANK	SCORE	RANK	SCORE	RANK
1	Singapore	605	1	593	3	611	2
2	Korea, Republic of	589	2	597	2	613	1
3	Hong Kong SAR	586	3	572	4	586	4
4	Chinese Taipei	585	4	598	1	609	3
5	Japan	570	5	570	5	570	5
6	Tunisia	410	35	470	32	425	30
7	Egypt	406	36	391	38	-	-
8	Morocco (Algeria)	387	41	(381)	(39)	380	40
9	Botswana	366	43	364	43	-	-
10	Ghana	276	45	309	47	331	42

Source:TIMSS Report, 2003,2007&2011
() — the Country amongst African Countries that participated that year
-- — did not participate that year

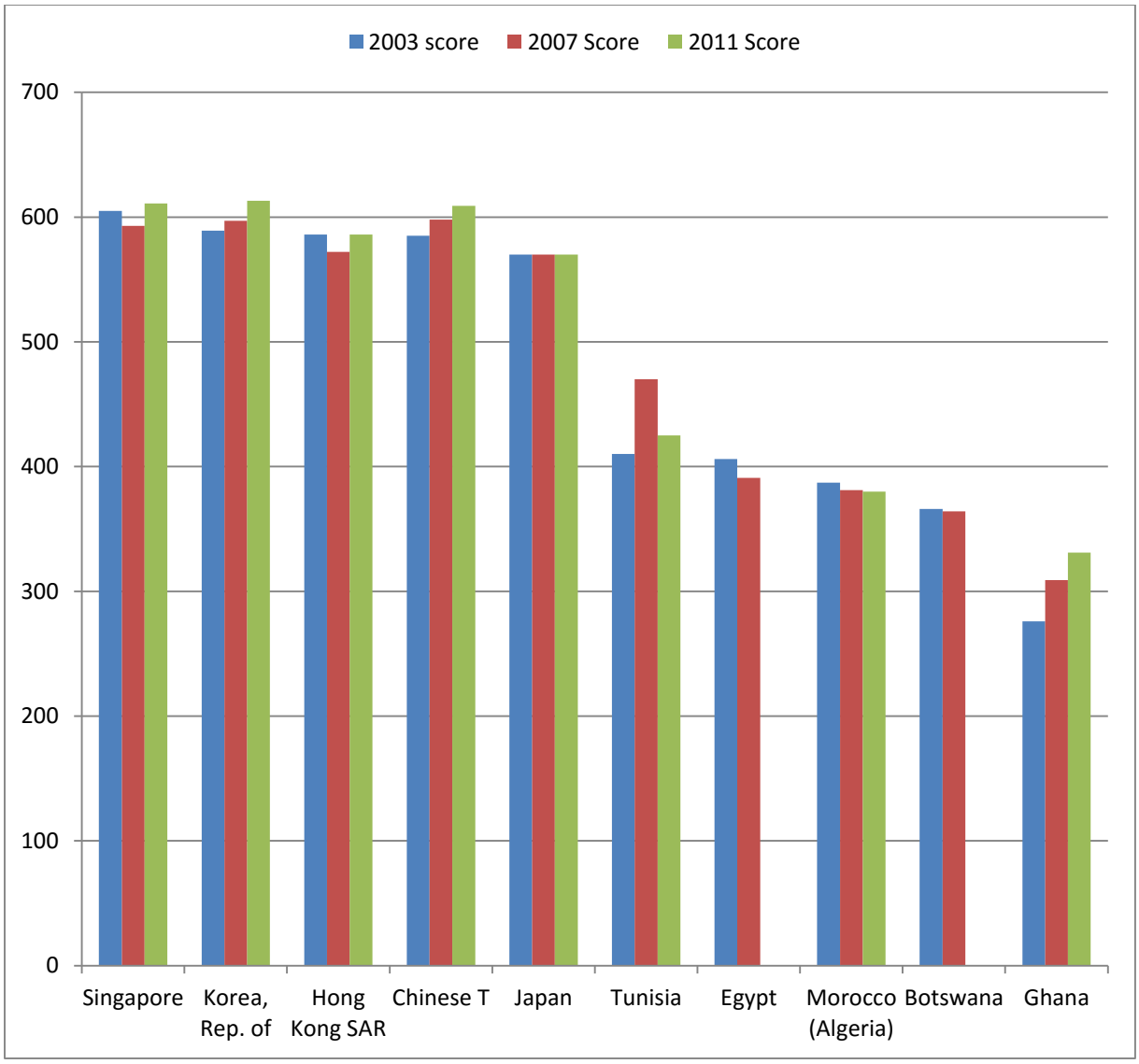

Figure 1: Scores of the first five and last five African countries

The results/scores revealed the abysmal performance of grade eight (JHS 2) students in African countries especially Ghana as obvious in the positions.

This situation is worrying in the sense that the academic life (i.e. progression) of every student in Ghana begins right at Junior High School level. Therefore, in response to the discussion so far, it is prudent and timely that further study is initiated to ascertain

reasons for such academic achievement with respect to students' attitude toward mathematics

1.4 The Study Purpose

This study seeks;

1. To identify Junior High School students' attitudes towards the learning of Mathematics as a subject in the school
2. a. To examine how students' attitude influences their achievement in the studying of mathematics

   b. To examine the relationship that exists between gender and achievement in.
3. To examine the extent to which mathematical attitude relates to mathematical achievement.

1.5 Research Questions

To achieve the purpose of this study, certain questions need to be answered. The present study is guided by the following research questions

1. What characterizes the attitudes of Junior High School (JHS) students towards mathematics?
2. a. How does students' attitude towards mathematics affect their mathematics achievement?

   b. Is there any relationship between gender and achievement in mathematics among Junior High School students?
3. What is the relationship between the attitudes and learning experiences of JHS students' in mathematics?

1.6 Significance of the Study

The findings of this research work is sought to add to knowledge in the following ways:

The Study would serve as an advice to students since the findings that would be gathered at the end of the study would provide them with insights into how the attitude towards mathematics affects achievement level either positively or negatively.

This study will make an important contribution to the field of knowledge regarding student attitudes, and then to the implications of their attitudes toward mathematics and mathematics outcomes in high school. This would help position teachers very well in terms of their conduct in the classroom, teaching methodologies, classroom interaction and the content knowledge that is required to assist.

Policy developers, implementers and all stakeholders in education will lay hands on information that can help develop better strategies to improve students' level of mathematics. Again, this research will be useful for policy development and for the development of resources for use at the junior high schools.

It is anticipated that the empirical evidence, which would be harnessed at the end of the study, would lead to the diagnosis of the problems and solutions in respect to student's attitudes, which are exhibited towards mathematics in the district. It would in turn prompt the educational directorate to pay attention to the learning and teaching of mathematics in the district. Subsequently, the study would help the Asunafo South educational directorate as well as the schools to take viable measures that could lead to an attitude that could improve students' math scores.

Moreover, this work will add to what has been established already (i.e. existing knowledge) in the field of mathematics teaching and learning. This study will likely encourage other researchers to undertake similar studies in other districts or municipalities. Thus, it will help obtain more information relating to the relationship between attitudes and learning experiences of JHS students in mathematics.

1.7 Delimitation

The research was carried out in the Asunafo South district in the Brong Ahafo Region. The capital is Kukuom and major towns like Sankore, Noberkaw and Abuom form part of the district. The 2010 Population and Housing Census pegged the population of Asunafo South District at 95,580 accounting for a little above 4 percent of the total regional population of the Brong Ahafo. The educational directorate has eight (8) circuits and seventy-three (73) junior high schools with an estimated student population of 6000. In all twenty-one (24) schools were selected from the eight (8) circuits in the district. This means three (3) was selected from each circuit. The selection included both public and private schools within the district. The study was limited to the Asunafo South District alone based on these reasons:

1. The researcher concentrated on the district because he is very familiar with the district and it is therefore highly possible to come out with comprehensive research outcomes.
2. The study was confined in the district again due to financial constraints.
3. The shortness of time factored in not able to cover the entire region of Brong Ahafo or the country at large.

Despite the relevance of the results of this study to the non-participating schools, it will be unfair on the part of the researcher to generalize the findings of this study to the rest of the Junior High Schools in Ghana. However, findings of the study might prompt further in-depth research into the issue at hand.

1.8 Organization of the Study

This is a five-chapter research study. Chapter one dealt with the introduction to the study. It comprises background relating to the research, statement of the problem for the study, the purpose in respect to the research, questions guiding the research and hypotheses, significance of the study and finally delimitation as well as limitations of the research.

Chapter Two was confined to the review of related literature. It also takes care of the conceptual, theoretical, and empirical approaches given the analysis of student's attitude to mathematics and academic achievement.

The third chapter captures the methodology of the research. It can boast of the research design, the study area, population, sample size, instrument for collecting data and finally the analysis of the collected data. It also deals with the description and administration of the research.

Chapter Four is about the results and discussion to the research findings, and sub-detailed into an overview, responding to the questions posed and discussion of research findings. The fifth chapter, which happens to be the final chapter, is dedicated to the summary, conclusions, and recommendations of the study.

1.9 Chapter Summary

This chapter deals with the general overview of the study. The research explains why it was necessary to analyze students' attitudes toward mathematics and academic performance, particularly in Asunafo South. The research questions as well as the existing gaps related identified among others have been stated. It is expected that the results of the study will provide accurate and timely answers to questions related to the feasibility of the study. The next chapter deals with various literatures on the subject.

CHAPTER TWO

REVIEW OF LITERATURE

2.1 Introduction

The usefulness of mathematics to human development and its crumbling standards among students has generated countless debates among the various stakeholders of education over the last two decades (Blum, 2002). Due to this, the entire Ghanaian educational curriculum, noted among them mathematics has been keenly perused resulting from the numerous reformations and the adoption of the new syllabus and teaching methods (Ampadu, 2012). The government and other education stakeholders have developed various strategies to improve the effectiveness of teaching and learning mathematics to make the subject enjoyable (Anku, 2008). Succinctly, this chapter attempts to review or study relevant studies of students' attitudes toward mathematics and their correlation with mathematics outcomes. It also examines the conceptual framework and the theoretical context in which the study was premised. It further reviews the various factors, which affect students' attitudes towards mathematics.

2.2. Conceptual Framework

Adeptness in languages, science, and mathematics is considered a crucial forerunner to accomplishment in modern society (Mata, Monteiro and Peixoto, 2012). Talent, much effort, good discipline, as well as positive attitude and interest exhibited by an individual is ascribed to be positively correlated to learning of mathematics and ability to obtain higher scores in mathematics examinations (Kasimbu, 2004). Such attitude construction or development is based on a series of factors with which the student comes into contact during the learning process, which leads to the motivations received from

teachers or parents, willingness to learn mathematical concepts and the difficulty or organization of remembering what we have learned.

Skinner (1953) grouped such attitudes into cognitive, affective and behavioural elements. Based on the above, a conceptual framework model for the recruitment of secondary school students into the mathematical learning process has been developed. Mathematics learning includes the three elements responsible for forming attitudes. However, it must be remembered that factors based on the student's individual experience differ in their learning environment. The learning environment may include attractive or other learning resources. The support of parents or teachers or their absence can be responsible. Peer influence and school familiarity can also compel or restrain a student to learn mathematics effectively. Thus, a student who finds him or herself in a group that inclines towards mathematics is most likely to like the subject and vice-versa. Routine activities of students in school could probably influence his or her interest in mathematics, and more importantly, such a student in the end will develop favourable inclinations towards mathematics learning. Briefly, all these factors responsible for the formation of attitude are as captured below;

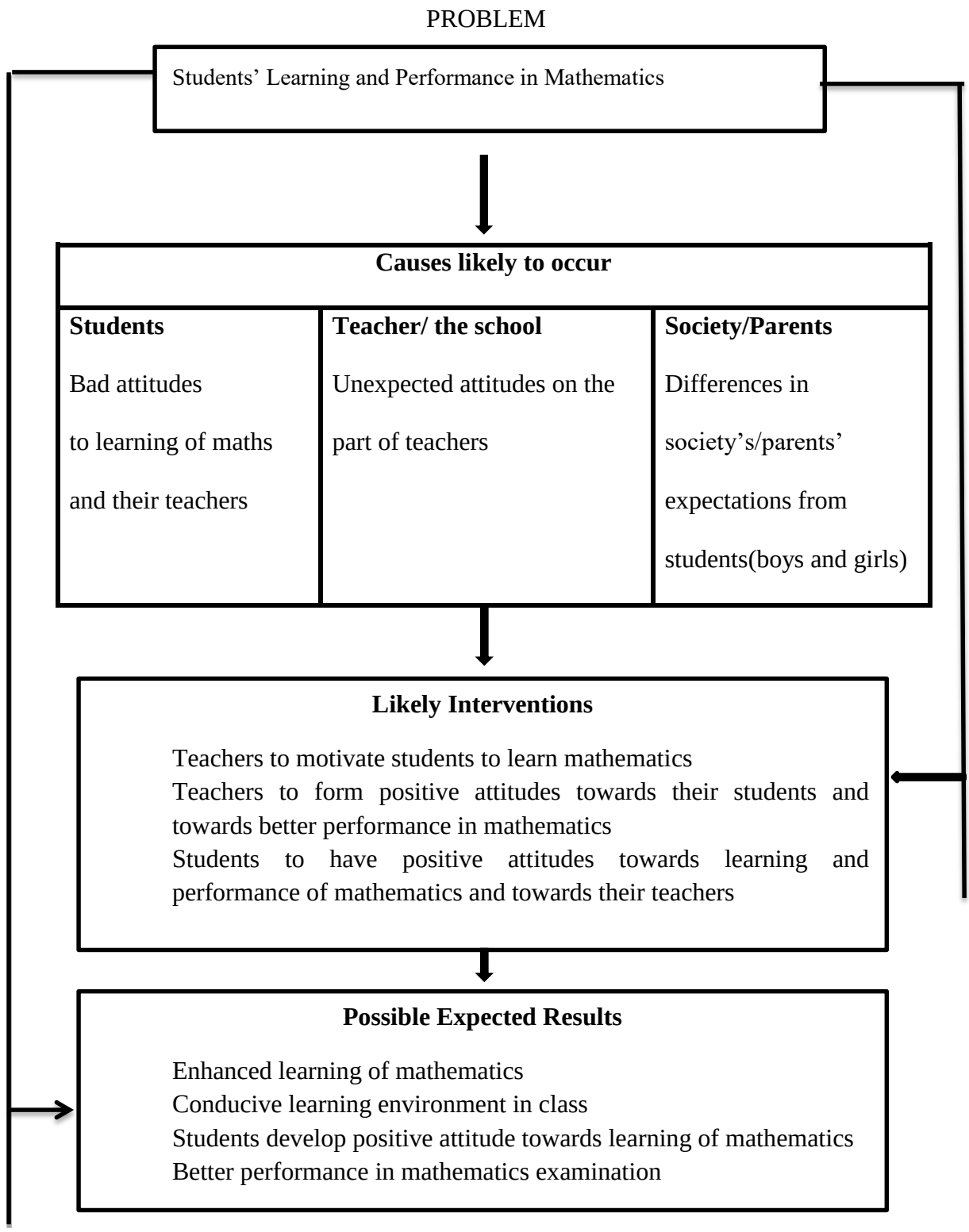

Figure 2: Conceptual Framework adapted from Grouwns and Koechler (1988).

As captured in Figure 2.1, several factors account for poor learning of mathematics among students. These causes or factors include the misbehavior of students who study mathematics, unpleasant learning experiences in elementary mathematics among others. Others are the lack of experienced teacher teaching techniques, negative attitudes of teachers and insufficient learning resources. Possible solutions include teachers who motivate students to learn mathematics, teachers who develop a positive attitude towards mathematics. In summary, mathematics teachers should encourage their students to develop a positive attitude towards mathematics learning and to show a positive attitude towards the subject which would ultimately translate into a better classroom environment and, therefore, by getting the best results for math students. Thus, attitude formation towards mathematics is engineered by personal (students), school and society related factors. In addition, students who have positive experiences with the previously mentioned factors tend to have affirmative attitudes toward mathematic which become evident in their academic achievements and those students who lack such experiences would eventually tend to experience the exact opposite. Succinctly, the above conceptual framework helps in understanding how students' attitudes toward mathematics affect their performances in the subject.

