UNIVERSITY OF CAPE COAST

PRIMARY SCHOOL TEACHERS' AND PUPILS' ATTITUDES TOWARD MATHEMATICS AND THEIR EFFECTS ON PUPILS' ACHIEVEMENT IN MANYA KROBO DISTRICT

BY

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DECLARATION

CANDIDATE'S DECLARATION

I hereby declare that this thesis is the result of my own original research and that no part of it has been presented for another degree in this University or elsewhere.

Candidate's signature------------------- Date:--04-03-2009----------
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SUPERVISORS' DECLARATION

We hereby declare that the preparation and presentation of this thesis was supervised in accordance with the guidelines on supervision of thesis laid down by the University of Cape Coast.

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ABSTRACT

The main purpose of this study was to determine whether any significant difference existed between primary class six boys' and girls' attitude toward mathematics and their effects on achievement. Also, to determine whether any significant difference existed between boys' and girls' achievement in mathematics. Finally, the study sought to determine whether primary class six teachers' and pupils' attitude toward mathematics contributed significantly to pupils' achievement in the subject.

The simple random sampling technique was used to select 400 primary class six pupils for the study. The 400 subjects consisted of 200 boys and 200 girls selected from both rural and urban schools. In all 40 primary schools were involved in this study.

The main instruments used to collect data for this study were two sets of attitude questionnaires of the Likert scale type and an achievement test. The data gathered were analysed statistically using an independent t-test, the multiple regression technique and Pearson's Product-Moment Correlation.

The study indicated the following results. Firstly, there was no significant difference between primary class six boys' and girls' attitudes toward mathematics. Secondly, there was a significant difference in mathematics achievement between primary class six boys and girls in favour of girls. Thirdly, primary class six pupils' attitude toward mathematics contributed significantly to their achievement in the subject. Fourthly, primary class six teachers' attitude toward mathematics related to pupils' achievement in the subject. Implications of the findings of study were discussed and reccommendations made.

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DEDICATION

This thesis is dedicated to my sons Precious Addy, Vans Addy, Paul Addy, Timothy Addy and My wife Mrs. Mercy Addy.

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CHAPTER ONE

INTRODUCTION

Background to the Study

Technological and economic development in all countries depends on effective knowledge and use of science and mathematics. It is for this reason that educational systems of countries have made great studies in their development. This accounts for mathematics being compulsory in our pre-university schools.

One of the national objectives of Basic Education is to prepare the child for life after school. It is only the teaching and learning of mathematics that can prepare the child adequately to fit into the society. A good foundation in mathematics is very essential for the success of the child in life. It is for this reason that mathematics teachers' knowledge of the subject content and methodology is made a core subject at the first and second cycle schools.

The Ghana mathematics syllabus for the primary schools issued by the Ministry of Education (MOE, 2001), outlines the rationale for teaching and learning of mathematics in schools. Firstly, mathematics at the primary school level should emphasise knowledge and skills that will help the pupil develop the foundation for numeracy. Secondly, the pupil is expected to read and use numbers competently, reason logically, solve problems and communicate mathematical ideas effectively with other people. Thirdly, the pupil's mathematical knowledge, skills and competence at this stage should enable him/her make more meaning of his/her world and also develop interest in mathematics as an essential tool for the study of science and other subjects and contribute to national development.

Furthermore, the pupil should be able to use correctly, accurately and with understanding the four fundamental operations addition, subtraction, multiplication and division as applied to both number and measurement. Mathematics has far more to offer the pupil to lead a rich and meaningful life. If the mathematics teacher is not able to help the individual pupil to achieve these goals, then the teacher does both the individual pupil or learner and society gross disservice. Mathematics is not only restricted to the development of the child, but also to that of the society.

The use of mathematics permeates many fields of study such as biology, physics, chemistry, economics, geology, medicine, commerce, geography, music, art to mention but a few. Mathematics is perhaps one of the subjects that receives the greatest attention in the school curriculum both at the basic and secondary school levels. Thus, in many developing countries including Ghana, mathematics takes the greatest number of hours of instruction per week. For example, in Ghana the time allotted for mathematics instruction at the primary class six levels is one hour per day and a total of five hours per week. The reason for this is perhaps because sufficient knowledge in mathematics is needed to equip the pupils to fit well into various scientific and technological fields in this modern world.

The importance of mathematics is seen in the assertion by Isenberg and Altizer – Tuning (1984) that in order to be prepared for potential success in the world today and in the future, knowledge of mathematics and science is necessary. Besides this, it is universally accepted that a strong foundation in mathematics is a prerequisite for professions and careers in today's dynamic society. The irony of this is rather that as mathematics is gaining importance, achievement in this subject at the various levels of education has been poor over the years as compared to the achievement of pupils in other subject areas of study in the schools. Available literature provides evidence for a trend in decrease in average performance in mathematics precisely on certain tasks that require deeper understanding of mathematics and significant decrease of students' interest in mathematics during the course of high school (Jones, 1988; Reynolds & Walberg, 1992).

Numerous studies had been carried out to investigate various factors that influence the teaching and learning of mathematics and achievement in this subject. Such factors which include the school environment, student, home, quality of teaching and methods of teaching as well as student learning strategies had been identified (Csikszentmihalyi & Nakamura, 1989; Karp, 1991; Csikszentmihalyi, Rathunde & Whallen, 1993). Other findings from studies carried out showed that other non – intellectual factors such as personality, anxiety, attitude, motivation, interest, to mention but a few, to some extent influence students' mathematics learning and their achievements in the subject (Aiken, 1970, 1976; Gillspie &Boonie, 1983).

Among these non – intellectual variables Abrego (1966) sees the attitude variable as an influencing factor on pupils' achievement in mathematics. To Abrego, without the right attitude the pupils' potential growth in knowledge and achievement cannot be attained. This means the right attitude towards mathematics will result in higher achievement and vice versa.

The development of a positive attitude toward mathematics is desirable because of its association with achievement. Nkani (1993) found a significant correlation between the attitude of SSS students and achievement in mathematics. Among Junior Secondary school students Neale, Gill and Tismer (1970) also found significant correlation between attitude towards mathematics and students' achievement in the subject.

Moses (1991) on the contrary found that attitude toward mathematics was not directly related to achievement. Moses was of the view that other factors such as methods of teaching and class size were probably involved.

Other studies in Ghana on attitudes of students toward mathematics and their achievement in the subject at the Senior and Junior Secondary school levels showed that female students have fairly high positive attitude towards mathematics than their male counterparts (Okpodjah, 1991). Kpemlie (1993) found that girls in JSS could equally perform as well as boys in all content areas in mathematics. Dealing with studies on urban and rural basis Appiah – Ofori (1993) found that both male and female students in both urban and rural Junior Secondary schools have positive attitudes towards mathematics.

Similarly, with regards to studies made in single- sex and mixed – schools, the following were revealed. Eshun (1987) found that males in single – sex senior secondary schools achieved higher than their female counterparts Besides this, the achievement in mathematics by female students in single- sex Senior Secondary Schools were highest when compared with the achievement of males and females in mixed – Senior Secondary Schools.

Nkani (1993) concluded that both males and females in mixed and single – sex senior secondary schools at the Ordinary and Advanced levels have positive attitude towards mathematics. Besides, Nkani found positive correlation (r = 0.546) between the attitude of students toward mathematics and their achievement in the subject.

Otchey (1999) carried out a study on teachers' and students' attitudes toward mathematics and their effects on JSS students' achievement. Otchey reported the following findings:

1. that there was no significant difference between male and female JSS3 students' attitudes toward mathematics.

2. there was a significant difference between the mathematics achievement of male and female JSS3 students with performance being in favour of female students.

3. teachers' attitudes toward mathematics was not significantly related to students' attitudes toward mathematics and their achievement.

4. girls in girls' schools achieved higher in mathematics than boys in boys' schools.

Studies on enrolment in mathematics classes are also of great importance to mathematics educators. Selkirk (1974) found that there is a trend in decrease in the number of students being enrolled into mathematics classes and programmes at the high school and college levels. Selkirk asserted that the reason for this decrease is due to students' general negative attitude towards mathematics. However, enrolment in Ghana is increasing. There are many females studying B.Ed mathematic at UCC and UEW.

The researcher was once a circuit supervisor in the Manya Krobo District Education Office and during official school visits and inspections the following common observations could be made. During mathematics lessons some pupils did engage in other activities, others put their heads on the tables, while others stayed away from mathematics classes but reported for lessons as soon as the mathematics classes were over. Also, sometimes pupils were not motivated to learn mathematics or to attend school. Teaching and learning were not challenging. Teacher absenteeism, lateness and malingering left pupilsto themselves. Sometimes timetables and syllabus were not always followed and some subjects not taught at all. The People's Daily Graphic (July 2,2003) reported similar comments that teachers must stop negative attitudes such as laziness, unnecessary absenteeism lateness to mention but a few. The teacher characteristics and attitudes have great influence on pupils' mathematics learning, achievement and the types of attitudes developed toward mathematics.

From the discussion greater part of the studies revealed that there is significant correlation between attitudes of students toward mathematics and their achievement in the subject. Moses (1991) on the other hand pointed out that attitude toward mathematics was not directly related to achievement. This has prompted the researcher to carry out this study to be able to determine whether attitude correlates with achievement.

Statement of the Problem

The Criterion-Referenced Tests (CRT) for primary six pupils in Ghana from 1992 to 1997 reported the national percentage mean scores for English and mathematics as presented in Table 1.

Table 1:

National CRT Results by Percentage Mean Scores by Year: 1992 to 1997

Year	1992	1993	1994	1995	1996	1997
English	29.9	30.9	31.6	31.6	33.3	33.9
Mathematics	27.3	27.4	27.7	28.1	28.8	29.9

It is evident from the above figures that over the years the mean scores of pupils' achievement in mathematics was slightly lower than English. However, the mean scores for both subjects were increasing (MOE.1997).

Furthermore, the Performance Monitoring Test (PMT) conducted for pupils from public primary schools from basic stages two to six revealed that in the Manya Krobo District basic stage six pupils obtained mean scores of 42.23 percent and 69.31 percent in mathematics and English Language respectively. The achievement in mathematics was slightly lower than English language (MOE,1997).

The Chief Examiner's Report (1998) of the Basic Education Certificate Examinations (BECE) highlights candidates' weaknesses in mathematics .Candidates demonstrated poor computation skills with the greatest problem being lack of knowledge and understanding. For example, some candidates showed lack of knowledge of units of measurements and used kilometres for mass and kilograms for distance.

The low achievements by primary school pupils in CRT continues to attract the concern of pupils, parents, educators, stakeholders and the general public. This could be judged from the remarks and observations made by policy makers as well as the general public. These remarks are that, in spite of the provision of inputs such as textbooks, stationery and the orientation and other measures taken to improve the teaching and learning process in the schools, effectiveness in schools remain low and achievement in primary school remain low (Ehun, 2001).

The results of the Third International Mathematics and Science Study [TIMSS] for England showed that in terms of 9 to 13 year-olds performance in mathematics had deterioriated slightly (TIMSS,1993-94). Amissah (2000) reported that it was the poor performance of TIMSS that urged MOE in 1992 to institute the CRT to determine the extent of pupils' performance in mathematics in Ghanaian public primary schools.

Modern mathematics was introduced to make mathematics more interesting to pupils and students at all levels so that students could also improve upon their achievement in the subject. Teachers are also always considered as how to improve upon their skills so the Mathematics Association of Ghana (MAG) occasionally organises seminars and workshops for mathematics teachers especially those at the pre-tertiary levels. The aim of this is to enable the teachers to adopt current strategies that will enrich the teaching and learning of mathematics in the schools.

Looking at mathematics in Ghana from 1960 to 2000, Mereku (2000) commented on the influence the changes in mathematics curriculum had on the performance of students. Mereku's study indicated that the teaching of mathematics in basic schools focused on computational skills, learning of formulas, rote practice and teaching as telling. The implication he stated was that by the time pupils begin secondary education their foundation in basic mathematics was low.

This study intended to investigate whether the attitudes of pupils and teachers contributed significantly to achievements of pupils in mathematics at the primary school level.

Purpose of the Study

The main purpose of this study was to find out whether the attitudes of pupils and teachers toward mathematics contributed significantly to pupils' achievement in the subject. Again, it was to investigate whether any significant difference existed between boys' and girls' achievement in mathematics. Finally, it was to determine whether any significant difference existed between boys' and girls' attitudes toward mathematics.

Hypotheses

To guide the study and to achieve the purpose of the study the following null hypotheses were formulated.

1. There is no significant difference between boys' and girls' attitudes toward mathematics.
2. There is no significant difference between boys' and girls' achievement in mathematics.
3. Pupils' attitudes toward mathematics do not relate to their achievement in mathematics.

4. Teachers' attitudes toward mathematics do not relate to pupils' achievement in mathematics.

Significance of the Study

Of late, our primary school pupils' poor achievement in mathematics has attracted and continue to attract the concern of parents, pupils, educators and the general public. In view of this, it is the researcher's hope that the findings of this study will inform both teachers and pupils the relationship between their attitudes toward mathematics and pupils' achievement in the subject.

Knowledge about the types of attitudes pupils develop toward mathematics will help headteachers, educational authorities and the general public to adopt strategies to eliminate negative attitudes and improve upon pupils' achievement in mathematics. Educational authorities will use the finding to organise in-service training courses and workshops for teachers to expose them to current methods of teaching and classroom interactional strategies.

Finally, it is hoped that this study will contribute significantly to existing literature and knowledge on pupils' attitudes toward mathematics at the primary level. Besides that, it will generate interest in further research on attitudes and achievement in mathematics at the primary school level in other districts and regions.

Delimitation of the Study

This study was delimited to only Manya Krobo District in the Eastern Region of Ghana. It was also delimited to only primary class six pupils and their class teachers in selected rural and urban public schools.

Finally, the study was delimited to attitudes of teachers and pupils toward mathematics and pupils' achievement in the subject. In the light of this it may not be possible to generalise the result of this study beyond the Manya Krobo District and the public schools. However, the results of this study could be replicated in other districts and regions.

Limitations of the study

1. To be more representative the study would have covered all schools in the districts in the Eastern region of Ghana. However, due to limited time, lack of materials and financial constraints the study was limited to only primary six pupils and their class teachers from selected schools in the Manya Krobo District. The generalisation of this study would therefore be appropriate for only primary six classes in the selected district which is the Manya Krobo.
2. Questionnaires were used to collect data for the study, so the problem of bias which is associated with research that uses questionnaire could not be ruled out.
3. The related literature which supported the study was more foreign than local, so cultural variations may give room for suggestions
4. It is not what people say that they always practice, hence pupils' favourable responses about their teachers' attitudes may influence the

results of the study. These limitations among others gave room for useful suggestions. There is therefore the need for more studies in the area.

Definition of Terms

For the purpose of this study the following definitions are implied.

Attitude: Is the characteristics of a person which describes his her positive and negative feelings towards a particular object, subject, situation, person, or ideas (Nitko, 2000)

BS6: Basic stage six that is, the sixth stage of primary school [illegible] referred to as primary class six.

Basic Education Certificate Examination (BECE) [illegible] examination conducted for students and candidates who complete their [illegible] school studies at the Junior Secondary School level. The purpose of this examination is for the award of basic certificates to successful candidates and for the selection of students to pursue further studies at the Senior Secondary School level.

Ministry of Education (MOE): The highest authority on education in Ghana. It formulates policies for the Ghana Education service

Performance Monitoring Test (PMT): Is a test administered to pupils [illegible] primary school pupils in the country to ascertain the level at which pupils have mastered subject content matter in the school curriculum.

Urban area: It is any settlement area with a population of [illegible] 5 [illegible] people where the bulk of the people are engaged in secondary production [illegible]

Rural area: Is also any settlement area with a population below 5000 people where majority of the people are engaged in farming activities (International Institute of Environmental and Development, 1992).

Criterion Reference Test (CRT): Is a test which determines the degree to which the student has attained a criterion performance (Tamakloe, Atta and Amedahe 1996).

Summary

In the light of the above background the researcher intended to investigate whether teachers' and pupils' attitudes toward mathematics in the primary school related to pupils' achievement in the subject. The study also meant to determine whether any significant differences existed between boys' and girls' attitudes toward mathematics. Finally , the study was to determine whether any significant difference existed between boys' and girls' achievement in mathematics.

This chapter discussed background to the study, statement of the problem, purpose of the study, research questions, hypotheses, significance of the study, delimitations, definition of terms and summary.

The next chapters include the following :Chapter two, review of related literature covering the following sub-headings: the concept and definition of attitude, attitudes toward mathematics, relationships between teachers' and pupils' attitudes toward mathematics and pupils' achievement in the subject, gender differences and achievement in mathematics, difficulty of mathematics, confidence and anxiety. Chapter three, methodology also consists of brief introduction to the chapter, the research design, population, sample and sampling procedures, research instruments, data collection procedure and analysis of data. Chapter four also consists of results and findings while chapter five included discussions, summary, conclusion and recommendations respectively

CHAPTER TWO

REVIEW OF LITERATURE

Introduction

This chapter, review of literature, discusses previous studies carried out which were related to this study. Thus, a thorough search through available literature showed that a number of studies and articles on attitudes toward mathematics and achievement in the subject had been carried out at various levels of education both local and foreign. More specifically, it was found that some of the studies concentrated on students' achievement in mathematics, teachers' and students' attitude toward mathematics and students' achievement in the subject.

However, for the purpose of this study the literature was reviewed under the following sub-headings.

1. The concept/ definitions of attitude.
2. Beliefs and perception about mathematics.
3. Teachers' and pupils attitude toward mathematics.
4. Relationship between teachers' attitude toward mathematics and pupils' achievement.
5. Relationship between pupils' attitudes toward mathematics and their achievement in the subject.
6. Achievement of pupils in mathematics.
7. Difficulty of mathematics.
8. Confidence and anxiety in mathematics.
9. Summary of the literature Review.

The Concept/ Definitions of Attitude

Attempts made to measure attitude could be traced back to Thurstone's work in the United States around the late twenties. This type of research has entered educational institutions precisely at the higher levels where literate individuals now willingly agree to complete questionnaires. The attempt to measure attitude resulted in the construction of a number of scales measuring attitude toward issues of concern. To date, the study of attitude has become an accepted part of studies in education. Thus, attitude toward various subjects of study and the effects of attitudes on education had all been studied.

Knowledge about the concept of attitude is very vital in human endeavour and behaviour. According to Aiken (2002) an attitude is an internal disposition to evaluate in positive or negative terms an object which accompanied by affective, cognitive and behavioural responses. The development of positive attitudes toward mathematics is a goal for many educational systems because they are seen as a requisite for students' performance. The literate has suggested that there is a positive relationship between attitudes toward mathematics and academic achievement.

Beth, Jenni and Allan (2005) maintained that attitudes are generally regarded as having been learnt. They predispose an individual to action that has some degree of consistency. They added that experiences of teachers influence the formation of attitudes and these in turn influence their classroom practices.

Attitude can be regarded as the description of how people feel about or react to other people, places, events, ideas or things (Borich and Kubiszyn

1987). Thus, attitude is a manner of acting, feeling or thinking that shows one's disposition or opinion. It is really how one responds to and approaches things. Of all the skills that one develops it is his/her attitude that influences them. A bad attitude does not take one far in life.

As early as 1935, Allport (1935) defined attitude as a mental and neural state of readiness organised through experience exerting a directive or dynamic influence upon the individual's response to all objects and situations with which it is related. The following ideas were highlighted in Allport's definition. First, attitude is a state of mind of readiness which leads an individual or one to perceive people and things surrounding him/her in a particular way and that directs how that individual responds to the situation or object related to it. Second, attitudes are not innate they are learned, developed and organised through experience. Third, attitudes are dynamic and for that matter they are therefore subject to change. Halloran (1967) with similar opinion opined that an individual's attitude does not develop in a vacuum, but the group affiliations of the individual helps to determine the formation of his/her attitude. Thus, the type of group that one affiliates to would influence his/her attitude. That is, if one affiliates to a group noted for bad or negative attitude then such an individual is likely to develop the same attitude.

Nitko (2000) sees attitude as characteristics of a person that describe his positive and negative feelings toward particular objects, situations, institutions, persons or ideas. That is, attitude differs in both direction and intensity. In terms of direction one's attitude toward an object or person may be positive or negative, favourable or unfavourable. In terms of intensity it refers to the strength of the feeling or the degree of the magnitude

Attitude is therefore seen as predisposition to respond favourably or unfavourably toward a person, thing, event, place, idea or situation. In other words attitudes are thoughts and feelings that encourage one to act as though he/she dislikes something for instance, like or dislike for mathematics. A person's attitude determines his behaviour (Atkinson and Hilgard, 1983). Hughes (1978) maintains that attitude is the key to success. In this regard, favourable attitudes of pupils toward mathematics, school to mention but a few should be encouraged in order to build a good foundation for the future.

Brophy and Good (1986) see attitude as affective or emotional response. This assertion has similar features of the definition of Fontana (1989) which states that attitude is relative enduring orientations individuals develop toward various subjects and issues they encounter during their lives and which they express verbally as opinions and issues. Thus, attitudes are therefore contained elements of beliefs and values as well as varying degree of factual knowledge.

Attitude is a tendency to make a response of either avoidance or approach to an object or groups of objects. Thus, the way one approaches an object or avoids it is determined by his\her attitude toward that object.

For the purpose of this study the concept and definition of attitude by Nitko (2000) was adopted. This was preferred because it talks about the characteristics of a person that describe his/her positive or negative feelings toward particular objects, situations, persons or ideas.

From the discussion the following features were highlighted. That is, attitude refers to beliefs, manner of feeling, reacting or thinking that shows one's disposition or opinion. Attitude describes one's positive or negative feeling to mention but a few.

Attitudes are learned and one's group affiliation determines the formation of his/her attitude. However since attitudes are learned they are therefore subject to change (Allport, 1935; Halloran, 1967).

Finally, judging from the foregoing definitions and concept of attitudes one may say that every individual reacts to his environment, object, people or subject in terms of beliefs, values, interests, opinion and sentiments. Attitude consists of affective, cognitive and behavioural responses.

Beliefs and Conceptions of Mathematics Teaching and Learning

Beliefs are defined as personal constructs that can provide an understanding of a teacher's practice (Nespor, 1987; Pajares, 1992; Richardson, 1996). Thus, it has been widely reported that teachers' beliefs influence their classroom practices.

Research evidence suggests that teachers' beliefs relate to their classroom practices. (Thompson, 1992; Fang, 1996; Kagan, 1992) cited in Fang (1996) attest that a better understanding of teachers' belief systems or conceptual base will significantly contribute to enhancing educational effectiveness.

Furthermore, Pajares (1992) says "beliefs are personal principles constructed from experience that an individual employs often unconsciously to interpret new experiences and information and to guide action" (p.316). Pajares noted that the beliefs teachers hold influence their perceptions, conceptions and judgements which in turn affect their behaviour in the classroom.

Thompson (1992) opines that beliefs play an important role in shaping teachers' characteristic patterns of instructional behaviour. Ernest (1989) notes the following key belief components of the mathematics teachers. That is, the teachers' view or conception of the nature of mathematics, view of the nature of mathematics teaching and the view of the process of learning mathematics. These beliefs or views affect classroom teachers' instructional behaviour. These views also determine individuals' attitudes toward mathematics. Raymond (1997) confirmed a strong influence of beliefs about the nature of mathematics and teaching styles among elementary school teachers.

Teachers' beliefs and attitudes influence their teaching and pupils' achievement in mathematics. In view of this, Schorr (2000) suggests that to teach mathematics effectively teachers must gain competence and understanding of the mathematics they teach. Schorr therefore recommends teacher development services for pre- service teachers.

Koehler and Grouws (1992) attest to the views that teachers' beliefs and actions and pupils' characteristics including their attitudes influence pupils' actions in the classroom and their learning outcomes. Nickson (1992) is of a similar view by stating that teachers' beliefs about mathematics influence how they teach and therefore the learning activities pupils will experience.

Considering the beliefs of students/pupils, Jungwirth, (1991) Contends that students' beliefs about their abilities in mathematics determine their achievement. Besides, their attributions for success and failure in mathematics may be influenced by the way they interact with their teachers.

From the discussion there seems to be evidence that teachers' views or conceptions of the nature, teaching and learning of mathematics influence their classroom practices and behaviour. Besides, the influence of teachers' beliefs influence pupils' learning activities, experiences and achievement.

Teachers' Attitudes toward Mathematics

The way individuals develop attitudes toward objects, places, things and people the same way they tend to develop attitudes toward mathematics. Attitudes toward mathematics to some extent determine an individual's willingness and readiness to study and benefit from the subject The development of positive attitudes toward mathematics in general is necessary for all learners.

Davies and Savell (2000) in a study which involved 53 New Zealand teachers reported that teachers possessed negative attitudes about mathematics. Grootenboer (2000) also reported similar findings for 31 New Zealand primary school teachers. Rech, Hartzell and Stephen (1993) also studied American elementary school teachers' attitudes toward mathematics. They noted that the respondents possessed significantly more negative attitudes toward mathematics.

A teacher's attitudes toward mathematics include his liking, enjoyment, enthusiasm and interest or their opposites. Besides, the teacher's confidence in his/her own mathematical abilities, mathematical self- concept and his/her valuing of mathematics are determinants of his/her attitude toward mathematics (Ernest, 1989). Thus, if a teacher likes and enjoys mathematics and its teaching he may pass on such attitudes unto his/her students. Besides, when the teacher feels enthusiastic and confident his attitude toward mathematics and its teaching are important contributors to the teacher's make up and approach because of the effect they have on a child's attitude toward mathematics and its teaching (Aiken, 1970).

Chionidou (1996) studied primary school teachers teaching 3rd to 6th grade classes in Athens- Greece. Chionidou reported that male teachers prefer trying out different ways of solving problems in both arithmetic and geometry because they believe that they promote critical thinking in their children. Female teachers on the other hand prefer to stick to algebra problems and algorithms and avoid geometry. Chionidou reported that all the teachers studied agreed that successful teachers of mathematics must:

1. Himself/herself be fond of mathematics.
2. Possess some confidence in the subject.
3. Do a lot of revision work and not to proceed unless sure that his/her pupils understand what has been taught. Try out alternative ways of teaching.
4. Be close to all his/her pupils.

Studies on primary school teachers' attitudes toward mathematics are very important due the potential influence they have upon the pupils. Research has argued that positive teacher attitude contribute to the formation of positive pupil attitudes (Sullivan, 1989; Relich, Way & Martin, 1994).Other studies have shown that classroom strategies used to teach a subject are influenced by teachers' attitudes which in turn influence pupils' attitudes (Carpenter & Lubinski,1990).