2.3 Theoretical Framework

The study was guided by the Reinforcement theory propounded by Skinner, which usually forms part of the motivational theories. This theory explains how individuals are motivated to achieve certain abilities which otherwise would not have strived to attain.

2.3.1 Reinforcement Theory

Skinner (1953) as a renowned learning theorist in the 1930s and 1940s emphasized his research on how organisms learn, regardless of their potentials or species. Even though some behaviours are clearly prompted by specifics stimuli, Skinner mentioned that reflexive behaviour is responsible for only a minute fraction of all conducts. Skinner then again mentioned another set of behaviour, which he termed as operant behaviours. To him, this is because these behaviours operate the environment in the obvious nonexistence of any unconditioned stimuli. Skinner then tilted his attention towards the relationship between behaviour and its effects/consequences. The use of pleasing and repulsive consequences to alter behaviour is referred to as operant conditioning. Lahey (2003) has described the term conditioning as learning, where the penalties of behavior lead to changes in the likelihood of its occurrence.

Argument has been advanced with regard to mathematics that if students are stirred for showing interest in mathematics, it will to a very large extent enhance their performance and success as far as mathematics is concerned and vice versa (Ismail and Anwang, 2009; Khatoon and Mahmood, 2010; Schackow, 2005; Sweeting, 2011). Rewarding students for showing good performance in mathematics and rebuking students for showing weak performance in mathematics is a major facet of the reinforcement theory which is an extension of the operant conditioning theory. This is the most applied classroom mathematics motivation theory in our part of the world where we clap and praise students scoring high grades in mathematics test and rebuke those who score low grades in mathematics test and sometimes giving them corporal punishments to serve as deterrence. This tends to reinforce the conviction and motivate those students who

scored high in mathematics test and encourage those who scored low to do better in future tests. There is therefore a strong relationship between motivation and attitude. Moreover, for a student to develop a positive attitude towards mathematics with a corresponding positive performance/achievement, he or she must first be motivated to do so. Suffice it to maintain that a positive or negative attitude formation towards mathematics is determined or informed by ones' level of motivation to study or learn the subject. The above necessitated the adoption of the theory of reinforcement whose underpinning concept is motivation to explicate or establish the relationships between attitudes and academic performance taking into consideration mathematics as a subject.

2.4. Definitions of Attitude

In everyday life, attitude is noted to be an integral characteristic guiding human existence (Mohamed and Waheed, 2011). Thus, people are likely hate, like, love, dislike, resist, agree, argue, disagree and favour. Everyone comes in response to an object. Attitudes can therefore be considered as a brief evaluation of an object of thought. These are fluctuations and predispositions that control a person's behavior and influence an act that can be considered positive or negative (Bohner and Wänke, 2002). Attitudes are configured and change over time. According to the model of the multiple components of Attitude, three main component influences attitudes: cognitive (characteristics, thoughts, beliefs) and affection (emotions, feelings) and behavioural elements (experiences, past, events) (Maio, Maio and Haddock, 2010). In developing a definition of attitude towards mathematics taking into account the various definitions of attitude, Eshun (2004) defines attitudes towards mathematics as the state of mind of an aspect of mathematics that an individual has acquired through his beliefs and experiences, but that this can change.

An examination of the mathematics literature shows that various factors influenced student attitudes and are divided into three distinct groups (Köğce, Yildiz, Aydin, and Altingdağ, 2009). As regards the first group of factors, they are those that are student related. These factors include mathematical achievement score of students (Köğce et al., 2009), mathematics, self-awareness and self-efficacy, exogenous motivation (Tahar et al., 2010), as well as high school experience (Klein, 2004; Bobis and Cusworth, 1994). The second category of factors is related to school, teacher and lesson. Examples of such factors are the didactic elements used by the teacher, the educational administration and the knowledge of the content and the individuality of teachers, teaching contents with examples of the real life, and opinions of other students on the mathematical courses (Yilmaz, Altun and Olkun, 2010). Other factors identified are belief of mathematics teachers (Cater and Norwood, 1997), the facts experienced by mathematics teachers (Ford, 1994; Karp, 1991) providing private tuition for students (Köğce et al, 2009) as well as teaching methods and reinforcement (Papanastasiou, 2000).

Students' attitudes towards mathematics can be either optimistic or pessimistic. An optimistic or positive attitude towards mathematical mirrors and a positive attitude towards the subject and a negative attitude towards mathematics (Zan and Martino, 2008).These emotional behaviors tend to affect a person's behavior, as they are likely to perform well on a subject that someone likes, has self-confidence or finds useful. To this end, positive grades in mathematics are crucial because they can influence students' willingness to learn and the benefits of mathematical instruction (Eshun, 2004).While some scholars limit the attitudes of mathematics to a simple like or dislike of the subject,

others expand the meaning to the abilities, beliefs and relevance of mathematics. On the other hand, Zan and Martino (2007) argue that attitude towards mathematics is a simple positive or negative emotional bias towards mathematics.

A study conducted by Nicolaidou and Philippou (2003) has shown that negative attitudes are the result of daily and ongoing errors or difficulties in solving mathematical problems, and that these unfavorable attitudes can last. They also said that children are generally positive when they go to school for the first time. Unfortunately, their attitudes become less optimistic over time and generally pessimistic at school. For example, Kögce et al. (2009) found significant differences in the attitudes of younger and older students toward mathematics, and the attitude of the eighth graders was worse than that of Grade sixth students. To this end, Nicolaidou and Philippou (2003) posit that several factors can shed light on what accounted for the more negative attitudes about the school. Such factors indicated by Nicolaidou and the colleague include a demand to perform well, challenging tasks, unexciting lessons and lackadaisical attitudes exhibited on the part of teachers.

Fraser and Kahle (2007) have also indicated that the prevailing learning atmosphere around the home and school settings as well as within the peer group accounted greatly in variances in students' attitudes and more importantly, class ethos impacted greatly on the scores obtained in these attitudes by students. More so, a review of various studies purposed to provide an understanding on the attitudes and their consequences on development about differences among students by Mohamed and Waheed (2011) also identified three types of factors that influenced the attitudes of students' towards mathematics. These factors were students related (i.e. mathematical

attainment, anxiety, motivation, self –awareness and self-efficacy among others); factors which were teacher, and teaching-induced (i.e. classroom supervision, teaching materials, guidance, teacher knowledge, beliefs among others) and factors which were from the household environment and society induced (i.e. training, parent expectations).

2.5. Relationship between Attitude and Achievement

Several studies have shed light on the correlation between students' attitudes toward mathematics and performance in the subject area (Mato and de la Torre, 2010; Nicolaidou and Philippou, 2003; Fraser and Kahle, 2007, Ma and Kishor, 1997; Schofield, 1982). Ma and Kishor (1997). Their meta-analysis identified a weak correlation between these recognizable variables and the relationships associated with different variables (i.e. sample size, ethnicity and grade). As regards grade, these correlations increased among older students (grade 7 to 12). However, other studies found an affirmative correlation-connecting attitude of students to mathematics and their academic accomplishment. For instance, Nicolaidou and Philippou's (2003) in their study found noteworthy correlations between attitudes and performance. Thus, students with optimistic inclinations did well. Similarly, Mato and De La Torre's (2010) study with high school students revealed better academic performance with students who had more optimistic attitudes towards mathematics than their counterparts did with pessimistic attitudes towards the subject. Zimmerman et al. (2004) corroborated these results in a broader study of high school students involving nine countries.

Another study by Brett- MacLean, Cave, Yiu, Kelner and Ross (2010) emphasized the relevance of attitudes in predicting school integration when he found that mathematical behaviors represented a mathematical performance difference of 25 percent

to 32 percent, and that much of the difference explained was independent of mathematical skills. Nevertheless, Georgiou, Stavrinides and Kalavana et al. (2007) argued that if high performance could be used to predict an optimistic attitude towards mathematics, such an attitude would not have produced more power. However, they emphasized that it was important for teachers and schools to change their attitudes, and argued that better teaching techniques and teacher motivation, and reading materials could improve mathematics outcomes.

A research to evaluate academic performance was conducted by Tinio (2009) in the Philippines. In the study, a test known as the Academic Engagement Scale for Grade School (AES-GS) was conducted for 250 grade 6^{th} and 7^{th} in the Philippines. A total of 102 questions were in this test with three groups, thus behavioural, emotional and cognitive engagements. A Likert scale with options ranging from always to never was used. The results indicate that all three subscales were crucial in measuring academic engagement. It was further asserted that such a scale must be constructed because it could be a means for improving the education of a student. It has further been argued that such a scale should be built, as this could be a way to improve the student's education. In furtherance of her argument, Tinio (2009) maintains that this would also help teachers to discover the aspects that students cannot answer.

Coleman (2009) examined the link between parenting, student motivation, and performance of fifth grade students. In the end, students' motivation and academic performance were found to be positively correlated. If a student is encouraged to succeed at school, he will probably try to get better grades (Coleman, 2009).There is a reciprocal link between incentives and academic achievement. It is believed an increase in one

automatically increases the other. In that case, a student who does well when motivated will continue to do well and the opposite expected (Coleman, 2009; Ellis, 2010).

In a study of the behaviour of lower secondary students in basic mathematics by Llorente-Avelino (2016) showed that students had a positive attitude towards basic mathematics taken as a whole and classified by demographic characteristics. These demographic characteristics included sex, size of the family, level of education of the parents, the professional status of parents, the level of education of teachers, the teaching experience of teachers and the continuous training of pupils in mathematics. It also revealed that students' attitudes toward basic mathematics education differed considerably when grouped according to the level of education of their teachers for students whose teachers had earned credits in postgraduate courses. Also family income, in favour of middle- and high-income families and parents' educational performance, in favour of students whose parents were tertiary students, but not by sex, the teaching experience of the teacher, the mathematical education, the size of the family and the occupation of parents.

A key element of a student's performance depends largely on how he sees him/herself, whether he is strong or weak in a subject. Khatoon and Mahmood (2010) have argued that over time and from different sources, students develop ideas, feelings and attitudes about school problems. Students showed a positive attitude towards mathematics and science, but not so much in countries where science is taught as separate classes in grade 8. Karimi and Venkatesen (2009) viewed them as environmental impacts. Environmental impacts can come from exogenous influences such as groups and social pressures. Home orientation and attitudes towards mathematics, press variables such as

friends and the pressure to learn math are some of the factors that determine students' attitudes and beliefs about this subject (Ismail and Anwang, 2009). This suggests that students who experience favourable environmental impacts are most likely to form positive attitudes toward mathematics hence higher academic performance and the exact opposite would be the case of those students who experience unfavourable impacts.

A study of 35 participants (including mathematics and postgraduate teachers enrolled in the 2014 Specialization Program in Mathematics Education at the University of Johannesburg) aimed to assess the attitudes of mathematics teachers towards this subject in relation to gender, age, and pedagogical practices of Jacobs and Spangenberg (2014) yielded positive results.

The study found that a proportion of respondents (over 90 percent) had a strong positive attitude towards mathematics inventory when considering the four dimensions and total attitudes towards considered (ATMI's). These mathematics teachers feel that the acquisition of mathematical skills is useful and necessary, that it provides mathematical solutions to problems and tasks and that it expects a lot from a good performance in mathematics. The study also showed that they wanted to learn more and fulfill their responsibilities as mathematics teachers (Jacobs and Spangenberg, 2014). Similarly, scholars such as Ampadu (2012); Durandt and Jacobs (2013); Ismail and Anwang (2009); Maat and Zakaria (2010); Mata, Monteiro and Peixoto(2012); Quinn (1997) and Sweeting (2011) found that the quality of mathematics education and the attitudes of teachers are important for student performance and, ultimately, for their math scores. The study left out students who the researcher believes form an integral part in the attitude

and achievement processes. The present study seeks to investigate into this attitude and achievement in respect to the students.

A study by Schackow (2005) investigated the attitude of primary school teachers who took an introductory course in mathematics. The purpose of the study was to determine the degree of change in teachers' attitudes towards mathematics during the course of the methods and the correlation between their initial attitude toward mathematics and their academic success at school. The study revealed significant statistical rates of change in the ATMI value of these students. In another study, Sisson (2011) examined attitudes of students towards mathematics and academic outcomes of elementary algebra in the University of Central Florida. It was shown that the general attitude of the students during the semesters had changed positively due to the improvement of the grades. Lim and Chapman (2010) have conducted another study investigating the attitudes of students toward mathematics and its relationship with academic performance in Asia. A total of 984 junior students in Singapore were recruited for this study. It was revealed that though the attitude of students towards mathematics was positive, they did not have an inherent motivation to do the subject. In this regard, it was found that the inherent motivations and academic performance in mathematics have a very positive correlation. The author posited that, parents and teachers create endogenous motivations for students that promote high self-esteem, leading to superior academic performance. This study however failed to establish what accounted for the lack of intrinsic motivation among students for the study of mathematics.

Based on Tapia and Marshs II (2004), ATMI is considered long. Lim and Chapman (2013) have developed a shorter version that measures only four subscales to

examine the relationship between students' attitudes toward mathematics and academic performance in Singapore. The four elements of the scale included the motivation for mathematics, the importance of mathematics, self-confidence in mathematics and enjoyment of mathematics. More than 1600 participants were involved in the study. The result suggests that a very high correlation (r = 0:96) was established between the enjoyment and the motivation subscales as far as mathematics was concerned. A strong correlation was also identified between this shortened version of ATMI and the original version of ATMI with a correlation mean of 0.96 indicating a high correlation between all the four factors.

Wade (2013) attempted to assess the impacts of students' attitude toward mathematics through problem-based learning (PBL).Although the study found that while PBL did not improve the mathematics attitudes of most students; their positive effects help them, determine the value of mathematics in the real world. In a similar study, Pyzdrowski, Sun, Curtis, Miller, Winn, and Hensel (2013) qualified students for their success at the university level of initiation. The analysis shows that performance of students, ATMI score and Calculus Readiness Assessment had important positive correlations with course performance.

Jackson (2012) has studied attitude as a link between mathematical anxiety and attitudes towards mathematics. This study focused on primary school teachers, exploring the possibility of reducing mathematical fears and improving attitudes toward mathematics. In Burnes' (2014) thesis, the relationships between anxiety in mathematics, attitudes toward mathematics learning, and related learning methods were examined. The link between anxiety in mathematics, attitudes towards mathematics and their

achievements has been examined in a Chong, Li and Yang (2014) thesis. The study found that adolescents from six high schools in Sarawak, East Malaysia, faced a moderate level of mathematics anxiety, have positive attitudes toward mathematics and considered themselves to have a moderate level of success in mathematics. This is indicative that the lesser the students anxiety with mathematics, the higher their academic performance or achievement and vice-versa.

Studies were also carried out on how to enhance the attitudes of students' in mathematics to improve the performance of the subject. For instance, by incorporating a teacher's diary into the instruction portfolio (Cutler and Monroe, 1999), by using a computer-based instructional mathematics simulation game (Van Eck, 2000, Touparova, 2000). Van Eck (2015) conducted a recent study regarding situated, genuine problem solving and a model that elucidates how digital games can promote transfer and perk up attitude toward mathematics. Similarly, Gamble (2011) compared mathematics attainment of 34 students in 5^{th} grade employing conventional textbook instruction and differentiated instruction as well as whether there exists a difference as regards students' attitude toward mathematics after the rolling out of these two different instructions. The study found a significant difference in the attitude of students' towards mathematics with respect to the satisfaction component. By implication, it is most likely for students to develop positive attitudes toward mathematics if teachers adopt more innovative and practical approaches to the teaching of the subject.

Awanta (2009) conducted a study in Ghana, which explored the standpoints of students, their formations of mathematics attitudes and habits of learning mathematics and their professed complicatedness level of various mathematics topics. In this study, a

random sampling method was used to sample 800 students from the Junior High and Senior High Schools in the Ashanti and Brong Ahafo Regions. A questionnaire was administered them to solicit information on the subject matter. The results showed that students' interest in attending mathematics class, and solving mathematical problems on the part of JHS decreased considerably compared to SHS, even though their general interest score in the learning of mathematics was three for all grade. In terms of confidence, it was revealed from the study that students' confidence in numerical calculations and word problem solving steadily declined. Students have observed a similar trend in the understanding of the contents of mathematics education. However, there was a slight increase in the average value of the statement, "although I know how to calculate, sometimes I do not know the reasons for the calculations." The study revealed that most JHS students took positive steps (that is, consulting teachers) to resolve their challenges and were even disinclined to surrender when they are faced with learning complications. This habit shifted at the SHS; thus, their desire to consult their teachers reduced significantly. At this level, they preferred to seek assistance from their colleagues. To this end, Awanta proclaims that this certainly indicates that the opinion of his peers is not strong enough before the stage of puberty. As a result, student attitudes strongly influence their success in mathematics.

A study by Dowker et al. (2012) showed that the attitude of primary school students towards mathematics is generally positive and that their attitude tends to become "negative" as they age. In a study of 9th grade mathematics students in Malaysia, Ismail and Anwang (2009) found sex, expected academic achievement, mother tongue, family history, and home-based educational resources that influence their success. Similarly,

Farooq and Shah (2008) found that optimistic attitudes towards mathematics are the key to success, while negative attitudes often have contradictory effects. Schenkel (2009) reaffirmed this in the subsequent year. Suffice it to reason that aside other factors, attitude is *sine qua non* to attainment or success in any course or subject of study.

The bad attitudes towards mathematics:

1. Result largely from repeated errors in mathematical work (Nicolaidos and Philippos, 2005).
2. Tend to limit learner intellect and inquisitiveness (Bragg, 2007) and
3. Offer less satisfaction and ease, as well as lower self-confidence among participants (Shrestha, 2006).

Despite overwhelming evidence of a positive correlation between the two, Hean, Craddock and O'Halloran (2009) and Mata, Monteiro and Peixoto (2012) state that behavior does not seem to affect mathematical integration.

2.6 Gender and Mathematics Achievement

Mathematics has become one of the most important areas in which all literary sciences in the academic field are headed to. It is often considered as an area in which children perform better, thus the same is true for the attitudes and self-concepts terms (Ma and Kishor, 1997). On the contrary, performance and mathematics scores at school did not differ significantly between boys and girls (Lindberg et al., 2010, Scafidi and Bui, 2010). In addition, a study in which Lindberg et al. (2010) used a meta-analysis data covering 242 research, resulting in the selection of 1,286,350 people for the study. The

study showed no gender difference and almost equal differences between men and women.

DeLourdes Mata et al. (2012), however, intimate that there abound several conspicuous variations in the opinions of boys and girls about attitudes towards mathematics. Research findings have continually shown lower mathematics self-concept in girls than boys (Skaalvik and Skaalvik, 2004). Several research findings as regards gender variations in attitudes seem less reliable than in self-concept. Several studies have established substantial variances when attitudes of girls and boys towards mathematics are compared (Asante, 2012; Eshun, 2004; Ma and Kishor, 1997). However, a number of studies also did not identify these differences (Aydin, Delice, Dilmac and Ertekin 2009; Etsey and Snetzler, 1998; Kalavanaet al., 2007; Mohamed and Waheed, 2011; Nicolaidou and Philippou, 2003).

De Lourdes Mata et al. (2012), however, noted that there are many differences in the opinions of boys and girls about attitudes towards mathematics. Research findings consistently show that girls are perceived less mathematically achievers than boys (Skaalvik and Skaalvik, 2004). Several research findings as regards gender variations in attitudes seem less reliable than self-concept. Numerous studies have led to significant differences in the comparison of girls and boys attitudes towards mathematics (Asante, 2012, Eshun, 2004, Ma and Kishor, 1997). However, a number of studies also did not identify these differences (Aydin, Delice, Dilmac and Ertekin, 2009, Etsey and Snetzler, 1998, Mohamed and Waheed, 2011, Nicolaidos and Philippos, 2003). Etsey and Snetzler (1988) conducted a study using meta-analysis and considered 96 studies. The study showed the existence of gender inequalities in students' attitudes towards mathematics.

Men were more optimistic about the subject. However, most of these studies failed to point out whether or not the pessimistic attitudes of students toward mathematics were engineered by school-related, personal and social/environment-induced factors. The current study is therefore premised on this shortfall.

The surveys of primary schools show that the effect size of 0.20 favoured women and the effect size of 0.23 for grade 9 to12 favoured men. Hyde, Fennema and Lamon (1990) studies confirmed the effect of sex among older students (high school and university) with women with unconscious behavior. Although these Meta-analyzes were prepared in the 1990s, they are confirmed by the results of recent studies (Asante, 2012, Zimmerman, Sanchez and Ye, 2004) and attempt to confirm this. In this regard, it is observed that boys tend to have more confidence than girls do and consider mathematics as a male field, which makes them nervous with mathematics (Asante, 2012).A similar study conducted in North America by Zimmerman, Sanchez and Ye (2004) showed that the attitudes of eight grade students towards mathematics differ significantly. Boys are more interested in mathematics than girls are, but girls tend to see mathematics very critically than boys do. Also at the end of the mathematics difficulty study, girls scored higher for items with a test score.

With regard to the school environment, changes in gender identity and attitudes of teachers and parents, as well as attitudes towards mathematics, are likely to contribute to inequalities between boys and girls in mathematics. Ma and Kishor (1997) examined the impact of gender on mathematics. The study used meta-analysis, which considered 113 studies, and it concluded gender variable did not significantly affect the correlation between academic performance in mathematics and attitudes. A similar study by

Kalavana et al. (2007) showed no difference in mathematical performance or mathematical attitude between boys and girls. Although the study revealed higher achievement in the subject by both genders, the explanation they offered to this development differed. Boys tended to ascribe their higher scores to consistency in intelligence than the girls. Similarly, in a study conducted in Pakistan with students, Farooq and Shah (2008) found no difference in the confidence of boys and girls in relation to the attitudes towards mathematics. However, they found that students' success in mathematics depends on their attitude towards the subject.

Again, Markman (2008) in his 'Psychology Today' study postulated that students of both genders receive dissimilar reactions from teachers in math from an early age. He further asserted that when boys are having difficulty, they are likely to be encouraged by the teachers to keep pushing and be reminded that math is a skill that must be acquired. Conversely, when girls have difficulties, they are often reminded of how tasking math is by their teachers and this tends not to necessarily exude confidence in the girls' competence to appreciate the nature of mathematics. In addition, he argued that teachers could encourage children with problems to continue working for this and remember that mathematics is a skill that needs to be attained. Conversely, in case of difficulty, girls are often reminded that they go to their teachers, which does not necessarily affect their ability to appreciate the nature of mathematics. Due to these treatments, girls tend to develop a notion that mathematics is a talent, which they can only be excelled in for some time. Suffice it to maintain that often times, peers are often encouraged to understand and appreciate mathematical concepts because they see it as a skill that can only be understood by practice (Markman, 2008).

Recognition of Markman's position, Cech (2012) suggests that gender surveys have shown that the main cause of girl's problem is not the difference in the abilities of mathematical instinct, but in environments where students learn mathematics, which gives them less support and confidence. Cesh also argues that most people have false impressions and are convinced that the differences in mathematical performance between the sexes are not due to the influence of their teachers, parents or classmates, but to the girls themselves. Cech's report is informed by Jo Boaler's (2008) viewpoint on mathematics education drawing from the research she undertook in England. He insisted that teachers believe that mathematics is a ritual journey that gives character and determination to young people (Boaler, 2008). When teachers struggle with the subject as students, they tend to believe that their students must also experience similar. Boaler's investigation further revealed that if boys and girls cooperate in learning math, they end up being more successful.

Mckeachie and Lin (1991) assessed the nexus between student sex, teachers' instructional strategies and students' performances and found that appropriate teacher instructional strategies resulted in higher mean achievement measured by grades of students. Mckeachie and Lin (1991) assessed the relationship between student gender, the teacher-education strategy, and student performance. The study found that appropriate training strategies for teachers resulted in higher average performance. Granlinski (1991) reported lower boys' anticipations in mathematics achievement than their counterparts and more importantly, girls think that they lack mathematical prowess. He further indicates that whenever girls perform abysmally in mathematics, they tend to blame it on their innate weakness in the subject. Similarly, impressions such as "like" or "smart"

were found to greatly foretell attitudes of students towards Science and Mathematics (Moore, 1993). Further lending support to the above statement, Moore (1993) found boys to be more advantaged than their counterparts.

Saha (2007) found in a study titled Gender, Attitudes towards Mathematics, Cognitive Style and Mathematical Success that the three factors contribute significantly to fluctuations in mathematical performance. Similarly, Ma and Xu (2004) identified the order of causality between attitudes towards mathematics and students' mathematical achievements, sometimes showing a predominance of attitudes throughout high school. However, gender inequality has not been found in this cause-and-effect relationship, but the privileged position in mathematics has reduced this causal link.

Swetman (1995) found that girls' positive attitude towards mathematics declined with age. Swetman added that girls are more positive about mathematics than their peers are, but as they progress, their attitudes become less positive. Based on the above, Swetman argued that to improve girls' mathematics performance, teachers needed to help them develop their productive attitude toward mathematics. Gill (1994) put forward evidence of previous results and argued that students had a positive attitude towards school, but an unfavorable attitude towards mathematics. In contrast, Fennema and Sherman (1995) found that well-educated, results-oriented and enthusiastic teachers tend to have a good attitude towards mathematics and science.

Mahanta and Islam (2012) conducted a study of students' attitudes toward mathematics and their relationship to mathematics success. Data analysis shows that 37 percent of boys view mathematics as a difficult subject, while 39.2 percent of girls view mathematics as a difficult subject. In addition, 60 percent of boys think mathematics is

crucial for mental development, while 58 percent of girls share a similar opinion. The study also found that urban students showed a more positive attitude toward rural areas. It was further found that students with a high attitude score on the test scored well in mathematics and those with low attitude scores had lower scores in mathematics examination.

In a study of first- and second-year students, Cox (2010) used surveys to assess their self-esteem and gender perspective for the success of mathematics. Then, the teachers participated in tests of resistance in mathematics to check if they knew the matter well. The study found that fear of mathematics teachers tended to preoccupy girls. Thus, girls tend to experience anxiety with mathematics if their teachers are also experiencing it. Cox argues that these girls are very likely to claim that boys are successful in mathematics and that girls read successfully because teachers are unable restore girls' confidence. It was revealed that student attitudes were found to influence their perception and performance. The more girls stereotype mathematics, the worst scores they attain in an examination.

2.7 Mathematics Learning Environment and Attitudes

Several studies have examined the role of the environment in learning mathematics. The learning environment is a critical factor in performance and learning. When the environment is strong, students can learn effectively (Ehiametor, 1990, Farrant, 1982). Students receive maximum learning as well as develop an affirmative attitude towards a subject in an environment where they are much involved; a good teacher-student relationship exists, and the teachers (Tanveer, Rizwan, Ali, Arif, Saleem and Rizvi, n.d) employ creative teaching methodologies. The relationship between the

learning environment and attitudes can never be avoided by trying to focus on factors that affect students' mathematical performance. Similarly, Fraser and Fisher (1982) found the positive relationship between upshots and perceptions about attitude. This is to say that for students to receive maximum learning, an atmosphere of comfort, motivation and experimentation in the classroom should reign. The styles of teaching and content have a helpful effect on learning and success in mathematics (Rizviet al., n.d). Thus, inappropriate teaching methods and inadequate understanding of mathematical concepts therefore lead to problems and make it difficult to determine the relevance of mathematics for their lives (Crespo, 2003). Flowing from the above, it is suggestive that suitable pedagogical approaches and teachers' deep mathematical insights have what it takes to help students come out of the bondage of negative attitudes toward mathematics and its resultant effects of poor academic performance.

A study by Akey (2006) established a series of elements of the school environment (teacher support, student interaction and student expectations) that are largely related to student attitudes and behaviour. This study concluded that in a class or school environment that teachers consider as encouraging, tend to foster students' sense of control and confidence in their ability to succeed. Suffice it to maintain that how students perceive teacher characteristics largely shape their attitudes towards mathematics (Maat and Zakaria, 2010). Similarly, Maat and Zakaria (2010) and Vaughan (2002) have recognized a strong correlation between the learning environment and the attitudes of students towards mathematics. As a result, students who are more in tune with the learning environment and whose teachers are more optimistic tend to adopt a more productive attitude towards mathematics (Maat & Zakaria, 2010). The results of

Rawnsley and Fisher (1998) have confirmed that students tend to have a positive attitude toward mathematics when teachers feel supportive. Thus, to some extent, issues of students' adverse attitudes toward mathematics can be addressed through teachers' supportive roles in the classroom.

Home settings and social factors influence students' attitudes toward mathematics. Examples of such factors include parents' level of education, parental expectations and occupation of parents (Köğce et al., 2009).The concept of mathematical society, of hard, cold, abstract, theoretical and supra-rational questions also influences the way students perceive it (Ernest, 2004). However, studies have shown a positive attitude of students on the subject (Tezer and Karasel, 2010, Yilmaz et al., 2010, Fan, Quek, Yan, Mei, Lionel and Yee, 2005). Teachers with greater self-efficacy and higher goals and objectives for themselves as well as their students are likely to cope successfully with barriers and problems (Ross and Bruce, 2007).There is thus the need for teachers to engage their students with practical learning as well as provide them with some real-world applications (Cady and Reardon, 2007). In support of this position, Moore (1998) argued that teachers should teach passionately because passionate teachers perform quality academic work. Several studies have also shown that students' sympathy and attitude towards mathematics is characterized by low, extraordinary, or average grades (Tapia and Marsh, 2001, Hannula, 2002).Thus, students who score higher marks in mathematics will turn to have stronger affection and attitudes towards the subject and vice-versa. In support of this, Lopez et al. (1997) maintained that self-efficacy of students, attitudes are correlated, and that self-efficiency in mathematics is influenced through previous grades and marks. Suggestive that students with poor previous grades

would tend to be negatively influenced which would eventually translate into poor academic attainment in mathematics.

2.8 The Effect of Motivation on Attitudes

Motivation is a key element influencing the academic success of students who need to be admitted to the classroom to improve grades, as this ultimately attracts student interest (Coleman and McNeese, 2009). Lourdes Mata, Monteiro and Peixoto (2012) argue that the lack of commitment and dedication of teachers to academic work is of particular interest to teachers. Similarly, Singh, Granville, and Dika (2002) compared the impact of attitude, motivation, and academic engagement on the academic performance of mathematics and science students in the eighth grade. In this study, since 1988, 25 percent of students in the National Education Longitudinal Studies were interviewed and two mobilization factors analyzed, thus a factor of academic commitment and a factor of attitude. The results showed strong influences of motivation, optimistic behavior and commitment to research work to succeed in mathematics and science. It was also established that for students to be successful particularly in the two subjects, they must be active in their learning. Therefore, teachers who are very relevant in the teaching and learning environment must consider motivation a serious and important catalyst in the achievement process of the students.

Motivation was found to significantly affect student performance in general and mathematics (Singh, Granville and Dika, 2002).Similarly, motivation was found to shape students' attitudes by compelling them to have more affirmative inclinations and self-confidence (Burris, Heubert, and Levin, 2004). As a result, incentives have a positive effect on their performance with both in a cycle, so one increase the other (Ellis, 2010).

Therefore, the support, expectations, and comments that students receive from others influence their cognitive crises and are the fundamental source of their emotional settings (de Lourdes Mata, Monteiro and Peixoto, 2012).Therefore, it is imperative to take into account the responsibility of these factors by incorporating the motivational attributes of the students. Wigfield (1997) asserted that behaviours deemed as the feelings of an individual towards reading could be linked to an individual's motivation involved because they affect the degree to which individuals engage in reading activities. Thus, the higher an individual felt motivated, the higher his or her performance in mathematics as a subject.