The prevalent view in literature so far holds that boys when compared to girls receive more attention, praise and critical feed-back from their teachers (Sadker, Sadker & Klein,1991). Chionidou (1996) made similar observation when he studied Greek primary school mathematics classrooms. Chionidou reported that in mathematics classes teachers tend to ask questions to boys rather than girls. That is, boys got more opportunities to give answers and stand to receive more praise than girls.

Teachers contribute to girls' problems by giving them less attention or a low quality of attention during mathematics class (American Association of University women, 1992). Leach (1994) also noted that girls' low participation and negative attitude toward mathematics and science are greatly affected by teacher's behaviour. Schwartz and Hanson (1992) also observed that teachers unconsciously pay more attention to male students than female students.

It has been established (Tiedemann,2000) that teachers hold gender-loaded views about their pupils' mathematics abilities. Tiedemann reported that when asked to consider boys' and girls' achievement in mathematics teachers were inclined to respond in favour of boys.

Karp (1991) contends that teachers with positive attitude incorporate instructional materials and representations that provide students with resources. Karp added that teachers with positive attitude toward mathematics use instructional methods that encourage independence.

Pupils' Attitudes toward Mathematics

Burnett (1995) in a study involving 957 pupils from grades 3 to 7 American elementary school children boys reported higher scores on attitude variables. Also, the Third International Mathematics and Science Studies [TIMSS] (1994-95) reported that in Austria, Hong Kong, Japan and the Netherlands elementary schools boys' attitudes toward mathematics were significantly more positive than girls. The TIMSS further reported that in many countries both boys and girls demonstrated similar positive attitudes toward mathematics. Swetman (995) maintains that initially girls have more positive attitude toward mathematics than boys, but as girls grow older their attitudes become more negative or decline.

Stipek and Granlinski (1991) noted that girls have lower expectation for themselves in mathematics than boys do and that girls believe they do not have mathematical ability. When girls do perform poorly in mathematics they attribute their poor performance to their inability to do mathematics.

Gopel Rao (1968) investigated British Primary school pupils' attitudes toward mathematics. He later extended the study to the secondary school students. He found that mathematics was liked in the senior secondary school but strongly disliked in the primary schools. Gopel again found that students' attitude toward mathematics become less favourable as pupils progress through the junior to the high school. This may be due to the fact that students begin to make career choices in the high school.

Collahan (1971) also found that a proportion of pupils dislike mathematics and others expressed strong dislike for the subject between ages 11 to 14. Collahan added that lasting attitude toward mathematics could be developed at any age, but the most crucial age for establishing this is about eleven. Dutton (1962) who is of similar view contends that negative attitude toward mathematics develops as early as the third grade. He added that the years in the Junior high schools are very crucial.

Levine (1972) in a study used pupils and their parents to rank four subjects by responding to statements which indicated their perceptions of the importance of mathematics, the respondents' own ability and interest in the subject and teachers' competences in the subject. The results revealed that pupils considered mathematics important and interesting when compared with the other subjects such as science, social studies and English.

Rowland and Inskeep (1963) observed that students in the intermediate grades ranked mathematics first in a rating of best liked subjects. Again, Rowland and Inskeep found that mathematics was ranked fifth in rating subjects on least liked basis.

Kyles and summer (1977) conducted a study on pupils' reactions to activities and different topics in mathematics. Kyles and Summer found that both primary and secondary school students considered mathematics to be useful.

Lamp (1997) observed that the social differences in mathematics participation were associated with different attitudes toward mathematics. He added that girls from upper primary classes view mathematics as an interesting subject.

Tricia (2001) in an attempt to determine the opinion and feelings concerning mathematics and science, 52 percent of males said they enjoy being in the scientific field whilst 29 percent of females said they would like a career pertaining to science. Besides. 50 percent of elementary school boys against 33 percent of girls described themselves as good at mathematics (Hanmer. 1996) cited in Tricia (2001).

Available data showed that studies at the elementary school level found mathematics being regarded as one of the most popular subjects. It also appears that more studies show that students dislike mathematics and that it becomes less favourable as students progress through junior high school to the college level. This trend may be due to the fact that through the high school to the college level students begin to make career choices. In the light of the foregoing there was the need for this study to enable the researcher to determine pupils' attitude towards mathematics at the primary school level in the Manya Krobo area.

Relationship between Teachers' Attitudes Toward Mathematics and Pupil's Achievement in the subject

The role of the teacher in bringing about the desired change in his/her pupils/ students is indispensable in any educational system. This could be judged from remarks parents. students, educators. stakeholders and policy makers make when pupils demonstrate poor achievement in the PMT.CRT. BECE. SSCE and other related assessment.

Christou. Philippou and Hiliophotou (1999) in a study that involved elementary school teachers found a relationship between attitudes toward mathematics and pupils' achievement. Caraway (1985) also noted that mathematics achievement was positively correlated with teachers' attitudes toward mathematics.

Schofield (2007) in a study involving 850 4th-6th grade pupils and 48 teachers noted that higher teachers' attitudes toward mathematics was significantly related to pupils' achievement. A number of researchers have also found significant correlation between teachers' attitudes toward mathematics and pupils' achievement (Begle,1979; Bishop & Nickelson, 1983; Schoenfeld,1988).

Relich (1996) in a study in Australia involving fifth grade elementary school teachers noted that there was a strong correlation between teachers' attitudes toward mathematics and pupils' achievement. Relich further stated that the relationship was found to be strongest for low achieving pupils. Research evidence suggests that teachers with low mathematics self- concepts may undermine the potential of students to learn, appreciate and react positively to mathematics concepts (Relick, 1996). Teachers with low self-concept in mathematics are less likely to study mathematics at higher levels of education. Hence, many primary school teachers may not only possess negative attitudes toward mathematics, but may have chosen not to study mathematics in their last years of high school (Aiken, 1976).

Haladyna, Oslen & Shaughnessy (1982) cited by Tricia (2001) found significant relationship between primary school teachers' attitudes toward mathematics and pupils' achievement. Taylor (1987) also attempted to investigate the relationship between classroom process and students' achievement in mathematics. He found that teachers' attitudes and methods used were strongly related to students' achievement. Taylor further noted that teachers' attitudes toward problem- solving were strongly related to students' achievement in mathematics.

On the other hand Imai (1993) in a studied involving primary school teachers noted that teachers' attitude toward mathematics did not relate to pupils' achievement. However, Trice and Ogden (1987) noted that anxious mathematics teachers plan significantly less instructional time for mathematics. Schoenfeld (1988) also concluded by stating that teachers transmit negative attitudes to pupils which contribute to the decline in pupils' performance. That what pupils learn is always less than what teachers teach. How much pupils learn is determined by their ability, background and learning style which may or may not match teachers' teaching styles. To maximise pupils' learning depends upon the control of the teachers' teaching styles.

Gore and Treagurt (1983) noted that the time teachers waited for a student to respond to questions posed by the teacher in mathematics class differed greatly between boys and girls. Gore and Treagurt concluded that teachers gave more significant "wait time" to boys than to the girls. Besides, girls' ideas in mathematics were not listened to carefully, but rather boys' little efforts and partial answers were further developed by teachers.

Unger (1999) cited in Tricia (2001) also observed that boys receive more attention from teachers than girls do. Thus, teachers may be unaware of the fact call on boys more than girls. Males are called more in class when complex questions are asked and by so doing the males think for themselves and try to break the problem down to discover the answer. These result in males performing better in these situations than females. Unger again noted that sometimes teachers are found solving mathematics problems for females without any encouragement to work out the problem

Hanmer (1996) cited in Tricia (2001) held similar view with Unger (1999). Hanmer added that may be teachers feel that females need that extra push or maybe it is the teachers with bias against what they feel females can and cannot do. Males and females should be treated somewhat differently due to their specific need. but at the same time the opportunities should be equal (Levi 2000) cited in Tricia(2001).

Available literature reviewed supported the above notion that boys receive more attention than girls do (Jones and Wheatley. 1990; Sadker. (1994) cited by Tricia (2001). They added that boys are often called upon to answer questions. given freedom to call out answers and receive detailed feedback on their effort and work. Leder (1993) was of a similar view where he noted that males had more contacts with teachers. dominated public interactions and involved in more disciplinary exchanges than were females.

Fennema (1984) noted that the mathematical expectations which teachers hold for boys and girls are manifested in the differential treatment on sex basis in mathematics class. This results in pupils reporting differently in class on teacher attitudes. Thus . sometimes higher cognitive level questions were answered by boys while lower cognitive level questions were answered by girls. Besides. in the classroom teachers' use of praise. criticism and help given to individual pupils were based on preferential treatment. These differential treatment strengthen the notion that mathematics was a male domain (Becker.1983).

Tricia (2001) noted that teachers exert enormous influence on the attitudes and achievement of pupils in mathematics. That is. if a pupil believes that a teacher has a low expectation/ opinion of him/her then it may be possible that the pupil will perform according to that expectation

Studies on attitudes based on stereotyped attitudes held for gender have also been carried out. Thus, Guthbezahl (1995) also observed that the expectations parents and teachers hold for girls or females in mathematics have enormous impact on girls' performance in mathematics. Guthbezahl further stated that girls internalise their teachers' and parents' negative expectations which become self- fulfilling prophecies. Thus, because girls believe they cannot achieve in mathematics, they do not achieve in the subject. Their poor performance reinforces parents' and teachers' negative expectation and feeds into the cycle of negative expectation and lack of achievement.

Whyte (1985) cited in Sayers(1994) noted the differential stereotyped attitudes toward boys and girls held by teachers. That is, girls tend to be valued for their neatness, conformity and good behaviour while boys were commended for exuberance, excellence and creativity (Open University, 1986, p. 47).

In Zambia, Shifferaw (1980) cited in Sayers (1994) found that male teachers were much more likely than female teachers to hold such stereotyped views of girls. It is possible to argue that even if male teachers are biased, perhaps it does not influence pupils. The sex of the teacher affects attitude differences among pupils.

Relich, Conroy and Webber (1991) cited by Relich (1996) noted that gender in self-concept between male and female teachers of mathematics present inappropriate role models for students especially, female teachers for their female students. Gender differences are found at the primary school level, but not at SSS level. This difference was found to be attributed to teachers' level of study of mathematics. Thus, males were more likely to have studied mathematics at higher level than females and therefore register higher mathematics self-concept. Common observations show that in Ghana female teachers predominate at the primary school level and many of who may not have studied mathematics as elective subject

The direct link between self- concept and achievement may be tenuous, but the evidence that teacher attitude affects student performance is stronger. Eccles (1993) maintained that teacher efficacy has stronger relationship with students' self- perceptions about abilities in mathematics. That is, in effect teachers' attitude toward mathematic have influence on how students perceive their own abilities to deal with mathematics. This association was found to be strongest for low achieving students who are taught by a teacher with low mathematics efficacy.

From the discussion there appears to be contradiction that there was no relationship between attitude toward mathematics and pupils' achievement Imai (1993) but majority of the reviewed literature indicated that there positive correlation between teachers' attitudes toward mathematics and students' achievement in the subject (Bishop and Nickelson 1983; Taylor, 1987; Tricia, 2001; Chistou, Philippou & Hiliophotou,1999; Caraway,2000; Schofield,2007; Relich,1996). Besides, evidence suggests that the expectation teachers hold for students in mathematics as well as stereotyping boys and girls influence students/ pupils achievement in mathematics.

Relationship between Pupils' Attitudes toward Mathematic and their Achievement in the Subject.

Investigating the relationship between achievement and attitudes toward mathematics is vital. Common sense reveals that an individual may achieve higher in something that he / she delights in doing, has confidence in doing and finds it to be useful to him/ her. Positive attitudes toward mathematics need to be encouraged among primary school pupils.

The Third International Mathematics and Science Studies [TIMSS] (1994-95) for grades 3 and 4 primary school children noted that in more than one- third of the countries a positive relationship was observed between pupils' attitude toward mathematics and their achievement. McLeod (1992) in a study reported that pupils' attitudes toward mathematics was related to their achievement. McLeod further suggested that neither attitudes nor achievement are dependent on one another, but rather they interact with each other in complex and unpredictable ways. Also, Ma and Kishor (1997) based on 113 studies in primary schools concluded that there was relationship between attitudes toward mathematics and pupils' achievement. They added that the relationship was strong among Asian and black students than among white, but did not differ across gender.

In Isreal Nasser & Birenbaum (2004) studied the relationship between the Arabs and Jews fourth graders' attitudes toward mathematics and their achievement. The authors reported that in both groups pupils' attitudes related to their achievement. The authors further reported that attitudes had minor and insignificant effects on mathematics achievement of the Jewish children while it had modest but significant effect on the Arabs.

Using data from the Chilean educational assessment systems [SIMCE] Ramirez (2003) found that fourth graders with more positive attitudes toward mathematics reported higher mathematics achievement than their peers with negative attitudes toward mathematics. Minato and Kamada (1991) found that attitude has greater effect on achievement than the converse.

Taylor (1987) attempted to determine the relationship between inputs of schooling and out comes, measured by students' achievement in mathematics. Taylor found that students' perception of mathematics was strongly related to their achievement.

Hart (1976) used a sample of 179 pupils and found a significant correlation between attitude and achievement. She added that even though a significant correlation was obtained it was difficult to determined whether the attitude toward mathematics affected the achievement or vice versa. Besides, Hart stated further that there may be other variables present which affected both the attitude and achievement, but were not disclosed.

Aiken and Dreger (1961) attempted to determine the effects of attitude on performance in mathematics. They found a relationship between attitude and achievement, but they stated that the relationship was not as great as one might expect.