Attitudes are emotional signals that accompany behaviors caused by an incentive state (Guthrie & Knowles, 2001). Therefore, attitudes can be closely related to motivation and provide important information for a better understanding of behavior and processes of mobility. In the field of mathematics, few studies examine the relationship between incentives and attitudes. However, some studies have shown links. Singh, Granville and Dika, (2002) employed two types of variables to ascertain motivation, first school attendance and classes and participation and readiness for mathematics classes. Singh and his colleagues asserted that motivational factors influenced mathematics attitude because considerable direct effects of .19 and .21, of these two motivation aspects, were observed in the attitudes of students. Students who exhibited school behaviour of motivation deficiency possessed a more pessimistic attitude toward mathematics. Such behaviours included; lateness to school, avoidance of classes, attending classes without preparations and books. In addition, authors such as Hemmings and Kay 2010 and Reynolds and Walberg (1992) considered consideration effort as a parameter of motivation. By

employing structural equation modeling to analyze the various factors that affect mathematics performance and attitudes with eleventh-graders, Reynolds and Walberg (1992) identified a great effect of motivation on mathematics attitudes. Similarly, a study of 10th-grade students by Hemmings and Kay (2010) confirmed a positive relatedness of effort to mathematics attitudes.

It is important for teachers to know the different aspects of motivation because they play a key role in the classroom (Eggleton, n.d.). Teachers are likely to increase student motivation by smiling, offering additional help to a task or calling a student for a good job. Therefore, Eggleton also believes that while these measures are an excellent stimulant and that the greater motivation of the teacher's personality is compared to that of his students. In addition, students feel motivated to learn mathematics when their performance in the subject is due to their high ability. However, students who blame their poor performance in the subject on low ability or difficulty of materials will be ill-motivated to study the subject. It is the duty of mathematics teachers to help enthusiastic and unconcerned students understand and appreciate that how successful a person becomes in learning of mathematics is dependent on that person's effort (Weiner, 1984).

Teachers who make sure their students understand the need to set personal learning objectives and take responsibility for learning math, increase motivation and success in the subject (De Charms, 1984). In terms of student interest and motivation, the type of response students receive from their teacher is an essential part of mathematics learning. For example, in a situation in which students view their teachers' comments as a controlling and designate goals that go beyond them, their motivation for learning mathematics and their interest in mathematics diminishes. On the other hand, students

who consider the responses of their teachers as informative and that it can help enhance their proficiency will boost their intrinsic motivation to learn mathematics (Holmes, 1990).

Students must be ready to have a sense of value. Teachers should not lower the standards of some students because they feel incompetent compared to other students. A study by Vásquez (1990) showed that students who thought teachers would not reduce their standards would be willing to approach them and provide them with the necessary practical support that proved to be the highest level of leadership. Teachers should trust bad students and provide them with the support and opportunities they need to excel.

Burris, Heubert and Levin (2004) examined several high school math courses and combined them into an advanced mathematics course. In this study, students with lower or higher performance, different racial backgrounds and socioeconomic status were trained in an advanced mathematics course. Positive results were observed among the students. Based on these results, the researchers argued that not only accelerated mathematics courses and other lessons should be reserved for the most advantaged students, but also that these lessons should be available to all. Thus, by granting low-achieving students the chance to learn at a high-speed, they feel challenged, and this eventually tends to boost their confidence levels. In short, motivation is one of the greatest tools that stakeholders of education including teachers, parents among others must employ to influence students towards mathematics positively, which would later enhance their academic performances in the subject.

Similarly, there is a variety of hypothetical or experimental relationships between confidence in learning mathematics and motivation of student to excel, endogenous motivation, self-image, and self-esteem (Hart and Walker, 1993). Numerous studies have shown that attitudes are inseparable from motivation and social support (from Lourdes Mata et al., 2012). Confidence is very important in mathematics. This is because students with confidence can solve difficult mathematics problems as well as learn new concepts. Hart and Walker also expressed the strong belief that trust affects students' delight and concentration in mathematics through greater participation in the subject (Hart and Walker, 1993).By implication, students with higher confidence levels in mathematics tend to have the flair for mathematics with consequential higher academic performances.

2.9 Teachers' Attitude and Students' Achievement in Mathematics

Several researchers have researched into the various factors that affect the study of mathematics among students as well as the various means through which those problems can be remedied (Agyeman, 1993; Kraft 1994; Asiedu-Addo and Yidana, 2004; Mereku, 2003). A careful review of the literature, Lamb and Fullarton (2002), shows three different but interrelated factors that influence the teaching and learning of mathematics. These factors are personal, school and classroom factors. Lamb and his colleagues argued that individual personal factors are faith and attitudes, willingness to learn from local factors, such as socio-economic status, parents' educational background, work and school life. School factors are the physical environment of the school.

However, the relevance of the interconnected factors mentioned above, the fundamental interaction between the learner and the scholar, is attributed to the teacher, known and respected by society, to norms, values, knowledge and abilities to the future

generations (Lamb and Fullarton, 2002). In this context, the influence of teacher factors on students' mathematical learning, as well as on field performance, has been the subject of a massive analysis by researchers for some time.

A significant number of studies, which interrogated the impact of teacher-motivated/induced factors on students learning and their performance with specific reference to the effect of the subject content of teachers on their teaching, found that teachers' subject delivery is greatly influenced by their content comprehension of the subject (Aubrey, 1997; Ball, 1991 and Mewborn, 2001). However, Mewborn (2001) found that even though knowledge of mathematical content plays a crucial role in his or her teaching, knowing more about mathematics does not guarantee that someone will teach conceptually to promote student understanding. In this sense, Ernest (1989) asserts that a good knowledge of the subject and the way the teacher conceives mathematics determine the way in which he teaches. In support of this argument, Ernest (1989), Jurdak, (1991), Teo (1997) and Perkkila (2003) posited that a teacher is strongly influenced by his theoretical orientations and convictions, as well as by his opinions on the subject. This is an indication of how teachers view their teaching as a crucial factor in ensuring that what is taught mirrors their experiences and believes (Ernest, 1989). Suffice it to reason that teachers' comprehension of the subject matter is evident in their classroom delivery which then whips up or shatter students' interest in the subject. To put differently, teachers who have command over mathematics or good at the subject as well as the techniques of teaching will help students develop positive attitudes and interest in mathematics and vice-versa.

Jurdak (1991) argues that the mentality of teachers and the nature of mathematical beliefs have a considerable impact on the way they teach. A study by Leo (1997), which examined the beliefs of 16 teachers in Singapore, revealed that the beliefs and concepts of mathematics teachers influenced the way they treated the subject. Similarly, in a comparative study, Pepin (n.d) established a direct relationship between teachers' philosophies and their teaching methods. A study on the Finish primary school teachers by Perkkila (2003) found that teachers' reminiscence of their skills and beliefs greatly influenced their teaching. Perkkila further established a link between how a teacher delivers in class and his experience with the teaching and learning of the subject. As all of the above studies show, factors such as the demands of the mathematics curriculum and the national demand for change in mathematics teaching and learning have a significant impact on teacher training, but an impact of their values and experience cannot be gainsaid. In support of this, Ahmed and Aziz (2009) maintained that a teacher's notion and way of delivery is exceedingly important in determining the efficacy of mathematics teaching and learning as well, as strengthens teacher's decision-making.

Ernest (1989) emphasizes the relevance of teachers and shows that a reorganization of teaching can only be achieved if teachers have a profoundly positive view of the evolution of mathematics teaching and learning. In the same vein, Handal and Herrington (2003) argued that a change of curriculum could be successfully achieved if program reforms were to take into account teachers' beliefs. The common method of exploring teachers' opinions on education and mathematics in previous studies has been to collect quantitative data (via a questionnaire) and qualitative data (through interviews) on how to put into practice their lessons.

For some time now, many studies have presented teachers' beliefs and ideas about teaching. However, Ahmed and Aziz (2009) argued that creating teacher-training data on students would give clues to what their teachers did. They also argued that the creation of teacher education data was necessary because their concepts were characterized by stimulating experiences that allowed them to follow their learning and teaching behaviour more closely than their teachers. It is sufficient to assume that student views on teacher supply make a significant contribution to improving teaching and learning. This offers valuable suggestions and guidelines for the future development of teachers. Ahmed and his colleague also maintained that students build up conceptual comprehension of concepts if they see classroom settings of their teachers as supportive rather than competitive. For this reason, Rawnsley (1997) believes that students can develop a more positive attitude towards their mathematics classes, if teachers provide a high level of support and offer students the opportunity to play a significant role in the process. In summing up the views above, teachers' relations with students play a crucial role in students' attitude formation towards mathematics as well as the attainment in the subject.

Some scholars believe that evaluating teachers' teaching practices based on student grades and comments has proven to be unswerving variable and one of the best scoring techniques for teachers' teaching practices (Arthur et al., 2003; Cashin, 1995; Centra, 1993). To this end, Arthur, Aseidu-Addo and Assuah (2003) argued that the teacher evaluation system, in which their views on teaching are neither reliable nor binding, considers that student visas are insignificant, even when teachers' actions and inactions are directed directly to the students. For example, many studies have revealed differences between teacher perception and actual teaching practice. Stigler and Hiebert

(1999) found that they had unusual beliefs, but their teaching practices contrasted sharply with these beliefs. Similarly, a study by Perkkila (2003) revealed that the beliefs of teachers about mathematics were fundamentally unusual, but that their teaching practices remained manuals, rules, and procedures for solving problems. Li and Yu (2010) also noted some inconsistencies between beliefs and actual pedagogical practices among the teachers offered. Li and Yu also ascribed these irregularities to the lack of pedagogical knowledge about the content of mathematics education.

In Ghanaian colleges and universities, students' rating of teachers' instructions is widely used. However, there is a dearth of studies aimed at investigating teachers teaching practices based on the assessment of the views students have of their teachers teaching at the basic and high school education levels. In this regard, scholars such as Asiedu-Addo and Yidana (2004) and Mereku (2003) opined that the method employed in assessing teachers' teaching practices and teaching effectiveness where students' views have been ignored failed to provide reliable and accurate information. This is suggestive of having a more reliable and compelling account on teachers teaching practices and effective teaching; there is the need to develop an assessment scheme or criteria, which would consider both the views of teachers and students.

Students tend to develop a positive attitude toward mathematics when they see mathematics as a valuable and interesting subject or field of study. Similarly, when students perform poorly, they adopt counterproductive attitudes toward mathematics or consider mathematics to be boring (Callahan, 1971, Selkirk, 1975). In addition, high school students' perceptions of the relevance of mathematics tend to influence their decision to stay in mathematics class (Fennema & Sherman, 1978). The development of

constructive mathematical interest and behavior involves the direct involvement of the student in activities involving both qualitative mathematics and communication with other important people in a separate community as a whole (Van Oers, 1996). Mathematics teachers still face critical moments in teaching decisions that express their faith and confidence in mathematics and show how to approach them (Shroyer, 1978). In the confidence and interest of the students, the attitude towards mathematics education is an essential factor that creates an atmosphere that can solve problems at home and encourages students to feel encouraged to discuss mathematical problems with their teachers (Cobb, Wood, Yackel, Nicholls, Wheatley, Trigatti and Perlwitz, 1991). Students' attitudes and interest towards mathematics are strongly correlated with the clarity of the mathematics teacher, so his ability to use terminology in the "why and how" of the debate to solve problems and the ability to create a sense of continuity in the mathematical problems of the curriculum (Campbell and Schön, 1977).

The way in which classroom instruction is taught is crucial in many ways. This translates into increased government involvement in trying to determine how teachers should teach, either through more regulated approach. Session planning, stimulation of intellectual education, work environment, communications between teachers and students, and limited focus on sessions were factors related to student performance. Effective higher education creates a supportive environment in which students are encouraged to develop and implement diverse approaches. Experimental learning through reproduction requires a person to understand the educational experience (Zapalska and Dabb 2002). Regardless of race, age or religion, students should not be denied the same right to quality education, but should have ethnic and cultural orientations that influence

learning and outcomes (Witkin and Berry, 1975, Witkin and Goodenough, 1981). Witkin et al., 1977).From the above, it can be concluded that students from different subcultures may have different models of selected learning strategies. Culture defines the values, beliefs, custom, patterns of communication and aesthetic patterns transmitted from generation to generation (Churcher et al., 2015). All of this serves as a unique cultural force that helps to determine the behaviour of a society.

2.10 Empirical Review of Students Attitude and Achievement

Arthur, Asiedu-Addo and Assuah (2017) assessed students' perspectives and their impact on the interest of Ghanaian students in mathematics using a multivariate statistical analysis. A total of 1,263 respondents from ten (10) high schools in the Ashanti Region of Ghana, were drawn for the study. The study used questionnaires in the data collection. The study found that 58.1 percent of respondents agreed that the negative perception of mathematics in elementary school strongly affects the interest of students in mathematics as they continue their studies. However, 20.4 percent of respondents collectively denied that the negative perception of mathematics in elementary schools affected the interest of students in mathematics. It was also revealed that primary school students scored poorly with an average score of 3.6 and a standard deviation of 1.33. However, the study showed another relative value index of 0.74 as an overall score of the importance of participants. Researchers have shown that educators have taken notice of the impact of phenomenal interest of students in mathematics, which could be detrimental to their interests. The study further recommended practical teaching methods, which can adequately motivate students, as well as help, reduce bad perception to optimize interest.

Tanveer, Rizwan, Ali, Arif, Saleem, and Rizvi (n.d) examined the role of attitudes toward mathematics learning among students in the department of Management Sciences of Islamia University of Bahawalpur. In all, 108 students were drawn from undergraduates' program and were asked to respond to structured questionnaires. It was revealed that students, who obtained higher marks in mathematics, have had a good attitude and fondness towards the subject. The study also indicates that successes in mathematics create positive attitude hence the need for teachers to focus their attention on increasing the level of achievements to foster optimistic attitudes among students.

In 2010, Mutai assessed students' attitudes towards mathematics learning and math success among high school students in the Bureti region of Kenya. In this study, a descriptive approach was adopted. The study used a structured questionnaire to gather data from the teachers and students. A total of 24 teachers and 359 students from 6 high schools in the region were selected for the study. The data obtained were coded and entered into statistical analysis of social science statistics (SPSS) for analysis. The main findings regarding attitudes toward mathematics in high schools are lack of self-confidence and lack of interest to learn mathematics and obtain good score, as reported by 45 percent of students. In addition, 24 percent of respondents expressed a lack of interest in mathematics and 56 percent of respondents agreed that mathematics is a problem. Interestingly, the same percentage (56 percent) strongly contradicts the claim that mathematical education was mind numbing. Again, 49 percent of respondents indicated that they wanted to continue mathematics after graduation. The study recommended limiting unpleasant attitudes in time before students completely give up learning and / or mathematical performance. Mathematicians have also been advised to

use the available learning resources wisely to reinforce positive attitudes, neutral attitudes and to eliminate negative attitudes towards learning and mathematical performance.

In South Africa, Bayaga and Wadesango (2014) analyzed student attitudes towards mathematical performance based on factor structure. The purpose of this study is to determine the number of factors (mathematical self-determination, parenting education, home history, education, school climate, and attitudes) that represent interactions between groups of interdependent variables of student attitudes to learning mathematics. The study examined the contribution of each factor explaining the fluctuation of students' mathematical performance and the overall variation that can be explained by the given factors. An analysis of the findings was conducted by interviewing 321 randomized respondents in a research protocol. The Scree test and eigenvalues showed that more than eight factors were retained. These factors constituted 60.1 percent of the variation. The results show that seven of the eight factors in the study represent about one-fifth of the variation in mathematical success (20.7 percent). Self-concept, family background, teaching and attitudes accounted for 12.3 percent, 5.1 percent, 1.6 percent and 0.9 percent of the variation respectively. Bayaga and his colleague argue that the results are important for the South African education system, because students' understanding and attitude towards the evolution of mathematical and classroom teaching techniques is much easier to improve the factors that affect the performance of students.

In Chile, Ramírez studied the attitudes towards mathematics and academic achievement of the Grade 8 student in Chile. While carefully studying data from the 1999 International Mathematics and Science Study (TIMSS), the study showed that Chilean

students enjoy mathematics, but overestimate their mathematical skills. In addition, hierarchical linear models ware employed to predict mathematics performance, both at the student and classroom levels. At both levels, the importance of students studying mathematics, expectations for continuing education and confidence in the causes of their math scores were important predictors of performance. In classes where more students liked mathematics, their averages were significantly lower. Ramírez (2005) attributed phenomena to the demanding curriculum and the highest standards of evaluation used in the best performing classes.