On the contrary available data from the second International Mathematics study showed that the very high mathematics achievement of Japanese students was accompanied by a low attitude toward mathematics(Travers and Westbury,1989). Abrego (1966) found no relationship between attitudes toward mathematics and achievement in the subject.

From the reviewed literature under this section greater findings revealed that there is a positive significant relationship between students' achievement in mathematics and their attitude toward the subject (TIMSS,1994-5, McLeod,1992, Ma & Kishor,1997; Kamada,1991). In the light of this the researcher deemed it necessary to carry out this study to determine whether any relationship existed between primary class six pupils' attitudes toward mathematics and their achievement in the subject in the Manya Krobo district.

Academic Achievement

Researchers assign academic achievement to several factors and this could be viewed from two broad perspectives. To some academic achievement is intellectual that is, emphasising intelligence as its basis while others see academic achievement as a product of psychomotor abilities of a person/ learner or students, thus, emphasising skills. That is, intelligence, abilities and skills are determinants of academic achievement.

Sprinthall and Sprinthall (1990) attest that academic achievement is what a student was able to achieve when tested on what he had been taught. Bagnato and Neisworth (1987) also maintain that academic achievement depends on natural gifts and talents. They stated further that whether one had a talent or not that giftedness was not something that could be taught.

Hammil (1987) holds the view that academic achievement involves skills that a person had mastered as a result of direct instruction. Hammil stated further that the skills may be teacher taught, parent taught or self-taught. That, in the school achievement tests were conducted to find out how much students knew about a particular content or subject matter taught and this may be obtained as a result of instruction. DeSimone, Werner & Harris (2002) maintain that attitude, motivation, reward systems, social or family events, task difficulty, students' ability and effort, luck, knowledge and skills could influence performance.

McCleland (1985) in his famous theory of achievement motivation, postulates that the primary factor for any level of achievement is the existing environment which puts the individual into action. McCleland maintains that the school environment is the primary element of achievement for every student or learner and that if the school environment is stimulating it will help to achieve higher academically or vice versa. This implies that if in all schools, boys and girls operate in stimulating environment they may all perform equally well. From the above one may then say that academic achievement in specific subject areas is not related to a single factor , but rather a combination of factors including intelligence, motivation, environment and interest to mention but a few.

Achievement of students in Mathematics

Amissah (2000) reported that it was poor performance of pupils in TIMSS that urged the MOE in 1992 to institute the CRT to determine the extent of pupils' performance on mathematics and English language for primary class six pupils. A summary of some of the results of the CRT for 1993 and 1996 are presented in Tables 2-4. Table 2 shows the 1993 CRT results by region.

Table 2:

National CRT Results by Region: 1993

Region	Number of schools	Number of pupils	Mean scores	Number reaching Criterion	Percentage reaching Criterion
Astante	78	2289	26.1	12	0.5
B/A	54	1292	26.6	5	0.4
Central	51	1165	27.2	11	0.9
Eastern	79	1652	25.1	16	1.0
G/A	29	1178	30.9	29	2.5
Northern	34	616	27.8	10	16
U/E	25	567	28.0	19	3.4
U/W	21	510	26.6	3	0.6
Volta	56	1439	27.5	18	1.3
Western	47	1141	30.4	54	4.7

National Mean: 27.4 percent

From the table in 1993 from about one- third of the regions the number of pupils that reached criterion set was less than 1.0 percent. Also, pupils from about one-third of the regions reached 1.0 percent but less than 2.0 percent of the criterion set. In the remaining three regions between 2.5 and 4.5 percent of the pupils reached the criterion set. The highest performance was observed in the Western Region where 4.7 percent of the pupils reached the criterion set. The national mean was 27.4.

Table 3 also shows the 1996 national CRT results region by region. It can be seen from the table that in 1996 there was slight improvement. In six or more than half of the regions the percentage of pupils reaching the criterion set was between 1.0 and 2.0 percent but in no region did the percentage reach 4.0. Only 1.7 percent of the pupils from all the regions reached the criterion set. The national mean score was 28.8 percent.

Table 3:

National CRT Results by Region : 1996

Region	Number of School	Number of pupils	Mean scores	Number reaching Criterion	Percentage reaching Criterion
Ashante	67	2136	28.8	26	1.1
B/A	53	1140	27.7	15	1.3
Central	48	1227	27.5	12	1.0
Eastern	77	1717	28.2	17	1.0
G/A	27	1315	30.6	38	2.9
Northern	39	957	27.0	11	1.1
U/E	30	383	29.9	22	2.2
U/W	23	397	28.1	4	1.0
Volta	61	1687	29.2	39	2.2
Western	50	119	29.9	41	3.4

National Mean : 28.8 percent.

Also, the CRT results were used to compare the differences in gender performances in mathematics. The results from 1992 to1997 are presented in Table 4. The results from the table show that over the years the mean scores for boys were slightly higher than girls but both were increasing (MOE, 1997).

Table 4:

National CRT Results by Gender: 1992-1997

Years	1992	1993	1994	1995	1996	1997
Boys	28.0	28.0	28.3	28.7	29.4	30.5
Girls	26.4	26.6	26.9	27.4	28.0	29.3

Wilmot (2001) studied the achievement of boys and girls in the primary school level. He used primary classes three, four and six from five schools in the Central Region of Ghana. He noted that in all the three classes boys out-performed their female counterparts slightly. Analysis of the test scores revealed that in primary classes three and four there was no significant difference in achievement between boys and girls. In the primary six class there was a significant difference in achievement in favour of boys.

Adarkwah (2004) made similar observation in a study involving primary classes three, four and six pupils within Winneba township schools She also noted that there was significant difference in achievement between boys and girls in favour of boys in primary class six but no difference in achievement between boys and girls in classes three and four.

Gender difference in mathematics achievement has been a debatable issue and an area of educational research. Acana (2001) reported the first

National Assessment of Progress in Education (NAPE) in Uganda carried out in 1996 where the achievement of primary 3 and 6 pupils and their teachers were assessed in English and Mathematics. Since then three more assessments have been done in 1999,2003 and 2004 for the same classes. Acana noted that boys performed significantly better than the girls throughout the periods 1999,2003, 2004. She added that the performance in mathematics was lower than that of English.

The Third International Mathematics and Science Studies [TIMSS] (1994-95) provides studies on the achievement of primary schools pupils from grades 3 and 4 in 26 countries. TIMSS noted that in most countries both boys and girls had approximately the same average mathematics achievement at both grades. However, in some countries significant differences were observed and favoured boys than girls at both grades. Some of these countries included Korea, Japan and the Netherlands. In other countries such as Hong Kong, Canada, Iceland, Norway and Slovia at the third grades there were significant differences in achievement in mathematics that favoured boys.

Abo-Zaenah (1985) in South Africa studied the achievement levels in mathematics involving 3882 pupils from 3rd grade and 1990 pupils from the 6th grade. He reported that there was significant difference in achievement between boys and girls in the 3rd grade and that the performance was in favour of boys. He further noted that in the 6th grade there was no significant difference in achievement between boys and girls that is their achievement s were the same.

Mohammed (2005) studied the mathematics achievement of 5th grade pupils in Mohammed Ali Selah primary school in Yemen. He noted differences in achievement between boys and girls and the performance was in favour of girls.

According Sayers (1994) a number of similar studies had been reported in the UK and Australia. Sayers went further to say that many studies such the APU (1981) suggest that there is little difference between boys' and girls' achievement in mathematics at the primary school level. That although there are differences in the type of items done well by each sex That is, girls out-perform boys in computational tasks.

In a project reported in "mathematics and the 10- years-old" Cockcroft (1982) tested 2296 children in England and Wales. He noted that girls performed significantly better than boys on 11 items out of 91. That the items on which girls did significantly better than boys were easier and were thought to be more important by their teachers. Costello (1991) was of similar view with Cockcroft. Costello suggested the possibility that girls may disadvantage themselves by only trying to please their teachers.

Authors have demonstrated that gender differences in mathematics achievements are visible as early as late childhood, but are clearer in older students (Fennema, 1984). With a similar view Aiken (1974) observed that sex differences in mathematical abilities are present even at kindergarten level and earlier.

In a review of literature on gender differences and mathematics Leder (1992) reported that few consistent gender differences exist at the primary school level. However, this trend changes at the beginning of secondary school level and males frequently, but not always out-perform girls. As children grow older differences in performance increase so by age 13 boys are significantly superior to gi.ls in all their mathematical performance and their attitude toward mathematics (Hanna Kundiger & Larouche 1990)

Factors which cause girls' lower performance in mathematics is a "gatekeeper" or what has been called a "critical filter" by Sells (1976). Data from studies on pupils' attitudes show a picture of girls being less confident, more nervous, enjoying mathematics less and seeing less use for their mathematics or perception of utility of mathematics when compared with boys. These differences occur throughout secondary schools and are exaggerated in the examination years. Besides, other possible reasons assigned to why girls performance is lower than boys is the evidence that girls' attitudes differ from boys in terms of confidence, anxiety, enjoyment and perception of utility of mathematics.

Every individual has the opportunity to learn and achieve in mathematics, but studies have shown that on the average girls do not score as high as boys do in mathematics tests especially if those tests involve high level of cognitive tasks (Leder, 1990). Females are under represented in advance mathematics course, college majors and careers that involve mathematics (Armstrong, 1979) cited in Tartre and Fennema (1995).

Adolescence is a period of great change. Thus, the relationships among skills, talent, attitudes and achievement as pupils/students progress through primary, middle, JSS and high school are not clearly understood. Some gender differences in mathematics perhaps not present at younger ages have been reported to appear as students become adolescents (Hyde,Fennema and Lamon 1990).

Studies reported that beginning at puberty boys tend to outscore girls on tests of spatial skills (McGree, 1979). Maccoby and Jacklin (1974) in their classic book about sex differences stated that " at about age 10 or 11 girls begin to come into their own in verbal performance. From this age through the high school and college years girls were found outscoring boys at a variety of verbal skills." (p 84). Tartre (1990) cited in Leder (1993) found spatial and verbal skills to be related to mathematics achievement.

Fennema and Carpenter (1981) evaluated the 1978 mathematics test of the USA National Assessment of Educational Programme (NAEP). The test was administered to 9, 13 and 17 year old pupils to assess their mathematical abilities of knowledge, skills, understanding and application. Fennema and Carpenter concluded that with the high scores on skills at 9 and 13 years boys did significantly better than girls in all cases. Besides, they found that the higher the cognitive level the greater the differences in performance between the sexes. NAEP further revealed that by age 17 majority of girls no longer studied mathematics and those who did continue to an average of lower achievement scores than boys. The survey also confirmed sex- related preferences for mathematics and science subjects were already established in lower schools and that by the end of SSS boys far out- numbered girls in those classes.

The Assessment of Performance Unit (APU,1980) cited by Eshun (1999) carried out in the UK indicated similar results that male performance in mathematics began to widen at age 11 and at age 17 the difference was wider in favour of boys. Similarly, (APU,1981) cited by Eshun suggested that with regards to mathematics achievement there is little difference between males and females on overall mathematics scored at the primary school level, although there are differences in the types of items done well by each sex. For instance, girls out performed boys on computation while boys seem to do well on measurement tasks.

Again, in the UK, (APU, 1985) cited by Eshun (1999) indicated that there were differences between males and females performances in mathematics, that, at age eleven boys scored higher than girls in all content areas of mathematics except computation, but at age fifteen girls have lost this computation area to boys. However, a number of studies found that these differences were greatly reduced in the signle- sex schools (Luna and Gonzalez, 1981; Schildkamp- Kundiger, 1982) cited by Eshun.

Husen (1967) conducted broard studies in twelve developed countries from America, Europe and Asia. In all the countries Husen observed that the performance of boys were far higher on verbal mathematics problems, that on computation considerable difference between the countries was reported, that the sex differences being greatest in Belgium, Japan and the least being in USA and Sweden. Husen concluded that these differences may be due to cultural variations.

However, in other countries where sex differences in achievement in mathematics were reported the difference seemed greatly reduced when achievement of boys in boys' schools were compared to the achievement of girls in girls' schools. The differences in the decrease were observed and reported in USA, Western Europe and Africa (Schildkamp-Kundiger, 1982) and in the Dominican Republic (Luna and Sara, 1981).

Lee and Lockheed (1990) also found in a study involving 1012 ninth graders in forty schools in Nigeria that girls in single sex schools had higher mathematical achievement than their female counterpart in mixed-sex schools, whereas boys in single- sex schools were negatively affected as compared to those in mixed-sex schools.

Randhawa (1991) in a three- year study of Saskatchewan high school sophomores found consistent male advantage in mathematics concepts, computation and problem- solving. Battista (1990) in a study found that males and females differ in spatial visualisation and in their performance in geometric problems, but did not differ in logical reasoning ability or in their use of geometric problem – solving strategies.

During the compulsory years of school in Australia the participation rates of students in mathematics is very high. For the most demanding elective mathematics courses at the post compulsory years of schooling and at the tertiary level females' participation rates have persistently remained lower than males (Leder and Forgasz, 1992) cited in Forgasz (1995). Leder (1992) noted the factors which influence the levels of performance of males and females. Thus, the extent and direction of gender differences can depend on the age of students and on the type, the format and content of the measures administered.