Similarly, Churcher, Asiedu-Owuba and Adjabui (2015) in Ghana assessed the performance of high school students in mathematics education in Kassena-Nankana high schools. In total, there were 140 final year students from three (3) selected schools in the community. Respondents were sampled using a purposive sampling method. The study used SPSS version 16 to generate many results for the analysis. Several analyzes were also generated with the use of linear regressions. Teacher performance and inadequate textbooks have been identified as the main cause of poor student performance. It has also been found that parental and extracurricular activities affect student performance. The study also shows that when assessing student performance, parameters such as the presence of students in the classroom, solving self-directed math problems, attending extra classes, students with a group study and the duration of the study outside the classroom needs to be taken into consideration.

In terms of attitude of students and its effect on achievement, Michelli (2013) conducted a study that looked at fifth grade students. Sex in the study played a key role in determining the relationship between attitude and performance. In addition, several types

of traits were examined, including extraversion, awareness, self-control, and the intellectual ability to determine their impact on performance. A Likert questionnaire and a mathematical test was developed and administered for the study. The study revealed a strong link between mathematics attitudes and mathematics success. In terms of gender, it was found that men had a more positive attitude towards mathematics than their respective women did, but in the performance test, gender did not differ in the assessment. Extroversion has also been found to be the only feature that has a significant relationship with performance, suggesting that less fit students may be able to score higher on the test. According to Michelli (2013), the findings are extremely a wake call on especially educators on how they ought to be in knowing of students' attitude and the need to improve on them to influence their performances (i.e. academic achievement) positively.

2.11 Chapter Summary

The chapter looked at students' attitudes towards mathematics and the implications on achievement or academic performance in the subject. It did this by first considering both the conceptual and theoretical frameworks of the study. It then looked at the meaning of motivation and how motivation affects students' academic taking into cognisance mathematics. Literature survey also assessed the correlation between gender and students' attitudes toward mathematics as well as academic performance. The chapter critically examines the extent to which teachers' classroom attitudes sometimes contribute to students' attitudes and performance in mathematics. Also considered under this chapter is how mathematics-learning environment affect students' attitudes formation towards mathematics and the resultant effects on academic attainment or performance.

Succinctly, following the various literature explored under this chapter, we can conclude that the relationship between students' attitudes towards mathematics and their mathematics results is very strong. Thus, a student who has negative attitude towards mathematics stemming from the learning environment, individual differences among others tends to perform poorly in the subject and vice-versa.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter looks at how research in general has been conducted in response to the perception of mathematics by JHS students and their successes based on these three research questions:

1. What characterizes the attitudes of junior high school (JHS) students towards mathematics?
2. a. How does students' attitude towards mathematics affect their mathematics achievement?

   b. Is there any relationship between gender and achievement in mathematics among Junior High School students?
3. What is the relationship between the attitudes and learning experiences of JHS students in mathematics?

It will also review the study design, the context of the study area, the sample population of origin, the scope and sampling methods used, and the research tools used to collect the data. Finally, it describes how data and data analysis processes were conducted.

3.2 The Research Design

The research anchors on the mixed method approach to researching. This makes relevance of the quantitative and qualitative paradigms. The three research questions underpinning this study cannot be handled quantitatively or qualitatively hence the need

to employ the mixed method approach. Moreover, the study adopted mixed method approach because each of the methods complemented each other in responding to the three questions guiding the study to make the work worthwhile, and this is supported by the literature. For example, Hart, Smith, Swars and Smith (2009) confirmed the fact that many educational scholars have recognized that the complicatedness of current issues in the field of education warrants many-sided or involved research blueprint. Silver (2004) strongly argues that, it would be prudent if we analyse or examine critically the research design and methods used and recognize that quantitative, as well as qualitative approaches are best for issues that are deep-rooted in the field of mathematics education.

Table 2: Research Design Matrix

RESEARCH QUESTION	DATA TYPE	INSTRUMENT(S) USED
What characterises the attitude of junior high school (JHS) students towards mathematics	Quantitative	Questionnaire
How does students attitude towards mathematics affect their mathematics achievement/ Is there any relationship between gender and achievement in mathematics among Junior High School students?	Quantitative/Qualitative	Questionnaire/Interview/End-of-term scores

What is the relationship between the attitudes and learning experiences of JHS students in mathematics	Quantitative/Qualitative	Questionnaire/Interview

Mixed methods research to Croswell (2015) is an approach to researching a study, thereby making use of both quantitative and qualitative approaches on the premises of collection, analysis, and integration of the data or information. He further argues that both qualitative and quantitative approach integrated into a single study establishes a better understanding of a problem or issue than either research approach alone. Hanson, Creswell, Plano-Clark, Petska and Creswell (2005) as cited in Ampadu (2012) assert that researchers in their quest to have a full insight into a situation often employ both quantitative and qualitative (i.e. mixed methods) approach in a single study. This they believe leads to simultaneous generalization of the findings from a sample to a population. Creswell (2003) view to mixed method approach in research is in support of the views expressed by Hanson et al. (2005). In sum, the study adopted this research method because since it is an integration of two methods, it is more formidable to help generate comprehensive data to aid in providing deeper insights into the issues at hand than just adopting a single method. Figure 3 expounds on the design procedures for analysis of data from the study. The triangulation design was selected from among the embedded design, explanatory design and exploratory design for this study. The strength of the triangulation design is that the researcher is able to collect both data at a go and data is collected and analyzed separately and independently before they will complement

each other for a conclusion. Although triangulation comes with several strengths, there are also other limitations. A researcher could be in trouble if both quantitative and qualitative do not produce same or similar result.

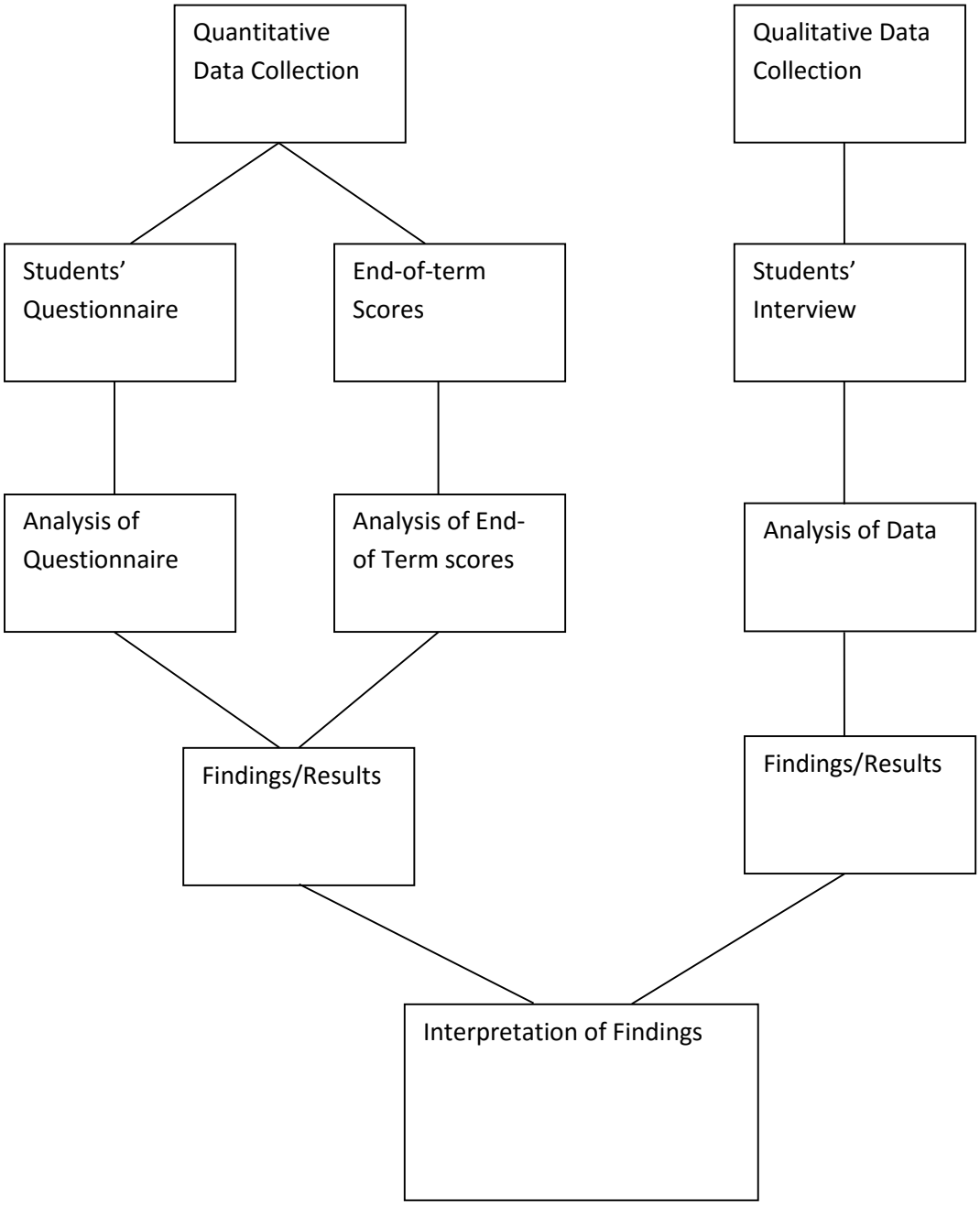

Figure 3: The Triangulation mixed method design by Creswell and Clark (2007).

As indicated in the triangulation mixed method design (figure 3), it throws light on how data was gathered separately or independently from the quantitative and qualitative instruments. After gathering the data, it was then analyzed independently and afterwards the results were merged and a conclusion was made on the findings. A case study and surveys design were adopted in this study. Moreover, details of these were presented.

3.2.1 Survey

Survey was the preferred choice for the study because the researcher was much particular about students' attitude towards mathematics and survey was the best approach to collecting such data. This affirms the suggestion of Pring (2004) that, "surveying does not depend upon an outside observer". The survey therefore considered the views of the students who formed the object of the research. The survey "questionnaire" helped in the quantitative aspect of the work. Surveys can be defined as procedures in quantitative research in which investigators administer a survey to a sample or to the entire population of people to describe the attitudes, opinions, behaviour, or characteristics of the populations (Creswell, 2012).

Moreover, McIntyre (1999) asserted that information about attitudes, which are difficult to measure using observational techniques, would be obtained through surveys. In support of the argument by McIntyre, Light and colleagues (1990:234) put forward that, "If used wisely, it [survey research] can lead to improvements throughout the entire fabric of an institution."

3.2.2 Case Study

This study adopted case study because looking at the issue under consideration it seemed the most ideal. This choice is justified by Yin (2003) assertion that a case study is an experiential inquest that probes a contemporary development within a real-life context, particularly when the limitations between phenomenon and context are not evident (Yin, 2003). Yin further identifies four instances where the application of a case study research is needed. Thus, when (a) the study aimed at answering "how" and "why" questions; (b) the behaviour of those involved in the study cannot be manipulated (c) you want to cover contextual conditions because you believe they are relevant to the phenomenon under study; or (d) the defining lines between the phenomenon and context are not obvious. The researcher, in this instance, agrees to the analogy opined by Yin and therefore, the choice of case study in the study to answer the interview questions that takes charge of the qualitative aspect of the mixed method research being undertaken by the researcher. In conclusion, interview, documents and archival records that form part of the six (6) sources of evidence by Yin were applied in the case study (Yin, 1994).

3.3. Study Area

This study took place in the district of Asunafo South which forms part of the new Ahafo Region carved out of the then Brong Ahafo through a referendum on December 7, 2018. The capital is Kukuom. The Asunafo South District was carved from the then Asunafo District with its capital as Goaso by the legislative instrument L. I. 1773 in the year 2004. The District, which is in the southern part of the Brong Ahafo Region, has an estimated land size of about 3,737 kilometre square. The Asunafo South District as it were shares boundaries in the Western Region with Sefwi-Juabeso and Sefwi-Wiawso

Districts to the South West and East, respectively. It again shares boundaries with Atwima-Mponua District to the East in the Ashanti Region. Finally, it enjoins common boundaries with its mother Asunafo North District in the same Brong Ahafo Region to the Northern part. The 2010 population and housing census by the Ghana Statistical Service puts the population of the district at 95,580 which comprised 48,836 (51.1 percent) males and 46,744 (48.9 percent) females (Census, 2010). Therefore, based on the pegged annual growth rate of 2.6 percentage point per annum, the figure is currently put at 117,499.00 using the geometric growth system. This figure of 95,580 represents 4.1 percent of the total Regional population.

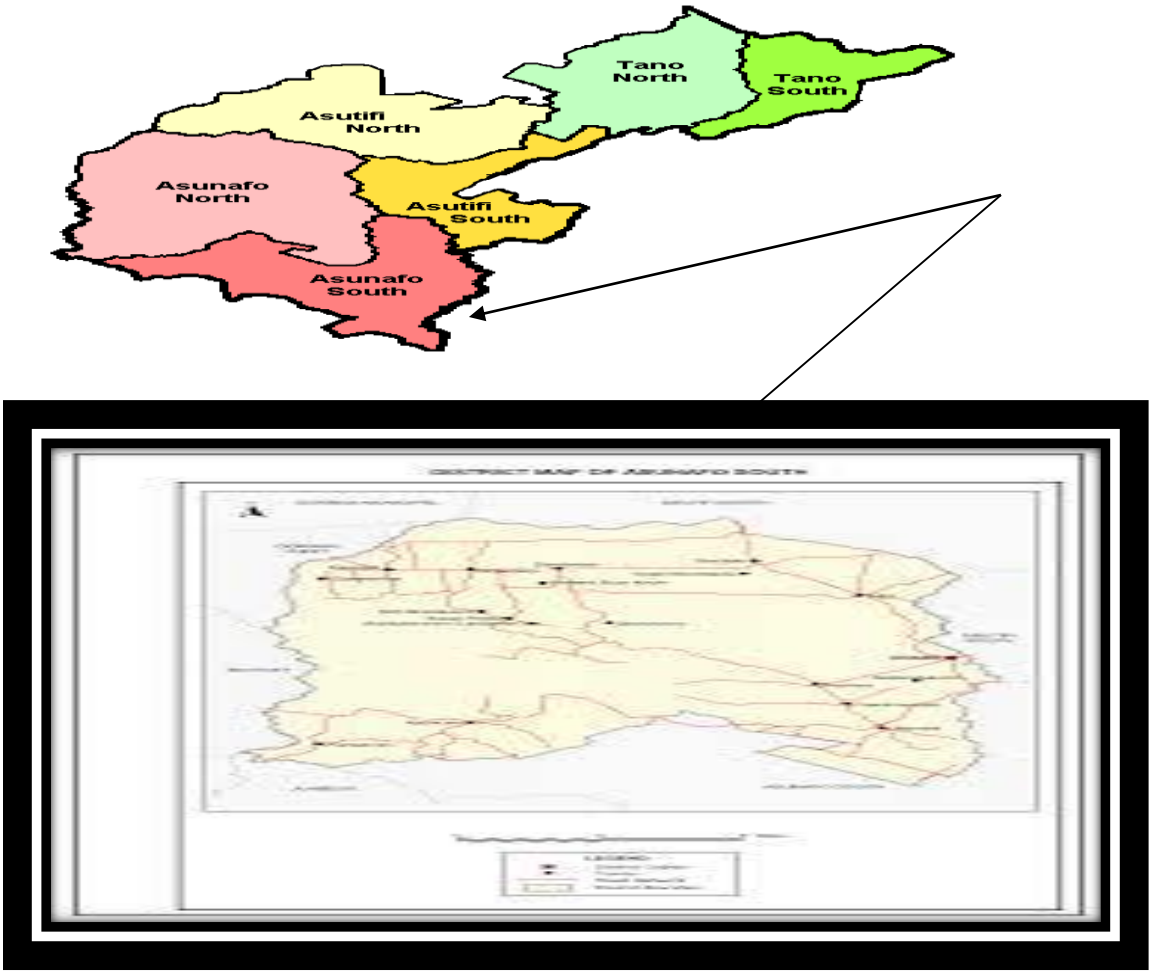

Figure 4: Map of Asunafo South District

The educational directorate has eight (8) circuits. The Asunafo South District (2018) indicates below the number of schools (public/private) that make up the basic level in the district.

Table 3. Basic Schools in Asunafo South

SCHOOL	PUBLIC	PRIVATE	TOTAL
Nursery/Kindergarten	68	10	78
Primary	68	09	77
JHS	67	06	73
TOTAL	203	25	228

Source: GES, Asunafo South 2018.