Hanna Kundiger & Larouche (1990) noted that as children get older, differences in performance increase so that by age 13 boys are significantly superior to girls both in their mathematical performance and their attitude toward mathematics. They added that these differences in later years are characterised by girls being under represented in the top ability band by fewer girls pursuing mathematics when it ceases to be a compulsory part of the curriculum. They concluded that gender related differences in mathematics vary among countries and even between different groups within a country

Writers hold the view that there are some minor cognitive differences yet attitudes play a much more significant role in the outcome. Attitudes are found to become less positive with age, the deterioration is more marked for females than males (mathematical association, 1988).

Hyde, Fennema and Lamon (1990) observed that males generally achieve better than females at higher cognitive level on mathematics tasks. Benhow (1988) cited in Relich (1996) also noted that at the high ability end of the spectrum, gender differences favouring males appear to have remained constant. However, Friedman (1989) cited by Relich (1996), Hyde, Fennema, Ryan, Frost and Hopp (1990) cited inTartre and Fennema (1995) noted that gender gap in mathematics performance has closed over the time Hyde, Fennema , Ryan ,Fost and Hopp (1990) noted that "it is somewhat premature to conclude that affective variable (affect) and attitude are not important influences on gender differences in performance and participation in mathematics (p. 312)".

Sayers (1994) attempted to determine gender differences in mathematics education in Zambia. Empirical data obtained suggest that gender differences exist in mathematics in terms of access and performance.

Costello (1991) noted that girls do better on topics which are perceived by the teacher as important. This suggests the possibility that girls may disadvantage themselves by trying to please the teacher

However. some female students can equally perform as well as males or even better than males in mathematics. To support this Eshun (1987) reported that a female speaker at one of the girls' clinics on gender stereotyping in science and mathematics in Ghana pointed out that when she was a student her teacher punished the boys in the class because she performed better than the males. This showed the harm the teacher could do to frustrate female students. Eshun concluded that rather than discouraging females. teachers should rather do everything possible to improve the performance of female students in mathematics and to encourage more females to participate in mathematics.

Fennema (1979) cited in Taole Zonneveld.Letsie-Taole(1995) stated that male superiority in mathematics learning had been accepted as a fact almost without question for many years. Fennema and Carpenter (1981) found that sex differences increased in relation to the amount of mathematics studied or taken.

In Ghana and other parts in the world. jobs requiring advance knowledge of mathematics are seen to be dominated by males. Thus. considering areas such as navigation. finance. architecture. aviation. surveying. engineering. medicine to mention but a few females are found in clerical aspects where typing and counting of money are common.

Many textbooks have influence on sex differences in mathematics achievements making it possible for females to develop negative attitudes toward mathematics. That is. in many countries committees attempted to investigate textbooks for sex roles stereotyping. Males are found to be in active professional situation as mentioned in the preceding paragraph. but women are always found in domestic passive roles. Always text books depict males as engineers and females as nurses. The effect of this is that females believe that they would be discriminated against even if they are successful in mathematics and that it may be difficult to choose a job that demands behaviours that people generally find attractive only in men.

In institutions where students are allowed to choose their subjects very few females opt for mathematics. Pratt, Bloomfield and Seal (1984) reported that girls tended to opt out of the mathematics and science when they were permitted a total freedom of choice of subject.

With the establishment of the girls unit in Ghana in 1997 to serve as a ministry to see to the affairs of the education of the Ghanaian girls with special emphasis on girls offering mathematics and science, now many girls show positive attitude in participating in mathematics. The STME which is located in the girls unit as stated earlier was established in 1987. The STME has now reached out to about 2000 students at the SSS level in the Country. In 1999 over 2100 students attended clinics or workshops at the regional levels. This means that many girls now participate in science and mathematics courses, so sooner the differences in participation and achievement will be narrowed (MOE,2002).

According to Heider (1944) cited in Nenty (1986) "when we have a disagreeable experience or a pleasant one we may locate its origin in another person or things, in ourselves or in fate" (p. 358). Thus, one often attributes his/ her performance either success or failure to something or someone. In life people attribute events to how their causal beliefs influence related behaviours. Thus, people could assign differences in achievement in mathematics to many factors based on layman's analysis. However, Heider's (1958) theory: causal attribution of performance is examined in terms of four factors namely, ability, effort, luck and task difficulty. Ability and effort are factors internal to the individual while luck and difficulty are external factors. Besides, ability and task difficulty are said to be stable factors because they are not within the control of the individual while effort and luck are classified or considered as unstable factors because they can be changed with time. Attribution of performance to stable factors which are not within the control of the learner tend to induce a cognitive expectation of similar performance in the future, while attribution to unstable factors tend to induce an expectation of possible change in future performance (Bar- Tal, 1987) cited in Nenty (1986).

Males tend to attribute their performance to internal factors while females tend to attribute theirs to external factors (Bar-Tal, 1987; Gregory, 1978; Nenty, 1986). Leder (1993) holds a similar view by stating that:

> "males agree more strongly than females that mathematics was useful, that it was enjoyable and that they were confident about getting good grades in the subject" (p.15.8).

Leder added that males attributed their success to ability while females more than males attributed their failure in mathematics to ability and to the task difficulty.

On the contrary, evidence suggests that males are not superior in all aspects of mathematics (Barnes, 1983; Boli, Allen and Payne, 1985) cited in Relich (1996). Willis (1989) noted that small differences in mathematics achievement exist between males and females. The differences vary from culture to culture and vary small in favour of males. The differences in performance are decreasing over the years (Benhow, 1992, Friedman 1989) cited by Relich (1996).

Mogegeh (1989) reported that there was no significant difference between male and female students in mathematics. Smith (1980) found a significant difference in mathematics achievement between females who were separated into an all females classroom and females in the mixed classroom achieved less than males though they were matched in their ability at the beginning of the study.

Other studies showed that attitudes relate to participation and achievement in mathematics (Armstrong and Prince, 1982; Shaughnessy Haladyna Shaughnessy.1983). Traditional view of mathematics as a male domain has contributed to the decline in performance, attitude and participation of females in the high school mathematics (Ernest, 1976; Eennema and Carpenter, 1981' Fennema, 1984).

From a research, Boserup and Eshiwain (1985) concluded that females' education in some developing countries is adversely affected by existing social attitudes which favour the intellectual advancement of males especially in the mixed schools.

From the discussion there appears to be general agreement that sex-related differences exist in mathematics achievement between boys and girls. Most of the studies revealed that the performance was in favour of males more especially on high cognitive level tasks. Besides, due to variations across cultures and sex- related differences in mathematics achievement, this study was focused on determining the type of sex-related differences in mathematics achievement that may existed among primary class six pupils in the Manya Krobo District in the Eastern Region of Ghana using an achievement test instrument.

Difficulty of Mathematics

Teaching mathematics is very challenging especially when one finds himself or herself teaching in a community which does not know its role in the school, does not value learning, a community which randomly prevent their children from attending school. One cannot be sure of the learners in terms of their abilities, knowledge, what they can do and what they cannot. Today they behave like this and tomorrow they behave differently.

Among the subjects in the school curriculum, common observations and general belief show that mathematics is the most difficult and feared subject especially by female students. Richards (1982) contends that if asked to sum views about mathematics at school many students describe it difficult, dull, abstract and disliked. Buxton (1981), cited in Richards (1982) described the feeling that adults still have about their difficulties in mathematics. Richards maintains that most of the people selected by Buxton could remember reactions like "oh my God I am going to make a fool of myself and described how they associated mathematics with fear and trembling, or a complete detachment.

Physical symptoms of panic and despair were also reported, cold sweats, clammy palms and lump in the throat feeling that you could get some release if you could but cry" (p.62). From the foregoing are the physical symptoms of difficulties one encounters in solving mathematics

Mathematics educators. students. parents to mention but a few are worried about mathematics teaching and learning in our schools. This is because it is believed that students fear the subject. they lack interest in it. they see it to be difficult. boring and abstract. Besides. some students complain that mathematics is not properly taught for their understanding and that. one need to be borne as a mathematician. Thus. these beliefs and features are the manifestations of the difficulty of mathematics. Mathematics teaching and learning has been a problem for many countries all over the world but not Ghana alone.

Leder (1993) observed that males attributed their success in mathematics to their ability while females attributed their failure in the subject to their ability and task difficulty. Leder further stated that males agreed more strongly than females that mathematics was useful. that it was enjoyable and that they were confident about getting good grades in the subject.

Other studies had found that as well as having lower confidence females also view mathematics as difficult. From surveys of eleven and sixteen year old pupils in England Wales (Shuard. 1986) reported that while even at age eleven girls more often described mathematics as difficult than boys did. Besides. girls felt less often that they could grasp new materials in mathematics quickly. By sixteen years the rating of difficulty becomes a very strong source of difference. It has also been agreed that differences in mathematics attainment between boys and girls are due to basic biological differences in the sexes. Thus, if a girl believes in an alterable biological cause, she easily surrenders when been confronted with difficulties

In an attempt to identify people with peculiar areas of mathematics problems, Fall (1998) outlined the following:

1) Some people are able to remember formula, but may not understand why the formula makes sense.
2) Some prefer to do paper and pencil tasks and are attentive to the details, but do not see the big picture.
3) Some see the big picture and have insight into patterns of the mathematics, but are poor at computations and have problems with remembering step-by-step procedures.
4) Some understand mathematics concepts and like to solve problems mentally and quickly yet their answers may be inaccurate. These individuals may have difficulty in verbalising and explaining their answers. All the above may let an individual to conclude that mathematics is difficult.

We know that the learning of mathematical concepts more than any other content area or subject is tied closely to the teacher's knowledge of mathematics and the manner in which these concepts are taught (Lyon, 1996). Therefore individuals with mathematics problems is a result of how their instructors are inadequately prepared in mathematical principles and how they teach them

Mathematics instructors need understanding of the mathematics curriculum, the ability to use a variety of instructional techniques that are simultaneously multisensory and which provide explicit instruction that is systematic, cumulative, diagnostic and both synthetic and analytical as well as knowledge of current research in mathematical instruction.

Other problems associated with mathematics are the language of mathematics and the concepts associated with it. These include spatial and quantitative references such as before, after, between, one more than or less than. Mathematics terms such as numerator and denominator, prime numbers and prime factors, carrying and borrowing may also be problematic.

Harper (1986) in a study noted the following factors which account for the difficulty of mathematics learning. Thus, rigidity of mathematics, the affective domain, relevance of mathematics, personality, fear, teachers of mathematics and the styles of teaching, language of mathematics to mention but a few.

In attempts to determine the effect of second language (L2) education and mathematics achievement, Baker (1993) feels that learners in L2 education lag behind their peers in areas such as mathematics and science. The explanation he offers is that, this may be because their L2 skills are insufficiently developed to be able to think mathematically and scientifically in their second language. This view was supported by Cummins and Swain (1986) as well as Saville- Troike (1991) who stated that, " certainly (L2) students are at disadvantage trying to understand instruction and express themselves in a foreign language especially when they must compete with other pupils who have already mastered their (L1)" (P.175).

The second language hinders learners and results in low achievement for studying through (L2). Saville- Troike (1991) describes this act as instruction bias which she defines as " teaching subject content to children', low level of English" (p.6). Mathematics is taught and learned in a language in an intensive manner. The US National Council of Teachers of mathematics (NCTM) prescribed standards for mathematics education. Thus, Austi (1997) summarizing the US NCTM guideline states that command of mathematical language plays an important role in the development of mathematics ability. The importance of language in mathematics instruction is often overlooked in the mistaken belief that mathematics is somehow independent of language proficiency. However, particularly with the increased emphasis placed on problem – solving, command of mathematical language plays an important role in the development of mathematical ability. Mathematics vocabulary, special syntactic structures inferring mathematics meaning and discourse patterns typical of written text all contribute to difficulties many (L2) students have when learning mathematics in English (p. 24). From the foregoing it seems that language sometimes contributes to mathematics difficulties.

Available literature shows that learners have their best chance of success in mathematics and science if they study it through their L1.Thus mathematics and science contain a high proportion of conceptual and abstract notions. These notions cannot be internalised in a meaningful manner through the memorisation of verbal formulae. Understanding is essential and a high degree of cognitive maturity and verbal fluency is required to negotiate and acquire this understanding. It is clear from The Third International Mathematics and Science Surveys (TIMSS) (1997) results that students and probably many teachers are not able to demonstrate a personal understanding of mathematics and science concepts in their own words. They rather rely on superficial repetition of formulaic phrases (TIMSS, 1997). Mathematical concepts such as area, volume, slope to mention but a few need to be formed well by the learners and this will result in better understanding and higher achievement in mathematics.

Mathematical literacy is conceptually abstract and difficult to understand and communicate in a meaningful way. In this vein teachers need to try as much as possible to vary methods and assist pupils to construct their own knowledge and concepts on given topics (TIMSS, 1997).

Wilson (1992), cited in Taole et al. (1995) talking about mathematics education in Africa observed that "the reality of mathematics teaching in African primary schools has long diverged markedly from that in the West" (p.135). Wilson noted that factors such as lack of textbooks, materials for activities as well as overcrowding, have been responsible for the adoption of the traditional chalk- and - talk method by most teachers in African primary schools.

Gibson and Dembo (1984) maintained that students tend to have positive attitudes toward courses and subjects that are at the appropriate level of their abilities and which provide rewarding experience instead of frustrating ones. More often than not the attitude toward a particular subject determines the rate at which the subject should be developed in the school. Difficulty of mathematics is associated with feelings, emotions, anxieties, expectation and these contribute to poor participation and low achievement in the subject.