3.4 Population

According to McMillan (1996), "a population is a set of elements or cases, whether they are individual objects or events that meet certain criteria and whose results we want to generalize." Similarly, Ary, Jacobs and Razavieh (2002) concluded that the population is the entire group of people to which the results of a study apply. For the purposes of this study, the population is therefore the group on which the researcher wishes to draw conclusions. The population of this study was comprised all JHS schools and students in the Asunafo South District. There are seventy-three (73) junior high schools in the district. The student population according to statistics of the educational directorate stands at 5,581. This population consists of 2,986 boys and 2,595 girls (GES, 2018). Details per circuit are in Table 4.

Table 4: Basic Schools Population Statistics per Circuits in Asunafo South

S/N	CIRCUIT	BOYS	GIRLS	G TOTAL
1	Kukuom	592	586	**1178**
2	Noberkaw	353	319	**672**
3	Kwapong	399	335	**734**
4	Sankore North	552	457	**1009**
5	Sankore South	379	326	**705**
6	Asarekrom	276	219	**495**
7	Abuom	264	196	**460**
8	Nakertey	171	157	**328**
	GRAND TOTAL	**2986**	**2595**	**5581**

Source: GES, Asunafo South 2018.

3.5 Sample Size and Procedure

Sample is a carefully selected subset of the units that comprise the population (Amedahe, 2002). A purposive sampling approach was applied in selecting 24 schools out of 73, which were already put in strata of eight (i.e. based on the eight circuits in the district).

Three hundred and sixty (360) students were selected to participate in the answering of the questionnaire. The 360 were comprised 15 students (5 each from JHS1-3) from each school and three males and two females constituted the selected five from each class. Therefore, 216 males and 144 females completed the questionnaire. A simple random sampling technique was adhered to in the selection of the five students (three males and two females) in each of the classes, JHS 1-3 in the selected schools. Per the

urban cap of 5,000 people according to the Ghana Statistical Service, six schools were from urban whereas 18 were also rural.

On the other hand, two (2) schools, one rural and urban each were selected for the interview. In each of the school purposively selected, five (5) students were randomly selected from the fifteen (15) students that answered the questionnaire. These five (5) were made up of 3 males and two females. Besides, in wanting to find out whether or not mathematical performance is gender-specific, ten (10) students from a school, thus, five (5) males and five (5) female students were purposefully selected from the fifteen (15) students that responded to the questionnaires and interviewed in that regard.

Table 5: Population and Sample Size

CIRCUITS IN THE DISTRICT	NUMBER OF SCHOOLS	SCHOOLS SAMPLED	EXPECTED SAMPLE SIZE
Kukuom	14	3	45
Noberkaw	8	3	45
Kwapong	9	3	45
Sankore North	11	3	45
Sankore South	12	3	45
Asarekrom	7	3	45
Abuom	7	3	45
Nakertey	5	3	45
TOTAL	73	24	360

3.6 Data Collection Instrument

The tools used to collect the study data are the questionnaire interviews and end-of-term scores (class work, homework and exams). The researcher found these tools appropriate to answer the research questions that led to the study. The questionnaire catered for the quantitative aspect of the work and with items being mostly closed questions. On the other hand, a semi-structured interview served the qualitative aspect of this very mixed approach research. The questions put forward for the interview were all open-ended in nature.

3.6.1 Development of the Questionnaire

A questionnaire is a vital research instrument or tool used for data collection (Oppenheim, 1992) and its basic function is the measurement. Based on the conclusion of Oppenheim, Bulmer (2004) opines that, questionnaire is a very vital tool within social science research that basically collects information on participants' in view of matters relating to their social distinctiveness, present and past, standards of behavior or attitudes as well as beliefs and reasons for action with respect to the topic under investigation.

In the researcher's quest to investigate the attitude of students, there was the need to solicit the view of students. Therefore, the choice of Likert type questionnaire, which is one of the most widely used techniques to measure attitudes (Ary, Jacob, and Razavieh 2002), was adopted. Apart from the fact that the Likert type questionnaire is popular; the researcher has an interest in it because it is convenient to construct, administer and score. The questions that formed the questionnaire to be administered to the sampled students were all closed-ended.

The semi-structured questionnaire for the students had 25 questions that were put into two groups or sections. The first part had 5 questions and basically used to collect demographic details about the students. The second part of the questionnaire was sub-divided into three (3) sections of questions 1, 2 and 3 adopted from existing tools (Ampadu, 2012; University of Cambridge-Faculty of Education, 2010). Question A was geared towards gathering information about what characterizes students' attitude towards mathematics. Questions B and C gathered information on the relationships between students' attitudes and their experiences toward mathematics. The questions A and C were in Likert scale format, respectively. The questions were answered using (SA-strongly agree, A-agree, D-disagree, and SD-strongly disagree) on the Likert scale. Question B of the questionnaire requested students to answer on how often they consider those questions. Students select from (Always, Sometimes and Never) in this circumstance.

3.6.2 Interviews

Interviews are the most used data collection method in collecting qualitative data (Ampadu, 2012). The interview generally denotes a dialogue between two or more people with the sole aim of achieving a specified goal. It is believed that interviews permit interviewers to observe and gain insights from non-verbal cues (Anderson, 1998; Gochros, 2005). Further to this, Byrne (2004) as cited in Ampadu (2012) noted that interviews as a relevant tool in the assessment process in respect to the attitudes of individuals and morals since they are difficult to be observed or put up in an official questionnaire. Interview as a primary data collection is useful by the researcher in the sense that detailed information about research questions is collected. Moreover, the

researcher has control over the process and can adopt all necessary and appealing strategies to lay hands on what he or she is after. The interview is however considered challenging since it requires a longer time. Another difficulty centres on the scheduling of time with respondents and at the same time getting the respondents to meet and respect the scheduled time.

Largely, interviews are categorized into three forms namely; the structured, the semi-structured and lastly the unstructured type. For purposes of this study, the semi-structured interview with all open-ended questions was selected for the study. The reason being that the interviewer in semi-structured is always at the helm of affairs controlling the process leading to the soliciting of information from the respondent, and the interviewer with the liberty of applying new strategies as and when it becomes necessary in the process (Bernard, 1988). I again chose semi-structured interview method because it allows the interviewee the freedom of expressing his/her viewpoints in a manner that comforts him/her. I needed these students to give real hand accurate information, therefore, the choice of semi-structured interview for the study.

In all, ten open-ended questions were put forward for the interview section of the study. Those questions helped in the collection of qualitative data to answer the second research question of the study. It appeared in two parts, the first part on demographic information and timelines for the process and final part on the other hand, contained the ten open-ended questions. Thus, the first part aimed to solicit information on the backgrounds of the respondents whilst the final part tailored at garnering information on the issue under investigation.

3.6.3 Cumulative Record

This is used to record each student performance in class assessment test and examination at the end of every academic term. To get an accurate data of the students' achievement in Mathematics, the cumulative record (End-of-term scores) of each student captured under the study was adequately recorded which gave the actual academic score of every student performance in Mathematics. This was executed because the researcher wanted to find out about the performances of the students and to establish whether such performances could be linked to the attitudes of students towards mathematics.

3.7 Validity and Reliability of Instruments

Validity and reliability are essential in research findings. Validity is the degree to which research accurately represents that which it was intended to research (Charmaz, 2006)). Specific to the topic, an attitude scale's validity points to the extent at which the measure accurately measures the attitude it is anticipated to assess (Eagly and Chaiken, 1993). Ary, Jacob and Razavieh (2002) maintained that validity is very important in the development and evaluation of research instruments. In simple term, validity determines whether an instrument measures what it is anticipated to measure. With the aim of ensuring validity, the drafted questionnaire and the interview guides were foremost given to my supervisors and colleague students at the Teacher Education Department for their comments, suggestions and corrections. Second, to ensure the reliability of the instrument used for the study, a pilot testing was conducted with Islamic, New Apostolic JHS and Presby JHS all at Kukuom, Asunafo South District in January 2019. The researcher's selected schools form part of the population and exhibit the same characteristics as the schools that are within the study area.

In the process, matters of clarity, understanding and ambiguity were discussed with the students and the feedback obtained helped the researcher to develop a final questionnaire. Teachers made inputs during the process. Five students from JHS 1 to 3 from each of the selected school participated with the help of simple random sampling technique. A Cronbach's Alpha of 0.79 confirmed the reliability of the instrument as it is above Pavet et al. (1991) Cronbach's Alpha of less than 0.7 considered not to be reliable.

3.8. Procedure for Data Collection

Prior to the data collection process, the researcher had requested the formal approval of the Asunafo South Education Council (see Appendix A) as well as the school principal and the underlying teachers (mathematicians) in the schools selected. Parents were also contacted through teachers to inform them about the purpose of the research and, therefore, the involvement of their departments in the project. Respondents (students) also stated that the exercise was for academic purposes only and that confidentiality is guaranteed to encourage them to give their answers without question.

An introductory letter that was sought from the Teacher Education Department (see Appendix B) necessitated these approvals acquired.

3.9. Data Analysis

The researcher in this work adopted the triangulation mixed method design. The Triangulation mixed method design according to Almalki (2016) is aimed at gathering complimentary but distinctly different data on the same topic, which can be amalgamated together for onward analysis and interpretation. Creswell and Tashakkori (2007) who supports the blend of mixed method approach (i.e. qualitative and quantitative) further

argue this. They further postulate that the integration will contribute to a better understanding of the study under investigation. Subject to this, quantitative, and qualitative data were analyzed separately as explained below;

3.9.1 Quantitative Analysis Procedure

The answered questionnaire was in the first instance scrutinized by the researcher to check whether they have been completed correctly. After, they were coded and analyzed using Statistical Package for Social Sciences (SPSS). More importantly, relevant information was presented in the form of graphs, charts, and tables to make the findings clearer. Both descriptive and inferential analyses were carried out to answer all the research questions. The researcher believes that, adopting both descriptive and inferential statistics indicates a powerful avenue for description and prediction in data analysis. It also brings to bear the complete picture of the data collected from the population. The statistics were much a choice by the researcher because there was the need to describe the patterns that emerged from the data and was interested in the performance of the students in relation to their attitudes.

3.9.2 Qualitative Analysis

Thematic analysis technique, which is identified as an avenue to understanding issues more widely (Marks and Yardley, 2004), was employed for the analysis of qualitative data. Braun and Clarke (2006) see thematic analysis in the form of identification, analyzing and reporting of patterns in the data collected during interviews. This form of analysis was employed because it is very useful in summarizing crucial features of a huge dataset in that it compels the researcher to take a well-structured

approach to managing data as well as helping to produce a clear and organized final report.

3.10. Ethical Consideration

About the consent, the authorities of the schools where the participants (students) were sampled from for the study were served with an introductory letter and approval granted. This was followed by an explanation of the purpose and objectives of the study. Subsequently, participants were free to participate in the study and to withdraw if they did not feel comfortable in the process. The researcher then guaranteed the participants anonymity and confidentiality. In addition, for anonymity sake, fictitious names were ascribed to participants to shade off their identities and their statements in the research.

CHAPTER FOUR

DATA ANALYSIS AND DISCUSSIONS

4.1 Introduction

This chapter dealt with the analysis and interpretation of the results of the data collected for the study. This was done according to the objectives of the study. The first section presented the demographic characteristics of study participants. It further presented the results in accordance with the objectives set for the study. Discussions on the results of the study followed.

4.2 Results

4.2.1 Demographic Characteristics of Respondents

To make sure the sampled participants truly represented the population chosen for the study, the demographic variables were collected and analyzed. These are presented below.

The study comprised of twenty-four (24) schools. There were fifteen (15) participating students from each of the twenty-four schools. This represents a percentage of 4.2 across board. The study had 60 percent of the respondents being males whilst 40 percent of them were females. This shows that the study had more male respondents as compared to female respondents. This reflects the number of both genders in the schools in the study area.

The ages of the students were taken into consideration and analysis of that follows in respect to the ages of the respondents, the study found out that 36.39 percent of the

students were between the ages of 10-13 years, 36.11 percent of them were between the ages of 14-16 years and lastly, 27.5 percent of them were above 16 years. From the analysis of this data, it can be observed that majority of the respondents of the study were between the ages of 10-16 years.

In terms of the classes of the respondents, the study again found out that 33.33% of them were in JHS 1, 33.33 percent were in JHS 2 whilst 33.33 percent were in JHS 3. This clearly shows that the classes of the respondents were evenly distributed with respondents coming from each of the classes in the Junior Secondary level.

Moreover, the study considered the location of the schools that participated in the study and found out that 75 percent of them were from rural areas whilst 25 percent of them were from urban areas.

4.2.2 Demographic Characteristics of Interviewees

This section analyzed the qualitative data that was collected for the study. Based on the aim and objectives of the study, the data were thematically analyzed by grouping the responses of the respondents under various themes for easy interpretation and comprehension. This section also presented the demographic data of the interviewees of the study. This was done to ascertain whether the interviewees are representative of the population selected for the study.

In view of the above, the study established that 60 percent of the interviewees were males whilst 40 percent of them were females. On the location of their respective schools, it was again found out that 50 percent of them came from rural schools whilst another 50 percent were also from urban schools. This gives a fair representation of

gender and rural/urban location of schools. This shows that the interviewees selected for the study are representative of the population of school and students sampled for the study.

Following the responses of the interviewees, two (2) key themes emerged from the interview data and they were;

- Attitude towards studying Mathematics
- Relevance of Mathematics

The two themes that emerged from the interview session also had sub-themes that were deduced from the main themes. The sub-themes that emerged from the theme of attitude towards studying Mathematics were;

a). Preference of Mathematics

b). Influence of colleagues and teachers on studying Mathematics

This section analyzed the data in relation to the emerged themes and sub-themes from the interview session with the interviewees and these were described using narrative techniques, representative quotes, and summaries in order to give a clearer understanding of the topic under study.

4.3 Research Question 1

4.3.1 Attitudes of Students towards Mathematics

To find answers to the first research question relating to students attitudes toward mathematics, the participants were asked to indicate their agreement to nine (9)

questions, testing their personal characteristics and future relevance as agents of attitudinal development. Table 7 depicts the participants' responses.

Table 7: Table showing respondents attitudes towards Mathematics

Variable	SA	A	D	SD	Mean	Std. Dev
1. The Mathematics we study in school is useful in other subjects	58.1	26.1	6.6	9.2	1.67	.95
2. I like studying Mathematics	29.7	46.7	15.0	8.6	2.02	.89
3. I look forward to doing Mathematics	47.2	23.6	16.1	13.1	1.95	1.08
4. I find Mathematics difficult	46.4	23.3	23.6	6.7	1.91	1.08
5. Mathematics is relevant to life in today's world	76.4	16.4	2.2	5.0	1.36	.76
6. I enjoy studying Mathematics	38.1	32.2	19.2	10.6	2.02	.99
7. Mathematics is boring	19.4	20.8	25.3	34.4	2.75	1.13
8. I find Mathematics interesting	41.4	35.0	13.3	10.3	1.93	.98
9. Even when it gets hard, can do our Mathematics work	23.6	31.9	37.8	6.7	2.28	.89

Strongly Agree = SA, Agree = A, Disagree = D, Strongly Disagree = SD

Source: Researcher's Fieldwork.

Table 7 has been examined in two categories, personal characteristics and future relevance in view of what characterizes students' attitudes toward mathematics.

In respect to their personal characteristics, it is evident from the responses that students' have positive personal characteristics towards mathematics except to concede though that mathematics is a difficult subject. 76.4 percent of the responses indicated inclination or like as opposed to a dislike of 33.6 percent. This could be attributed to several factors including students' aspirations, among others. As regards students' perception as to whether mathematics is a difficult subject, most of the respondents (69.7 percent) affirmed the statement whilst the remaining 30.1 percent held opposite. This is quite indicative that a fair majority of the pupils found mathematics as difficult. As to whether pupils enjoy studying mathematics, a majority of 70.3 percent indicated that they enjoy studying the subject whilst the remaining 29.7 percent indicated otherwise. As regards whether students consider Mathematics as boring, less than 50 percent responded in the affirmative whilst the majority disagreed. It can therefore be said that most of the students do not consider Mathematics as boring.

Furthermore, it can be observed that majority of the students consider mathematics as an interesting subject as over 76 percent of them responded in that direction. Thus, it makes sense that most pupils consider mathematics as interesting and are bent on putting in their best efforts possible to attain their set targets in life. About 55 percent indicated their willingness in attending to harder questions. To add to this, though the responses above indicate that a little more than half of the pupils were prepared to attempt to difficult mathematical problems, I must say that the percentage difference thus,

55.5 percent against 44.5 percent, simply suggests that more work has to done to whip up the attitude of the pupils in attempting more tasking mathematical problems.

It can well be examined from table 7 under future relevance that majority of the respondents agreed mathematics is useful in other subjects. Thus, with a whopping 84.2 percent of respondents as against 15.8 percent agreeing to the usefulness of mathematics in other subjects, it is suggestive that the respondents truly understand and appreciate the relevance of mathematics in their lives. The analysis also indicated that majority of the students' look forward to pursuing mathematics, as 70.8 percent of them rendered affirmative answers as against 29.2 percent who disagreed. With regard to the relevance of mathematics in the contemporary world, it can also be observed that 92.8 percent as opposed to 7.2 percent underscored its relevance. Thus, one is right to maintain that the students' underscored the relevance of mathematics in all spheres of their lives.

4.4 Research Question 2

4.4.1 Effect of Attitude on Mathematics Achievement

This section sought to find out from the respondents of **the study how their attitudes toward mathematics influence their achievement level generally and in respect to gender.** Based on that, an Independent T-test was carried out to find out how the attitudes on Mathematics influence achievement. For easy analysis, students who scored 50 percent and above were classified as above average and students who scored below 50 percent were classified as below average.

Results from Table 8 show that students with high attitude towards Mathematics also have high achievement (M = 3.259, SD = 1.07) towards Mathematics than students

with low attitude (M = 2.842, SD = .89), [$t_{(358)}$ = 1.662, p = 0.006]. This means that attitude towards Mathematics affect achievement in Mathematics. It is important to note that the more positive an individual's attitude towards mathematics the higher the possibility to make strides in mathematical attainment.

Table 8: Attitude and Achievement in Mathematics

Attitude *Achievements	N	Mean	SD	df	t	p
Above Average	341	3.259	1.07	358	1.662	.006
Below Average	19	2.84	0.89			

P<0.05

Results from Table 11 shows that male students (M = 34.17, SD = 6.16) do not have higher Mathematics learning achievement than female students (M = 21.56, SD = 5.21), [t (108) = -.612, p = 0.39]. Thus, the mean difference between male and female is not statistically significant since p-value > 0.05. This means that there are no gender differences in Mathematical achievement among the respondents.

Table 9: Gender difference in achievement towards mathematics

Gender	N	Mean	SD	df	t	p
Males	216	34.17	6.16	358	-.612	.39
Females	144	21.56	5.21			

P<0.05

4.4.2 Relationship between Attitude towards Mathematics and Mathematics Achievement

This section in complement to the analysis above sought to test the relationship that existed between the respondents' attitude towards the study of mathematics as a

subject and how it influences their achievement in mathematics. It also compared the achievement in mathematics between urban schools and rural schools. Based on that, the Pearson Moment Correlation was used to test for the type and degree of relationship that exists between the two variables; Attitude and Achievement whilst the Independent T-test was also used to test for the differences in Mean and Standard Deviations between the achievement of urban and rural schools in relation to mathematical test. The findings are below:

From the Table 9, it is shown that there is a strong positive relationship exists between attitude towards mathematics and its achievement, and it is statistically significant ($r = .761^*$, $p (.008) < .05$). This means that an increase in attitude will lead to better academic achievement. In this case, the more students develop positive attitudes towards the study of mathematics, the more they are likely to achieve greater success in mathematics as a subject. In that regard, if one does not develop positive attitude towards the study of mathematics, he or she will be unable to achieve success in the subject.

On the strength of the correlation, a strong positive correlation (0.761) exists between the attitude towards mathematics and the achievement in the subject. This is in accordance with the analogy of Malhotra (2007) that, a correlation figure of 0 shows no correlation, 0.1 – 0.4 shows mild correlation and 0.5-0.9 shows a strong correlation. This means that an attitude towards the study of mathematics will automatically lead to greater achievement in mathematics. It can therefore be said that attitude towards mathematics is one of the greatest predictors of achievement in the subject.

Table 10: Correlation between Attitude towards Mathematics and Achievement of Mathematics

	r	p
1. Attitude towards mathematics	.761*	
2. Mathematics scores		.008

P <.05

4.4.3. Attitudes toward Mathematics

Students were interviewed to enquire on their attitudes toward mathematics. The following answers were obtained in view of the questions given them. The interviewees were asked whether they like mathematics and on that, interviewee 1, a J.H.S.3 student indicated "*yes, because it is interesting for me"*. The interviewee 2 who is in J.HS.2 also said "*yes, I like mathematics because mathematics is a way of thinking logically"*. The same positive response was given by interviewee 9 who stated that "*Oh I like mathematics because in this modern world, if you want to do anything it involves mathematics"*. However, interviewee 4, a J.HS.2 student was of a different view and she indicated "*No because it is very difficult to me"*. In the same manner, interviewee 5, a J.HS.1 student agreed with interviewee 4 by saying, "*No because it is a very difficult subject"*. This shows that whilst most of the interviewees show great preference for Mathematics and thereby having positive attitude towards it, others make it explicitly clear that they do not like Mathematics and that it is very difficult subject to study. This means that not all the students have positive attitude towards the study of Mathematics.

When asked how often they learn Mathematics and what their reasons are, the interviewees gave various responses. Interviewee 2 who is a J.H.S 2 student responded by saying "*Sometimes and whenever mathematics subject is in the classroom".* Similarly,

interviewee 4 who is a J.H.S.2 pupil responded by saying "*Sometimes when teachers give me work".* In addition, interviewee 5 who is a J.H.S1 student responded by stating "*Every day because it is a very difficult subject".* Likewise, interviewee 7, a J.H.S 1 student responded by saying, "*I like to study it every day because I don't want to fail during mathematics exams".* In furtherance, interviewee 9 who is a J.H.S.3 student responded by saying "*Every day, because like what I said before, everything you do involves mathematics and I want to overcome it".* The responses above indicate that the interviewees regularly study and answer Mathematics questions in class to be abreast with knowledge and information in Mathematics. It can also be deduced from their responses that they usually study Mathematics only when lessons are ongoing and do not do so in their leisure times. This shows that even though the interviewees state that they have interest in Mathematics, they mostly do so to pass their examinations and assignments.

When asked if they would volunteer to respond to a question in Mathematics if they know the answer, they all answered in the same accord, *Yes.* This means that all the interviewees show that they do voluntarily answer Mathematical questions in class whenever they know the answer. This is a positive development and shows a high level of student interest and attitude towards Mathematics.

When asked about whether mathematics is a male or female thing or not, respondent 1 (JHS 1); respondent 3 (JHS2); respondent 5 (JHS 3) and respondent 8(JHS3) who all happened to be female indicated that their male counterparts do not perform better them in the subject. Therefore, it would be wrong to intimate that mathematics is not their thing but rather a thing of their counterparts'. They further

mentioned that they all performed equally, hence, no need to attribute better academic performances in mathematics to their male counterparts. However, respondent seven (JHS 2) who also happened to a female, indicated that mathematics is never their thing; it is a male area. Turning to their counterparts, respondent 2(JHS1), respondent 4 (JHS 3) strongly intimated that mathematics is their thing because they perform far better than the opposite. The remaining three respondents thus, respondents 9, respondent 6 and 10 who happened to be in JHS 3, JHS 1 and JHS 2 respectively said that they cannot candidly say that mathematics is a male area of dominance because it is not always the case that boys/males emerge a stop-performers in the subjects. They further indicated that the subject is for either gender. Thus, mathematical performance is not gender-specific but rather attitudinal in nature. By implication, mathematical achievement boils down on the individual's attitude towards the subject; a healthy attitude would definitely translate into better performances and the opposite is also true, thus, unhealthy attitude towards the subject would bring about distasteful outcome.

4.5 Research Question 3

4.5.1 The Relationship between Attitudes and Learning experiences of Students

From Table 10, it is indicative that a positive relationship exists between students' attitude towards mathematics and their learning experience in mathematics and it is statistically significant since the p-value < 0.05 ($r = .426^*$, $p (.004) < .05$). This means that students who have positive learning experiences towards the study of mathematics are more likely to have positive learning achievement in mathematics.

Table 11: Relationship between Students' Attitude and Learning Experience of Mathematics

	r	p
1. Attitude on Mathematics	.426*	
2. Learning Experience		.004

P <.05

In addition to this, the students were interviewed to elicit their views on how their attitudes, peers and behavior of teachers influence their interest and decision in the learning of mathematics. About how their peers influence their learning of mathematics, the study tried to find out how their colleagues encourage/discourage them from developing positive attitude towards Mathematics. When asked what happens whenever they give a wrong answer, interviewee 1 a JHS3 student stated, "*My friends laugh at me".* Similarly, interviewee 3 a JHS2 student responded by saying, "*Most of my friends laugh at me and my teacher shut them up and encourages me to do it".* In the same manner, interviewee 6 who is a JHS1 student responded by indicating, "*I feel shy because my friends tease me".* Interviewee 8, a JHS3 student answered the question by saying "*My teacher motivates me that I should go and study".* Another JHS3 student identified as interviewee 9 stated "*Oh when I gave a wrong answer, my teacher congratulates me to continue with that because I was on the way for the correct answer so I shouldn't give up".* A somewhat similar was given by a JHS3 student- interviewee 10 which read, "*The teacher encourages me to do more".*

From the analysis of the interviewees responses above, it can be seen that whilst the colleagues of interviewees tease and make fun of them whenever they answer Mathematics questions wrongly, thereby negatively affecting the interviewees attitude

towards the study of mathematics, their mathematics teachers on the other hand encourage them to study hard and work harder towards mathematics achievement. It actually confirms that their colleagues' attitudes are disruptive whilst their teachers' attitudes are encouraging. This explains that one's attitude is significant on others and as such can greatly affect one's achievement and abilities in mathematics.

On how they intend to talk to their friends about Mathematics, interviewee 1 a JHS3 pupil gave a response, which read, "*I always tell them that mathematics is a good subject, and everybody should learn mathematics"*. Interviewee 3 a JHS2 pupil posited, "*I intend to talk to them to learn mathematics because mathematics is very interesting subject".* Interviewee 4 responded by saying, "*I won't allow them to learn it is a very difficult subject".* A similar response was given by interviewee 5, which read, "*I will tell them not to choose mathematics".* Contrary to interviewees 5 and 4, Interviewee 8 posited that, "*I always intend to talk to them about mathematics because it is easy. I told them that it is easy to learn and if they try, they can do better".* The responses above suggest that more must be done to whip up the interest of children in studying mathematics.

4.5.2 Relevance of Mathematics

This section tried to find out from the interviewees the relevance of Mathematics in their lives and their future career paths. In view of that, certain questions were asked, and the analysis presented below.

When asked why they think Mathematics is relevant/irrelevant, interviewee 5responded by saying, "*Mathematics is relevant because you can learn mathematics in*

other subjects". Interviewee 7 also answered by indicating "*It is relevant because every job that you will do require mathematics".* Interviewee 10 also underscored the relevance of mathematics by asserting, "*Mathematics is relevant because it helps us in all the subjects we study, especially science".* From the responses of the interviewees, they all consider Mathematics very relevant to their academic pursuits and their future developments. This means that all the interviewees recognize the relevance of Mathematics in their lives.

When asked if they would want to further Mathematics related subjects in future and the reasons for their answers, the interviewees gave the following responses. Interviewee 1) responded by saying, "*Yes, I want to further my mathematics education because I want to be a banker".* The interviewee 2 gave a response, which read, "*I want to further in mathematics related subjects because I want to become a mathematician".* Abena held a different view by stating, "*No because it is very difficult subject, I find it difficult to learn".* The interviewee 5 held a similar view by responding "*No because it is a very difficult subject".* Interviewee 9 with a statement, which read, "Yes I want to further mathematics because it will help to overcome challenges in this world", presented a contrasting view.

This clearly shows that while some of the interviewees are of the view that they would want to further study Mathematics and choose Mathematics related subjects in future, others due to their perception or experience in respect to the difficult nature of the subject do not want to have anything to do with it shortly. It also indicates that not all the interviewees share the same enthusiasm for the study of Mathematics with their reason being that it is difficult. This therefore suggests to me that students would take delight in

pursuing a course of study if s/he finds it doable (less difficult). By implication, if students at all levels of mathematics education perceive the subject as something within capability they would by all means put in "their entire all" to excel in the subject. Therefore, all those individuals who have some roles to play in ensuring that students of mathematics think and believe that excelling in the subject is a possibility must at no point relent their efforts in do so because the subject is crucial to the development needs of the students and the country in entirety.

4.6 Chapter Summary

This chapter covered the analysis of data collected in the field. This was done taking into account the purpose and objectives of the study. The study collected qualitative and quantitative data. Quantitative data were analyzed statistically, the results being presented as descriptive and statistical inference, while qualitative data was analyzed by themes. These were presented in the form of tables, figures, tables and direct reports. The chapter also reviewed the results of the study and the results of other studies already conducted in the same field. All this was done in accordance with the objectives and objectives described in the study. The next chapter examined the last part of the study and the summary of findings, conclusions and recommendations highlighted for the study.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter examines the results of the study, the recommendations suggested in the study findings, and the conclusions drawn from the results of the study. All of this was consistent with the objectives of the study and the research questions raised for the study.

5.2 Summary of Findings

The study tried to identify junior high school students' attitudes towards the learning of mathematics as a subject in the school. It also went on to examine how students attitude influences their achievement in the studying of mathematics. It further looked at the extent to which mathematical attitude relates to mathematical achievement and finally, whether a relationship exists between the attitude and learning experiences of JHS students with respect to mathematics. At the end of the study, it was found that;

1. Students have very positive attitude towards the learning of mathematics in school due to its numerous advantages in the global environment.
2. The study also found a strong positive correlation between attitudes in mathematics and mathematics achievement. This suggests that having a positive attitude towards mathematics could lead to a better performance in mathematics, and the opposite is the case.

3. The study again established that there are no gender differences/variations pertaining to mathematics achievement. That is both male and female students have the same or equal mathematical achievement.
4. The study further established that the environment of the individual as well as the attitude of mathematics teachers and their colleagues have a greater impact on their achievement in mathematics.

5.3 Discussions

5.3.1 Research Question One

The first research question looks at the factors that characterize the attitude of junior high school students' attitude towards mathematics. The study unearthed this;

The sub-questions under this major question are grouped into personal characteristics and future relevance. Per the responses provided by the pupils, the following can be observed. The responses in respect to questions 2, 4, 6, 7, 8 and 9 in table 7 under personal characteristics explain that the pupils have positive character towards mathematics in all aspects except to say that most pupils conceive also that mathematics is difficult though. On the other hand, the answers respondents provided for questions 1, 3 and 5 in table 7 indicate that pupils ascribe to the fact that mathematics is relevant in this contemporary world.

The study found majority of them considered it as a useful and fascinating subject hence forming affirmative attitudes towards, though a few of them considered it as boring. In this regard, Callahan (1971) and Selkirk (1975) averred that students form unproductive attitudes towards mathematics when they perform poorly or consider

mathematics as boring. Thus, once students realized the importance or usefulness of mathematics in the real world, they would be moved to develop positive attitudes towards the subject, which would eventually culminate in improvement in their performances. This is in line with Van Oers (1996) study that have revealed that the growth of constructive mathematical interest and attitudes is connected to the direct student's involvement in activities that entail both quality mathematics and communication with significant others within a distinct community such as a classroom.

The result of this study is consistent with a Chilean study by Ramírez (2005), which examined attitudes towards mathematics and school performance in Chilean Grade 8. At both levels, students stated that mathematics was complex. Expectations for continuing education and beliefs about the causes of their mathematical results were important predictors of performance. Ramírez (2005) also interpreted this because of the most demanding curriculum and the highest standards of evaluation used in the best performing classes. Mutai (2010) identified a lack of self-confidence and a lack of interest in the ability to learn mathematics and to perform well as attitudes that affect mathematics learning in secondary schools.