From the discussion there seems to be the general feelings, opinion, beliefs and impression held by people that mathematics is a difficult subject. Harper (1982) noted the factors that account for the difficulty of mathematics

That is, rigidity of mathematics, the affective domain, relevance of mathematics, language of mathematics, teachers of mathematics and their teaching styles

Shuard (1986) reported that even at age eleven, pupils described mathematics to be difficult especially girls. Leder (1993) noted that males attributed their success in mathematics to their abilities while females attributed their failure in the subject to their abilities and to task difficulty. In the light of this the study was concentrated on primary class six pupils and their class teachers in the Manya Krobo District in the Eastern Region of Ghana to determine how respondents described mathematics in terms of difficulty.

Confidence and Anxiety

Mathematics anxiety has been defined as feelings of tension and anxiety that interfere with the manipulation of numbers and the solving of mathematical problems in a wide variety of ordinary life and academic situations.

Chionidou (1996) in a study in Athens- Greece involving 3rd to 6th grades pupils reported that girls tend to find mathematics boring and boys have higher confidence in mathematics than girls. Research reveals a substantial relationship between mathematics anxiety and confidence in learning mathematics to the extent that they are often considered as the same concept (Freislihch & Bowen- James,2003). Bretscher, Dwinell, Heyl & Hegbee (1989) found significant correlations between the attitude factors of mathematics anxiety and confidence in one's ability to learn mathematics. Mathematics anxiety can cause one to forget and lose one's self confidence

(Tobias, 1993). Mathematics anxiety is very real and occur among thousands of people. Much of this anxiety happens in the classroom due to lack of consideration of different learning styles of students. Besides, traditional mathematics classrooms, imposed authority, public exposure to mention but a few cause great anxiety in many students.

Newstead (1998) also presents other sources of anxiety. These are categorised under educational, environmental, teacher and societal factors, failure and the influence of the early school experience of mathematics. Thus, any of these factors may establish anxiety among students.

For example, students' prior negative experiences in mathematics class and at home when learning mathematics are often transferred and can cause lack of understanding of mathematics. According to Tobias (1993) millions of adults are blocked from professional and personal opportunities because they feared or performed poorly in mathematics and these negative experiences remain throughout their adult lives.

Mathematics is often associated with pain and frustration. For instance, unforeseen debts, unpaid bills, unbalanced check books, internal revenue services (IRS) forms to mention but a few are negative experiences associated with number.

Mathematics must be looked upon in a positive light to reduce anxiety. A person's state of mind has a great influence on his/her success. Therefore teachers must design classrooms that will make pupils/students feel more successful. Incorrect responses must be handled in a positive way to encourage student participation and enhance students' confidence.

Studies have shown that students learn best when they are active rather than passive learners (Spikell 1993). Students today have a need for practical mathematics therefore mathematics need to be relevant to their everyday lives. students enjoy experimenting. To learn mathematics, students must be engaged in exploring, conjecturing and thinking rather than engaged only in rote learning of rules and procedures.

Children will master mathematical concepts and skills more readily if they are presented first in concrete, pictorial and symbols. Besides, cooperative groups provide students a chance to exchange ideas, to ask questions freely, to explain to one another, to clarify ideas in meaningful ways and to express feelings about their learning. These skills acquired at an early age will be greatly beneficial throughout their adult working life

Confidence and anxiety are important affective variables in mathematics learning. Tobias and Weissbrod (1980) contended that anxiety is a strong factor that causes females to avoid mathematics and its related courses for they suffer more mathematics anxiety than males.

Affective variables have been found to relate to mathematics achievement. Thus, studies have shown that confidence in one's ability to learn mathematics positively correlates with mathematics achievement (Meyer and Koehler, 1990). Meyer and Koehler maintained that since girls have tended to be less confident in their abilities to do mathematics than boys are, it is reasonable to hypothesise that confidence is an important variable to investigate.

Tartre and Fennema (1995) in their study on mathematics achievement and gender observed that confidence in learning mathematics is the affective variable most consistently related to mathematics achievement. They also noted that males tend to stereotype mathematics as male domai . more than females do

The greatest differences between males and females can be found in their attitude to and self- confidence in mathematics rather than in actual achievement (Boli,Allen and Payne, 1985; Eccles,1982) cited in Relich (1996). Mars et al (1985) cited in Relich, in a study with fifth grade students found that although the girls out- performed the boys on a standardised mathematics test they nevertheless had lower mathematics self-concepts than the boys. Other studies (Leder, 1988; Mura, 1987; Thomas & Castello, 1988) cited in Relich also provided evidence of boys' perceived superior competence and girls under valuing their achievement in mathematics

As discussed earlier, some of the causes of mathematics anxiety for pupils include the teaching styles in the classroom. Thus, pupils in the elementary schools complain that teachers do not teach them well to understand. Besides, pupils complain that mathematics offers little opportunity for debate or discussions. On the other hand teachers also say pupils prefer literature and social studies since they can participate more in class and are under no pressure to find the one right answer. Again, teachers may create more anxiety by placing too much emphasis on memorising formula, learning mathematics through drill and practice applying role-memory rules and setting work in the traditional way rather than understanding and reasoning (Greenwood; 1984).

People fail to do their best when scared. Mathematics anxiety develops from uncertainty and lack of confidence. Although mathematics aim at right answers these can be reached through open- ended problems being experienced as a series of discoveries to be made by the learner rather than mathematical methods and rules. Learners need to acquire abilities to analyse, question, test and find solutions. Knowledge and skills relating to the processes can later be applied in any situation. Who will bring about this and how? Which methods of instruction or approaches to learning can bring mathematics to a large number of people within the reach and interest of young minds? Many authors have looked at the causes of mathematics anxiety and alternative teaching techniques to aid understanding (Greenwood, 1984, Newstead, 1998; Hembree, 1990; Hopko and Ashcraft, 1998).

The critical age for the development of mathematics fear is between nine and eleven although fear may deepen or change throughout schooling (Mclead,1993). Once formed negative attitudes and anxiety are difficult to change and may persist into adult life with far reaching consequences in the form of avoidance of mathematics, distress and interference with conceptual thinking and memory processes.

Fennema and Sherman (1977) found that anxiety and confidence appeared similar because they found that a high rating on confidence scale correlated highly ($r= O . 89$) with a low rating on the anxiety scale. Besides, Fennema and Sherman found that from grades six to twelve boys were significantly more confident in their abilities to deal with mathematics than were girls.

From the discussion there seems to be general agreement that girls tend to be less confident in their abilities in mathematics than boys. The critical age for the development of anxiety in mathematics is between ages nine and eleven (Mclead. 1993) Mathematics anxiety is real and occurs among thousands of people In the light of this the study intended to find out whether any significant mathematical anxiety existed among primary school pupils and the level of confidence between male and female pupils

Mathematics as a male Domain

Common beliefs, views, feelings, opinion and expressions by people from culture to culture cause individuals to view mathematics as a male domain. Besides, traditionally, mathematics has been regarded as a male domain. Looking at careers that use mathematics as their tools , such as surveying, medicine, engineering to mention but a few, confirm that males dominate occupations that are mathematics related. There is available literature to support this belief or notion.

Fox (1977) in a research revealed that parents, counsellors and teachers believe that mathematics is an activity meant for males more than females. Besides, in a research with twelth grade students Stein (1969) provided evidence that females perceived that the use and the creation of mathematics is a male domain.

In an attempt to review 36 studies, Fennema (1974) cited in Sayers (1994) concluded that there was little evidence that sex- related differences exist in mathematics learning before or during secondary school level and the general trend was that males excel in higher cognitive tasks while females excell in the lower cognitive tasks. Fennema (1979) cited in Taole et al.(1995) however, remarked that all the important affective variables are related to the stereotyping of mathematics as a male domain right from the elementary school level and become stronger during adolescent stages and matures at the adult stage as a male domain. Besides, Stein and Smithells (1969) and Stein (1979) observed that mathematics is not considered as masculine by both males and females until adolescent stages. Thus, during that period evidence shows that mathematics is not ranked highly as masculine as athletics, mechanical and spatial tasks do.

Fennema and Sherman (1979) observed that male superiority in mathematics has been an accepted fact without question for many years. Today common observations show that more males use mathematics daily than females do and this is confirmed by the careers which use mathematics as stools as discussed earlier.

Maccoby and Jacklin (1974), concluded that all of the intellectual sex- differences that still exist in male superiority in mathematics is ability. Aiken (1972) was of similar view when he observed that sex- differences in mathematical abilities are even present at the kindergarten level or earlier. All the review showed that male superiority was evident at the upper elementary or JSS level.

From the discussion it seems that traditionally, mathematics has been regarded as a male domain . Besides, the careers which have mathematics as their tool are dominated by males. More females confirm that mathematics is a male domain. Finally, male superiority in mathematics begins right from the kindergarten level through the elementary school level to the adult stage. However, Stein and Smithell (1969) and Stein(1979), in their studies reported that mathematics was not considered as masculine by both male and female students until the adolescent stage.

Perceived Relevance of Mathematics

Most teachers want to meet the needs of all their students the best way they can. It is helpful for these teachers to be aware that students'/pupils' perceptions of the usefulness of mathematics are highly correlated with their plans to take more mathematics courses (Pedro, Wolleat, Fenneman & Beker, 1981; Thorndike- Christ, 1991, Edkard, 1995). Female students often do not perceive mathematics as being useful. Therefore, in teaching information need to be presented to them in general form as well as in female specific form. Students' perceptions of relevance or relatedness include seeing the connection between the course material and the students' experiences and career goals.

Wolters and Pintrich (1998) found that knowing task value was a predictor of cognitive and regulatory strategy, but not a predictor of performance. Wolters and Pintrich again found that self- efficacy beliefs were predictors of achievement in mathematics. They suggest that task value may enable students to begin tasks, but that efficacy beliefs help students persist and overcome obstacles. Besides, Wolters and Pintrich found that students with high test anxiety tended to use fewer regulatory strategies and receive lower grades.

Summary of literature Review

Of late, there is growing interest in finding out the main factors that contribute to students' mathematics learning and their achievement in the subject. Thus, factors such as the school environment, the home, content and methods of teaching, attitudes to mention but a few could be investigated into.

Among these factors the concept of attitude is an important factor in human behaviour. Attitudes affect the way people perceive and respond to events, ideas situations, other people, subjects, things to mention but a few.

Dealing with attitudes toward mathematics studies reviewed revealed that teachers' possessed negative attitudes toward mathematics (Davies & Savell,2000; Grootenboer, 200;Rech,Hartzell,Stephen,1993).Teachers' views, beliefs, attitudes and actions influence pupils' actions and attitudes in the classroom and their learning outcomes (Koehler & Grouws, 1992).Teachers' beliefs about mathematics influence how they teach and therefore the learning activities pupils experience (Nickson, 1992).

It was also noted that differences exist between boys' and girls' attitude toward mathematics. Thus, initially girls have more positive attitude toward mathematics than boys, but as girls grow older their attitudes decline or become more negative (Swetman 1995). Boys have higher positive attitude toward mathematics than girls (Burnett,1996; TIMSS,1994-5).

Some studies are not in agreement with the general trend and belief that females have negative attitude toward mathematics. TIMSS (1994-5) noted that in some countries both boys and girls were similar in their attitudes toward mathematics.

With regards to age and attitudes Eccles et al. (1993) opined that even at very young age, boys and girls feel more or less competent in certain subject areas. Besides, a proportion of pupils dislike mathematics and others express strong dislike for the subject between ages eleven and fourteen, but the most crucial age for establishing this is about eleven years (Collahan, 1971).

From studies reviewed under the relationship between teachers' attitude toward mathematics and pupils' achievement in the subject. the following were noted That is. teachers' attitudes toward mathematics related to pupils' achievement (Christou. Philippou & Hilophotou. 1999. Caraway. 1985: Schofield.2007: Schoenfeld 1988: Begle.1979: Bishop & Nickelson.1983). Imai (1993) on the other hand reported that teachers' attitude toward mathematics did not relate to pupils' achievement. Teaches exert enormous influence on pupils' attitudes and achievement in mathematics (Guidry. 2000) cited by Tricia (2001).

Teachers find themselves attempting to teach mathematics which they have not mastered (Heaton, 1992). Besides. primary school teachers expressed their dislike for mathematics.

Furthermore. studies revealed that teachers hold differential stereotyped attitude toward boys and girls (Whyte. 1985) cited by Sayers (1994). This results in differences in attitudes and achievement among the sexes. Male teachers were much more likely than female teachers to hold such stereotype views (Shifferaw. 1980) cited by Sayers. Boys receive more attention from teachers than girls do (Unger. 1999; Jones and Wheatley. 1990; Kahle and Lakes. 1993; sadker. 1994; Tobin. Kahle and Fraser 1990) cited by Tricia (2001).

Again. studies revealed that pupils' attitudes toward mathematics relate to their achievements in mathematics (TIMSS.1994-5; McLeod.1992; Ma & Kishor 1997). Besides. students' perception of mathematics strongly relate to their achievement in the subject (Taylor. 1987). It was also noted that the higher the achievement the more positive were students' attitudes toward mathematics.

Studies on pupils' achievement in mathematics were reviewed and the following were noted. That is, CRT results in Ghana from 1992- 1997 indicated that from year to year boys out- performed their female counterparts (MOE, 1997). Other research findings are in agreement that boys' achievement in mathematics are better than that of girls (TIMSS1994-5; Wilmot,2001; Adarkwa,2004; Acana,2001; APU 1980, 1981,1985; Maqsud and Khalique, 1991; Randhawa, 1991; Hyde, Fennema and Lamon, 1990). On the contrary Mohammed (2005) in a study which involved 5th grade primary school pupils reported that girls out-performed their male counterparts. Besides, it was noted that there exited gender differences between male and female students' achievement in mathematics. Thus, it was noted that as children get older the differences in achievement increase so that by age 13 boys are significantly superior to girls both in their achievement and attitude toward mathematics (Hanna et al, 1990). That, sex differences begin to widen at age eleven.