All these studies corroborate the findings of this current study that personal characteristics and future relevance in mathematics affect the attitude of students' towards mathematics as well as success in the subject. Suffice it to maintain that students' positive personal characteristics and future relevance correlate positively with students' interest in the subject hence the tenacity to pursue it at the higher level of education.

5.3.2 Research Question Two

The second research question discussed how students' attitudes towards mathematics affect their mathematics achievement and in view of gender.

According to Mahanta and Islam (2012), the attitude of students and achievements are positively correlated. They further maintained that students with high attitude scores tend to obtain good scores in mathematics examinations whereas their counterparts with low attitude scores obtain bad marks or scores in mathematics examinations.

The analysis of the data in this study revealed a strong relationship between students' attitudes towards mathematics and academic achievement. This corroborates with that of Minato and Kamada (1996) who had established that mathematical achievement of students and their optimistic attitudes towards mathematics are directly proportional. Similarly, Eshun (2004) posited that positive inclinations towards mathematics are crucial because they can influence the willingness of students to learn as well as the gain they can obtain from mathematics instruction, supports the finding. More so, Nicolaidou and Philippou's (2003) in their study found noteworthy correlations between attitudes and performance. Thus, students with optimistic inclinations did well. Mato and De La Torre (2010) study with high school students revealed better academic performance with students who had more optimistic attitudes towards mathematics than their counterparts with pessimistic attitudes towards the subject and these same findings were corroborated by Zimmerman et al (2004). In same vein, McClain et al. (2011) stressed the relevance of attitudes in foretelling academic accomplishment, when it found that mathematics attitudes explicated a difference of 25 percent to 32 percent in mathematics achievement

with much of the explicated difference independent of capability in mathematics. Sisson (2011) established that the general attitudes of students positively changed over time indicated by the improvement in their scores.

Whilst other scholars such as Ma and Kishor (1997); Kalavana et al. (2007) established a weak correlation between the two variables discussed above, the evidences are overwhelmingly conclusive as realized in this study, that a strong positive correlation exists between students' attitude and achievement in Mathematics.

The study also found no difference between gender and mathematical experiences. This means that whether a student is a male or female, it has no relevance to their mathematical achievement. This finding confirms that of Kalavanaet al. (2007), Lindberg et al. (2010), and Scafidi and Bui (2010) who established no gender variations and nearly equal male and female variances in terms of mathematical achievement. It also confirmed Farooq and Shah's (2008) which no consequential difference in the confidence of male and female students towards mathematics but however, found that students' achievement in mathematics hinged on attitude towards the subject. Nonetheless, other scholars such as De Toures Mata (2012), Skaalvik, and Skaalvik (2004) have established contradictory findings. They found lower mathematics self-concept in girls than boys. This is however in sharp contrast with studies by Asante (2012), Eshun (2004), Ma and Kishor (1997) who established substantial variances when attitudes of girls and boys towards mathematics are compared. Other studies, which contradicted the current study, were those done by Zimmerman et al. (2004) and Asante (2012) indicated that when compared with boys, girls lacked confidence, had enfeebling causal attribution patterns, professed mathematics as a male terrain, and were nervous about mathematics. This

shows that males do have higher experiences in mathematics than females but the findings of this contradicted these findings and established that there are no gender differences as far as the learning experience in mathematics is concerned.

5.3.3 Research Question Three

The third research question expounds the relationship between the attitudes and learning experiences of the junior high school students.

From the analysis of the responses above, whilst some of the interviewees encourage their colleagues to study mathematics, others were of the view that Mathematics was very difficult thereby discouraging their colleagues from further studying mathematics. This means that not all the students really love the study of mathematics with some seeing the subject as very difficult.

The study also found out that factors such as colleagues as well as teachers attitude affect one's attitude towards the achievement in mathematics. Whilst teachers' attitudes in class was found to be encouraging students to form positive attitudes toward mathematics, students are found to be discouraging one another by making mockery of colleagues whenever they answered questions wrongly. By deduction, one's attitude is significant on others and as such can greatly affect one's achievement and abilities in mathematics. This finding agrees with the findings of Akey (2006), Maat and Zakaria (2010) and Vaughan (2002) that several components of school milieu (teacher support, student-to-student interaction, and the academic and behaviour expectations of the teacher) are greatly linked with the attitudes and behaviours of students. That is to say that in a class or school environment that students consider teachers approaches as encouraging, tends to promote students' feelings of control and confidence in their ability

to succeed. However, this contradicts Markman's (2008) position that when boys are having difficulty, they are likely to be encouraged by the teachers to keep pushing because math is a skill that must be acquired. It can therefore be said that to help address the issue of gender disinclination towards mathematics or improve upon the attitudes of both genders towards mathematics teachers must remain unbiased to all genders.

More so, the study found out those students who came from conducive classroom setting developed better attitude than their counterparts in an unconducive classroom setting. This finding corroborates with that Ehiametor (1990) who established that students receive maximum learning as well as develop an affirmative attitude towards a subject in an environment where they are much involved; a good teacher-student relationship exists, and the teachers employ creative teaching methodologies. On the other hand, inappropriate methods of instruction and lack of deep comprehension of mathematical concepts create problems and the inability to identify the relevance of mathematics in students' lives (Crespo, 2003). This is further affirmed by the findings of Akey (2006), Maat and Zakaria (2010) and Vaughan (2002) which indicated that how students perceive teacher characteristics largely shape their attitudes towards mathematics (Maat and Zakaria, 2010). Thus, they have recognized a great correlation between the learning atmosphere and attitude towards mathematics. Therefore, students whose perceptions about the learning atmosphere are higher and a more optimistic opinion about their teachers tend to have more productive attitudes towards mathematics (Maat and Zakaria, 2010).

The results further affirmed Rawnsley and Fisher's (1998) findings that students form more positive attitudes toward mathematics in cases where teachers were found to be

highly supportive. More so, teachers with better self-efficacy and set higher goals and targets for themselves and their students are most likely to deal with obstructions and problems successfully (Ross and Bruce, 2007). There is thus the need for teachers to engage their students with practical learning as well as provide them with some real-world applications (Cady and Reardon, 2007). This is further corroborates with Moore's (1998) finding that teachers ought to be passionate in their teaching because passionate teachers produce quality academic achievers. All these studies confirm the findings of this present study that the learning environment has a lot of impact on students' interest in mathematics and that the efficacy and competence level of mathematics teachers play a key role in students developing positive attitude towards the subject.

5.4 Conclusion

The aim of the study was to assess the attitude of Junior High School (JHS) students towards mathematics and academic achievement in respect to the Asunafo South District. In view of that, the study tried to identify those that characterize JHS students' attitudes towards the learning of mathematics as a subject in the school. It further sought to examine how students' attitude influences their achievement in the studying of mathematics. It subsequently tried to look at whether a relationship exists between the attitude and learning experiences of JHS students with respect to mathematics. The study also looked at the gender differences and its effect on mathematical achievement among the respondents.

Based on these, both the qualitative and the quantitative methods of data collection were used to collect data from the sampled respondents for the study. Twenty-four (24) Junior High Schools (JHS) were selected from the study area and included in

the study. Fifteen (15) respondents were selected from each of these schools using the stratified and the simple random techniques. Ten (10) were also selected from two schools using the same sampling techniques. The schools were selected from both the urban and the rural areas. Both the questionnaires and interview guides were used to collect both the quantitative and the qualitative data for the study.

At the end of the study, it was found out that students have very positive attitude towards the learning of mathematics in school due to its numerous advantages in the global environment. The study also established a strong positive correlation between attitude in mathematics and achievement in mathematics. This means that students who have positive attitude towards mathematics are more likely to achieve greater success in Mathematics and vice versa. The study also found out that the environment of the individual as well as the attitude of mathematics teachers and their colleagues have a greater impact on their achievement in mathematics. Finally, it was discovered that there are no gender differences/variations pertaining to Mathematics achievement and that both male and female students have the same or equal mathematical achievement. This means that one being great or weak achiever in mathematics is wholly dependent on the individual and his/her attitude towards mathematics and the environment and has nothing to do with the gender of the individual. In this case, gender does not reflect individual achievement in mathematics as a subject.

It is clear as I discussed in chapter 1 that although a lot of research exist on the topic internationally and locally, I discovered that not much has been done in respect to the basic level especially in Ghana. The findings of this study has given an in-depth knowledge to educators on how students behave towards the subject and how it affects

their achievement at the JHS level. Even though literature supports the relationship between attitude and learning experiences most importantly on the part of teachers, it was quite explicit per the results and discussions as was gathered and analyzed from the interviews that, the influence of peers or colleagues on achievement at this level is substantial.

5.5 Contribution to knowledge

It is clear as I discussed in chapter 1 that although a lot of research exist on the topic internationally and locally, I discovered that not much have been done in respect to the attitudes and achievement of students at the JHS level especially in Ghana. The findings of this study therefore contribute to educators understanding of students' attitudes and how it affects their achievement at the JHS level. Even though literature supports the relationship between attitude and learning experiences most importantly on the part of teachers, it was quite explicit per the results and discussions as was gathered and analyzed from the interviews that, the influence of peers or colleagues on achievement at this level is substantial. This is therefore an insight into how educators had to manage their teaching environment.

5.6 Recommendations

Following the findings from the study, the following recommendations have been suggested;

1. Mathematics teachers must also recognize the immense role they play in enhancing or inhibiting the attitude of students towards the study of mathematics

and engage in activities that will stir the interest of students in studying mathematics.

2. Females must be encouraged to develop positive attitudes and study mathematics just like their male counterparts since there are no gender variations in the study of mathematics.
3. There must be a national agenda to promote the study of mathematics as has been done with Science so that more students will develop positive attitude and interest in the study of mathematics.
4. The government can set up a national mathematics Center where all stakeholders in mathematics education can research and share ideas on the best way to teach and learn mathematics which will promote mathematics education in the country.
5. The school must put in measures like providing teaching-learning materials and introducing incentive packages for students who perform well in mathematics in order to develop in them positive attitude towards the study of mathematics.

5.7 Implications for further studies

These are the researcher's candid advice for further studies on the topic for discussion. The study was specific to the Asunafo south district in the Ahafo Region. On a broader perspective, I think the study can be repeated in other districts and/or the entire country so that an all-inclusive report can be obtained on the topic. This would lead to interventions that are more appropriate if the need arises.

The study also left out teachers who happen to be key stakeholder in the development of students' attitude in the classroom. I therefore think further studies must take them on board to incorporate their views for a comprehensive report.

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APPENDIX A

GHANA EDUCATION SERVICE

ASUNAFO SOUTH

REPUBLIC OF GHANA

District Education Office
P. O. Box 50
Kukuom – B/A

My Ref No. GES/ASS/2262/2019/05

26th February, 2019

MR DERRICK ANOKYE POKU
KUKUOM SDA BASIC SCHOOL
KUKUOM

INTRODUCTION LETTER

With reference to your introduction letter dated 11th February, 2019 the directorate have granted you permission to collect data for your research.

''Analysis of JHS Students'' Attitude to Mathematics and Academic Achievement.

Thank you.

BOAKYE DUKU HAYFORD
DEPUTY DIRECTOR
For: DISTRICT DIRECTOR

APPENDIX B

UNIVERSITY OF GHANA
DEPARTMENT OF TEACHER EDUCATION
SCHOOL OF EDUCATION AND LEADERSHIP

Ref. No.: SEL/DTE. 7 February 11, 2019

Dear Sir/Madam,

LETTER OF INTRODUCTION:
DERRICK ANOKYE POKU (ID: 10703053)

I write to introduce to you, Mr. Derrick Anokye Poku, an MPhil student of the Department of Teacher Education, School of Education and Leadership, University of Ghana for the 2018/2019 academic year.

As part of his course requirements, he is supposed to conduct a research on "Analysis of JHS Students' Attitude to Mathematics and Academic Achievement: A case of Asunafo South District". He is seeking permission to collect data for this research.

I would be most grateful if you could extend to the student all the assistance required to enable him to meet this requirement.

Thank you.

Yours sincerely,

Dr. Ernest Ampadu
Acting Head of Department

COLLEGE OF EDUCATION
P. O. Box LG 1181, Legon, Accra, Ghana.
• Tel: +233 (0)303 934 692 / 0502 673 636 • Email: teachered@ug.edu.gh • Website: www.ug.edu.gh/ted

APPENDIX C

UNIVERSITY OF GHANA
ETHICS COMMITTEE FOR THE HUMANITIES (ECH)
P. O. Box LG 74, Legon, Accra, Ghana

My Ref. No.....

26th March, 2019

Mr. Derrick Anokye Poku
Department for Teacher Education
University of Ghana
Legon

Dear Mr Anokye,

ECH 070/18-19: ANALYSIS OF JHS STUDENT'S ATTITUDES TO MATHEMATICS AND ACADEMIC ACHIEVEMENT: THE CASE OF ASUNAFO SOUTH DISTRICT

This is to advise you that the above reference study has been presented to the Ethics Committee for the Humanities for a full board review and the following actions taken subject to the conditions and explanation provided below:

Expiry Date:	26/03/20
On Agenda for:	Initial submission
Date of Submission:	20/12/20
ECH Action:	Approved
Reporting:	Bi-Annually

Ethics Committee for Humanities
26 MAR 2020
(University of Ghana)

Please accept my congratulations.

Yours Sincerely,

Prof. C. Charles Mate-Kole.
ECH Vice Chair

Cc: Dr. Ernest Ampadu, Department for Teacher Education, University of Ghana.

Tel: +233-303933866 Email: ech@ug.edu.gh

APPENDIX D

STUDENTS' QUESTIONNAIRE

The Questionnaire is into two (2) sections. The first section is about your background information and your school whereas the second section is about your personal feelings about mathematics.

SECTION A

BACKROUND INFORMATION

1.NAME OF SCHOOL: _____

2. GENDER: Tick one that applies to you. (Male) ☐ (Female) ☐

3. AGE: …… 4. CLASS: (JH1) ☐ (JH2) ☐ (JH3) ☐

5. SCHOOL TYPE: (Rural) (☐n) ☐

SECTION B

DIRECTION: Make a tick **(√)** in the space against the correct response. Questions 1 and 3 statements have four (4) possible responses whereas question 2 statements have three (3) possible responses. In each case tick only one which you consider as the most appropriate response to the statement. (**SA= Strongly Agree, A=Agree, D=Disagree, SD=Strongly Disagree**).

A.

No	Statement	SA	A	D	SD
1	The mathematics we study at school is useful in other subjects				
2	I like studying mathematics				
3	I look forward to doing mathematics				
4	I find mathematics difficult				

5	Mathematics is relevant to life in today's world				
6	I enjoy studying mathematics				
7	Mathematics is boring				
8	I find mathematics interesting				
9	Even when it gets hard, I can do our mathematics work				

B.

NO	STATEMENT	ALWAYS	SOMETIMES	NEVER
1	I perform well in mathematics examinations			
2	I can cope with harder maths course			
3	I think questions given us are within our range			
4	Mathematics is interesting to me; I enjoy maths courses			
5	When I hear maths, I have the feeling of failure			
6	Mathematics makes me feel lost and can't find my way out			
7	I feel sense of insecurity when attempting mathematics			
8	I ensure that my mathematics assignments are completed			

C.

No	Statement	SA	A	D	SD
1	I approach mathematics with a feeling of hesitation, resulting from a fear of not being able to do math				
2	I have never liked math and it is my worst subject				
	I have the intention to study				

3	mathematics when the time comes to choose				

APPENDIX E

STUDENTS'INTERVIEW GUIDE

Name of student: …… Age …….

School Name: ……

Class JHS 1 ☐ 2JHS 3☐ ☐

Date of Interview:……..

Interview start time:….....

Interview Duration:……

1. Do you like mathematics and why?

2. How often do you learn mathematics and why?

3 a) Do you answer questions in mathematics lessons?

b) How often do you answer questions during mathematics lessons?

4 a) If you know the answer to a question, would you volunteer to answer?

b) What happens when you give wrong answer?

c) How do you feel when you give a wrong answer?

5. Why do you like/dislike mathematics?

6. Do you feel comfortable studying mathematics and why?

7. Why is mathematics important?

8. Why is mathematics relevant/ irrelevant?

9. Would you want to further in mathematics related subject and why?

10. How do you intend to talk to friends about mathematics?