From studies reviewed under difficulty of mathematics, it was noted that many students view mathematics to be difficult, dull and abstract (Richards, 1984). Besides, Richards concluded that many students disliked mathematics. It was also noted that students fear mathematics and the critical age for the development of mathematics fear is between ages 9 and 11 (Mclead, 1993).

Finally, from studies reviewed on mathematics as a male domain, it was noted that males tend to stereotype mathematics as male domain than females do (Tartre and Fennema, 1995)

In the light of the foregoing discussion, it is evident that there are disagreement in some of the research findings, coupled with the fact that there are relatively few studies on attitudes toward mathematics at the primary school level in Ghana and especially in the Manya Krobo district researchers will therefore agree that more studies are needed in this area to support the existing findings presented by notable mathematics authorities.

CHAPTER THREE

METHODOLOGY

This chapter discusses the research design used, the population, sample and sampling procedure and the characteristics of respondents. The research instruments used to collect data and data collection procedure were also discussed. Furthermore, methods for scoring responses as well as methods for data analysis were all discussed in detail.

Research Design

The research design used for the study was descriptive sample survey. The descriptive sample survey design as pointed out by Gay (1987, p. 189), involves collecting data in order to test hypotheses or to answer questions concerning the current status of the subjects of the study". Again, a descriptive study provides a general descriptive picture of a situation to establish norms and baseline data for consideration by researchers in making their decisions to assist them raise relevant questions. Furthermore, descriptive survey determines and reports the way things are.

Descriptive survey as described by Ary, Jacob and Ravazich (1990) surveys sample populations in order to discover the incidence and distribution of and the interrelations among sociological .Psychological and educational variables. The data gathered in a survey are usually responses to predetermined questions that are asked of a sample of respondents.

Furthermore, according to Best and Khan(1998) cited by Amedahe (2002) descriptive research is concerned with the conditions or relationships that exist such as determining the nature of pre[illegible] practices and attitudes, opinions that are held, the processes that [illegible] that developed. Amedahe (2002) also maintains that in descriptive [illegible] accurate description of activities, objects, processes and persons [illegible] objective. That, descriptive research deals with interpreting the relationships among variables and describing their relationships. Descriptive research seeks to find answers to questions through the analysis of relationships between or among variables.

In the light of the discussion above, the descriptive sample survey was appropriate for this study since the study attempted to describe only some aspects of a population by selecting individuals in the sample. Again, the design was appropriate because the study attempted to investigate possible relationships and differences that may exist between the attitudes of teachers and pupils toward mathematics and pupils' achievement in the subject. Finally, the descriptive sample survey was appropriate for this study because of its strengths described by Gay (1987). Thus, according to Gay, descriptive survey deals with what exists or prevailing conditions, practices and attitudes. It searches for accurate information about the characteristics of particular subjects, groups, institutions or situations.

Population

For the purposes of research, the term population can be taken to mean all members of the target of the study as defined by its aims and objectives (Nwana, 1992;Saunders, Lewis and Thornhill, 1997). Amedahe (2002) maintains that population is the aggregation of cases that meet a designated set of criteria. Therefore , for the purpose of this study the target population includes all primary school pupils and their teachers in the Manya Krobo District in the Eastern Region of Ghana The accessible population included all primary class six pupils and their class teachers in the selected schools in the Manya Krobo District in the Eastern Region of Ghana.

The primary six pupils were selected because the pupils can give better description of their feeling toward mathematics. Primary six was considered because it is the transitional stage for primary school education. At that stage pupils are expected to complete or cover the subject matter or content specified in the primary school mathematics syllabus/ curriculum.

Sample

In all a sample of 400 primary classes six pupils were used for the study. This figure consisted of 200 boys and 200 girls. This sample of 400 pupils represented twenty- five percent (25%) of 1,600 pupils in primary class six of public schools in the Manya Krobo district. The ages of the students ranged between 10 and 15.

Besides, 40 primary class six teachers made up of 22 males and 18 females were included in the study. Thus, 40 class six teachers of the selected 40 schools were used as automatic respondents, no selection procedure was used. This sample of 40 primary class six teachers represented 50 percent of the class teachers of the population. However, certain characteristics of the teachers were considered. That is, all were professional teachers. They were teachers who had taught for at least one year in the public primary schools and teachers from both sexes. These characteristics were considered because as professional teachers they had all in one way or the other had the same training during their pre- service. They were also exposed to pedagogical skills and for that matter methods used to teach mathematics might be similar from school to school. Besides, the gender of teachers was considered because there may be differences between male an female teachers' attitudes toward mathematics.

The sample of 400 pupils representing 25% of the 1600 pupils of the target population and the 40 class six teachers representing 50.0 percent of the 80 primary class six teachers in the public schools were representative of the population. That is, commenting on sample size, Nwana (1992) suggests that if the population is few thousands then a sample of about 10% will do, if few hundreds then a sample of about 40% will do. Dale (1993) also suggests that for credible results a minimum of 20 percent size of sample for population of few thousand to be ideal. Furthermore, according to Fraenkel and Wallen (2000) for descriptive studies a sample with a minimum number of 100 is essential and for correlational studies a sample of at least 50 is deemed necessary to establish the existence of a relationship.

Sampling Technique

The simple lottery random technique was used to select the circuits, schools and respondents. There were ten circuits in the district [illegible] three rural and three urban circuits were selected (see Appendix F.). The names of the circuits were written on slips or pieces of paper and folded. The folded pieces of paper were put in a bowl and shuffled. The pieces of paper were removed one at a time from the bowl without looking in to it. Anytime a slip of paper is removed its name or number is registered or recorded. This process continued until the sixth circuit was picked.

Similarly, from the circuits 15 and 25 schools were selected from the rural and urban circuits respectively using the schools' registration numbers (see Appendix G). These schools were also selected using the simple lottery method described earlier. The schools from the rural circuits were 15 because most of the primary six classes were handled by untrained teachers who did not meet the criteria under the teacher characteristics discussed earlier under the sample. From each of the schools selected ten (10) pupils were selected which were made up of 5 boys and 5 girls. The simple lottory technique was used to select 150 and 250 pupils from rural and urban schools respectively.

That is, in each school and class the names of the boys and girls were written on pieces of paper and put in separate bowls. The pieces of paper were shuffled and picked at random until the required number of boys and girls were obtained

The sampling technique used as described above was a probability sampling procedure. A probability sampling procedure was preferred because of the following reasons. Amedahe (2002) maintains that probability sampling is a more respected approach because greater confidence can be placed in the representativeness of probability samples. That majority of the social researcher employs probability sampling for several reasons among which are: Its high reliability, high degree of representativeness and high generalisability.

Research Instruments

Attitude is not directly observable; it is rather inferred from behaviour but may be affected by several factors. The quality of one's attitude can be judged from observable evaluative responses he/she makes, since attitudes are manifested in conscious verbal responses, gross behaviour and experience. Through observation of what one does or says, his/her opinions or feelings about an object, person or something can be measured. However, questionnaire is designed to measure attitudes. Questionnaire is used to determine one's expression of preferences among available alternatives. Besides, questionnaire is used to ask one his/her feelings or opinion on matters that relate to general attitude to be measured. In light of this, three instruments were used to collect data for the study. That is, two attitude questionnaires and an achievement test.

There are a number of procedures for the measurement of attitude. The commonest methods include the Thurstone scales, Guttman scales, Likert scales, social distance scales and Scalogram analysis (Openheim, 1968; Sax, 1974; Borg and Gall, 1989). Besides, Fenneman & Sherman Mathematics Attitude scales (1976) cited in Tapia and Berry (2004) is one of the most popular instruments used in research. The Fennema- Sherman Mathematics

Attitude scales consist of a group of nine instruments: attitude toward success in mathematics scale, teacher scale, confidence in learning mathematics scale mathematics anxiety scale, effectance motivation scale in mathematics and mathematics usefulness scale. Among the various procedures mentioned the Likert scale was found to be the most popular in the literature on mathematical attitude reviewed. In light of this, the Likert scale was used for this study. Borg & Gall (1989) maintain that the Likert scale is the most simple and efficient approach. With the Likert scale respondents are requested to say or indicate whether they strongly agree (SA), agree (A), disagree (D), strongly disagree (SD), or undecided (U) with statements as indications of their attitude toward objects, people or situations of inquiry. The statement can either be positive or negative or a blend of both. Furthermore, according to Best and Kahn (1989), the Likert scale type enables respondents to indicate the degree of their feelings or belief about an object or given statement

The Questionnaire

The use of questionnaire is very common in the social sciences including research in education. In any case questionnaires are employed as the only method of data collection (Amedahe,2002). Two sets of Likert scale type of questionnaire were developed by the researcher by borrowing ideas from(Nkani,1993; Otchey, 1999). Other ideas were also borrowed from the internet. For instance, some of the statements under the pupils' questionnaire items borrowed from Nkani (1993) were :

4. mathematics lessons make me feel bore in class.

12. mathematics is very interesting.

14. I do not like mathematics.

17. Girls fear mathematics more than boys.

27 It is useful for girls to learn mathematics

Also, the following were borrowed from Otchey (1999)

30. Mathematics is the most difficult subject that I learn at school.

11. I like mathematics more than any other subject

7. My mathematics teacher encourages me to learn mathematics.

5. I could do mathematics better if my teachers were patient with me in class.

16. I would not use mathematics after leaving school.

Similarly, the following are some statements down loaded from studies by Tricia (2004):

13.I would like to stop the study of mathematics at the JSS level.

15.I think mathematics is the most enjoyable subject that I learn at School. 21. I do not think mathematics is important.

However, the instruments were pilot tested for validity and reliability. These questionnaires were used to collect needed data on attitudes of teachers and pupils toward mathematics.

The pupils' questionnaire contained 31 items and respondents were asked to respond to all of them (see Appendix B) .

The items had pre-printed responses of which respondents were to tick only one appropriate response. Besides, the items of the questionnaire were close-ended type. The questionnaire were in two sections that is, Sections A and B. Section A contained only three (3) items which were used to elicit the background information on the characteristics of the respondents. That is, the items under section 'A' included name of school, sex and age. Section 'B' contained twenty-eight attitude statements such as [illegible] always been afraid of mathematics, to mention [illegible]

The second set of questionnaire [illegible] questionnaire contained 39 items (see Appendix C). This questionnaire was also divided into two sections, A and B. Section A contained nine items also to elicit background information on the characteristics of respondents. The main factors considered were name of school, sex, age, highest academic and professional qualifications, rank in the GES, years of teaching experience, aspect of mathematics studied, that is, core or an elective subject and number of pupils in class. Section B of this questionnaire also contained 30 attitude statements which were similar to those of the pupils' questionnaire [illegible] in the proceeding paragraph.

Achievement Test

Another instrument used to collect data for this study was an achievement test (see Appendix D). The achievement test was developed by the researcher assisted by the supervisors. The achievement test was designed to assess the subjects' cognitive ability in mathematics as well as to investigate the correlation between attitude toward mathematics and achievement in the subject. The researcher aimed at covering a wider area of the primary school mathematics syllabus so multiple choice test items were preferred and constructed. The test consisted of twenty-four (24) items [illegible] class six syllabus and text books. For instance, test items 2 and 21 [illegible] found in the Ghana mathematics Series Pupils' book six pages [illegible] exercise C, numbers 3 and 5 respectively. Besides, pupils' book six with specified pages show where the researcher lifted other items of the test from. That is, test item 1 could be found on p. 11, exercise C, 1. Test item [illegible] on [illegible] 30 were authors' example and many more.

As stated earlier the achievement test was a multiple choice type. Each item contained four responses A-D with only one correct response of which subjects pupils were to circle only one correct response assigned to the letters A-D to each item.

Validity and Reliability of the Instruments

Borg and Gall (1989) contend that content validity is important in achievement testing and various tests of skills and proficiency such as occupational skills to test. In order to attain content validity of the instruments the two sets of questionnaires and the achievement test were given to the supervisors and experts from the Faculty of Education for scrutiny, since content validity is determined by expert judgement (Gay, 1987; Borg & Gall, 1989).

Amedahe (2002) describes threats to internal validity and how to control them. These include history, selection, nature of the test, instrumentation, maturation and many others. History refers to events occurring in the environment at the same time that the test is going on. For such events it was ensured that the testtees were in good mood and during testing time other events such as movement of cars, animals people, games to mention but a few taking place in the school were controlled to the minimum.

Also, because of threats like the nature of the test including scoring and administration procedure, it was ensured that equal time was alotted to all pupils from school to school. Since the achievement test was objective type the problems of bias in scoring was ruled out.

In selecting respondents variables such as school, age, gender, ability and others were considered as discussed in paragraph one under the sample. Thus, rural and urban schools were selected for comparative purposes, ages of respondents ranged between 10 to 15 and equal number of boys and girls were selected for the study. Maturation on the other hand refers to the processes of change that take place with the subjects at the time of testing. These events which include influence by others, hunger, thirst, over learning, forgetfulness and many others were controlled for some of their occurrence.

Furthermore, the instruments were pilot tested in the Yilo Krobo District in the Eastern Region of Ghana. This district was considered because it has similar characteristics to that of the Manya Krobo district where the study was carried out. Some of the characteristics include language spoken which is Dangme, location, staffing, infrastructure, achievement of pupils and others. The questionnaires and the achievement test were administered to 20 primary class six pupils and 20 teachers who teach primary six classes.

After the pilot testing the reliability co-efficient of the achievement test was computed using the split- half method that is, using the Pearson's Product Moment Correlation (r) . The reliability co- efficient of the achievement test was found to be 0.80.The Pearson's correlation coefficient was preferred because Amedahe (2002) maintains that the most common correlation coefficient in educational research is the Pearson's correlational coefficient.

This is used to describe the linear relationship between two variables that are both interval or ratio variable. The statistical basis for correlation (r) is that it compares how consistently each value pairs with another value in a linear fashion

Also, the reliability co-efficient of the two sets of the attitude questionnaires were computed using the Cronbanch Alpha formula and these were found to be 0. 74 and 0. 76 for the students' and teachers' questionnaires respectively. The method of split- half could not be used to compute the reliability co-efficient of the attitude questionnaires because the items were on a four- point Likert scale, so the Cronbanch Alpha was preferred.

Based on the pilot testing results suggestions from experts and supervisors were incorporated to refine and modify the contents of the instruments in order to make them more relevant and valid for the purposes of the study. The final instruments for the study therefore included all important issues which gave all the necessary answers to the formulated hypotheses.

Data Collection Procedure

The researcher went to introduced himself and explained the purpose of the study to the District Directors of Education for Manya and Yilo Krobo Districts with the introductory letters issued by the Head of the Department of Primary Education (see Appendix A) . These letters were personally handed over to them and approval given to carry out the pilot study and the study in their respective districts. Copies of the approval letters were distributed to the various schools personally by the researcher. The headteachers, teachers and pupils were briefed about the purpose and the implications of the study. They were also assured that any information they gave were going to be kept confidential. In each school days and convenient times were set aside for the administration of the instrument.

The questionnaires and the achievement test were administered on the same day in each school. The questionnaires were administered first followed by the achievement test. To ensure the choice of appropriate responses by the pupils, the researcher explained the responses Strongly Agree (SA), Agree (A), Disagree (D) and strongly disagree (SD). On each item the statements was read to the respondents first and were asked to read individually reasoned and ticked the appropriate option as their response to the statements. This practice was carried out in all the selected schools. The practice ensured that all the respondents in each school completed the questionnaire at the same time.

It was observed that in some schools pupils could not even write the name of their schools. This was why the practice was adopted by the researcher to read the statements first to pupils or respondents personally.

In each school while the students were taking the achievement test their class teachers were also given copies of the questionnaire for teachers for completion. All the class six teachers were present in their various schools on the days the instruments were administered and that ensured a hundred percent return- rate of the questionnaire.

However, for the purposes of identification and to remain anonymous, each respondent was given an identification number. Pupils used the same identification numbers on both the questionnaire and the achievement test.

The data collection process lasted for five weeks. The process was successful. Headteachers of the selected schools, the staff and respondents co-operated with the researcher, except on few instances [illegible] teachers requested for some compensation for their time [illegible] questionnaire.

Scoring the Items of the Instruments

After the data were collected the scripts were [illegible] coded. Where there were omissions such as name of school, age, etc. to mention but a few they were corrected by the use of the identification numbers.

The pupils' response sheets were used to compare and correct such missing variables. Section B of the two sets of questionnaires for teachers and pupils were scored or coded using a four- point Likert type scale whether the statements were worded positive or negative. For positive stated items such as "I enjoy teaching / learning mathematics" and "mathematics is interesting" they were coded as follows:

Strongly Agree (SA)	(SA)	4
Agree	(A)	3
Disagree	(D)	2
Strongly Disagree	(SD)	1

The above procedure was reversed for negative statements such as "I do not like mathematics" and "I fear mathematics". They were also coded as follows

Strongly Agree (SA)	(SA)	1
Agree	(A)	2

Disagree	(D)	3
Strongly Disagree	(SD)	4

The four-point Likert scale was preferred due to the level of the pupils. Any additional option could give room for many interpretations. For uniformity the teachers' questionnaire was also limited to the four-point scale. Besides, any additional option such as undecided could mean many things. However, for the sake of positive and negative statements of the items of the instrument the following criteria was used to determine positive and negative mean scores: A mean score of 2.5 and above on any attitude variable was considered positive mean score whilst a mean score of below2.5 was considered a negative mean score.

Section A of the pupils' questionnaire was coded as follows:

Item 1. Name of school: rural schools coded 1 and urban schools coded 2. Item 2. sex: boys coded 1 and girls coded 2.

Item 3. age: below 13 years coded 1. 13-14 coded 2 and above 14 years coded 3. Items of the teachers' questionnaire were also coded as follows:

Items 1 and 2 coded similar to that of pupils' items 1 and 2 Item 3.age in years:below30 coded 1. 30-40 coded 2 and above40 coded 3. Item 4. Highest academic qualification: MSLC= 1 SSCE = 2. GCE "O" = 3. GCE "A"= 4. higher qualification = 5 Item 5. highest professional qualification: cert 'A' 4 years = 1. Cert A 2 year post secondary P/S= 2. Cert 'A' 3 year P/S = 3. Diploma and others = 5 Item 6. Rank in G.E.S: Teacher = 1. Assistant Superintendent A/S = 2. Superintendent = 3. Senior Superintendent = 4. Principal Superintendent P/S =5. Assistant Director A/D = 6

Item 7. years of teaching experience: below. 5 = 1. 5-10 = 2. 16 -20 = 3 and above20=4. Item 8. aspect of mathematics studied: core 1 elective 2

Item 9. Enrolment of pupils: less than 15=1. 16-29 = 2 and 30 and above= 3

The achievement test scripts were also marked and each item was scored one The maximum and minimum scores that a pupil could obtain were 24 and zero respectively.

After scoring the instruments the raw scores for each pupil on the attitude questionnaire and the raw scores of the achievement test were obtained and recorded for analysis. Right answers to the achievement test were provided (see Appendix E).

Analysis of Data

To facilitate the data analysis process. respondents were re-numbered serially. That is. those of the rural schools ranged from 1-150 and those from urban schools 151 – 400. The same serial number was recorded on both the questionnaire and the achievement test sheet for each pupil. The attitude factors or variables were considered and items of the questionnaire were categorised as follows:

1. Enjoyment of mathematics
2. confidence in mathematics
3. anxiety in mathematics
4. difficulty of mathematics
5. mathematics as a male domain
6. Perceptions

The teachers' questionnaire items were classified under various variables as follows.

Attitude Factors/ Variables:	**items**
1. Enjoyment of mathematics	[illegible]
2. Confidence in mathematics	[illegible]
3. Anxiety in mathematics	[illegible]
4. Difficulty of mathematics	[illegible]
5. Mathematics as a male domain	20, 22, 28, 29, 30, 31, 32
6. Pupils' perception	25, 26

Similarly, the pupils' questionnaire items were classified as follow:

Attitude factors/ variable	**Items**
1. Enjoyment of mathematics	4, 10, 11, 12, 13, 14, 15, 16, 18, 19, 21
2. Confidence in mathematics	23, 24, 25, 28
3. Anxiety in mathematics	9, 17
4. Difficulty of mathematics	29, 30, 31
5. Mathematics as a male domain	22, 26, 27
6. Teachers' perception	5,6,7,8,20

Each variable consists of a collection of items of the questionnaire with specific aspects of attitude toward mathematics. The emphasis was on enjoyment of mathematics which was considered as the key factor for attitude towards mathematics. Thus, teacher's attitude towards mathematics includes his liking, enjoyment, enthusiasm and interest or their opposites (Ernest, 1989).

The data gathered were analysed statistically using both non-parametric and parametric techniques. The main statistical tools used to test the hypotheses were the independent t-test, multiple regressions and Pearson's Product Moment Correlation. Percentages were also used.

The independent t-test was used to test hypotheses 1 and 2. The t-test was preferred because of the following reason. The study sought to determine any significant difference between boys' and girls' attitude toward mathematics. It also sought to determine difference in mathematics achievement between boys and girls. That is, the data was categorical. Fraenkel and Wallen (2000) maintain that the most common tool used in analyzing categorical data is the t-test. Fraenkel and Wallen added that a parametric technique is more likely to reveal a true difference or relationship if one really existed, so the t-test can reveal any difference.

Hypotheses 3 and 4 were tested using the multiple regression technique. This technique was preferred because of the following reasons. It can be used to determine the correlation between one dependent variable and a combination of two or more independent variables. Gay (1987) maintains that multiple regression does not only determine how variables relate but also the degree to which they relate. In addition, multiple regressions can be used to determine the relative and joint combinations of the independent variables to the dependent variables. All the hypotheses were tested at 0.05 alpha level.

CHAPTER FOUR

RESULTS AND DISCUSSION

The results and findings of the study are presented in this chapter. The pupils' questionnaire responses were presented first followed by the teachers' questionnaire and the achievement test scores. The data gathered were analysed statistically using the SPSS Programme from the computer. The SPSS Programme enabled the researcher to test each hypothesis

Background of Respondents (pupils)

Tables 5 to 7 under this section show the frequency and percentage distributions of respondents (pupils) on the questionnaire and the achievement test. Table 5 shows the classification of the respondents by schools into two categories that is. rural and urban .

Table 5:

Frequency and percentage of pupils by schools

School	Number	Percentage
Rural	150	37.5
Urban	250	62.5
Total	400	100.0

From the table about one-third of the respondents were from rural schools while two-thirds from urban schools.

Table 6:

Frequency and percentage distribution of pupils by sex

Sex	Number	Percentage (%)
Boy	200	50
Girl	200	50
Total	400	100

The table shows that there were equal number of boys and girls

Table 7 shows the classification of respondents (pupils) into three age groups

The results from the table shows that only one-fourth of the pupils were below 13 years while one-half were 13 to 14 years. Again, less than one-fourth of the pupils were above 14 years.

Table: 7

Frequency and percentage distribution of pupils by age

Age	Number	Percentage (%)
Below 13 years	114	28.5
13- 14 years	195	48.8
Above 14years	91	22.7
Total	400	100.0

Background of Respondents (teachers)

Tables 8 -13 shows the frequency and percentage of teachers' background information

Table 8:

Frequency and Percentage Distribution of Teachers by sex.

Sex of respondents	Number	Percentage (%)
Male	22	55.0
Female	18	45.0
Total	40	100.00

From the table males teachers used were a little more than the female teachers. Table 9 shows the classification of teachers into five categories of highest academic qualifications. From the table about one-half of the respondents obtained GCE 'O' level and SSCE as their highest academic qualifications. Also, less than one-fourth of the respondents were MSLC holders and only 2.5 percent of the teachers had diploma

Table 9:

Frequency and Percentage of Teachers by Highest Academic Qualification

Highest Academic Qualification	Number	Percentage (%)
MSLC	7	17.5
SSCE	12	30.0
GCE 'O' Level	13	32.5
GCE 'A' Level	7	17.5
Others	1	2.5
Total	40	100.0

Table 10 shows the classification of respondents by highest professional qualification into four categories. The results from the table show that about one-half of the teachers had Certificate 'A' 4 year P/M as their highest professional qualification. Also, three-quarters of the teachers had certificate 'A' 3 year P/S while one teacher or 2.5 percent of the teachers were certificate 'A' 2 year P/S. Again, only one teacher or 2.5 percent of the respondents had diploma.

Table 10:

Frequency and Percentage of Teachers by Highest Professional Qualification.

Highest Professional Qualification	Number	Percentage (%)
Certificate 'A' 4 Year P/M	8	20.0
Certificate 'A' 2 Year P/S	1	2.5
Certificate 'A' 3 Year P/S	30	75.0
Diploma	1	2.5
Total	40	100.0

Table 11 shows classification of respondents by rank into six categories. The results from the table show that about one-half of the teachers did not attain any rank as at the time of the study. Also, about one-fourth of the teachers were senior superintendents. Less than one-fourth of the number of teachers were principal superintendents and assistant directors respectively.

Table 11:

Frequency and Percentage of Teachers by Highest Rank

Rank of Respondents	Number	%
Teacher	[illegible]	[illegible]
Assistant Superintendent	4	10.[illegible]
Superintendent	[illegible]	1[illegible]
Senior Superintendent	1	[illegible]
Principal Superintendent		[illegible]
Assistant Director	1	
Total	40	100.0

Table 12 shows the classification of respondents [illegible] study of mathematics into two categories. From [illegible] more than [illegible] quarters of the teachers studied core mathematics [illegible] studied elective mathematics.

Table 12:

Frequency Distribution of Teachers by Aspect of Mathematics studied

Sex	Core	Elective
Male	19	3
Female	16	2
Total	35	5

Mean Scores on pupils' Attitude Variables by Gender

The attitude scale of 1to 4 was used to measure the attitude variables. A score of less than 2.5 measured a negative characteristic of [illegible] attitude variable while a score of greater than 2.5 measured a positive characteristic of the attitude variable. If a respondent disagreed with a negative statement then the response was interpreted as 'agree' but if the respondent strongly disagreed it was interpreted as 'strongly agreed'. The weighted means were computed. The mean score responses on the attitude variables by gender were computed and presented in Table 13.

Table 13:

Mean Scores on the Pupils' Attitude Variables by Gender

Variables	Means	
	Boys	Girls
Pupils' enjoyment of mathematics	34.41	34.02
Confidence in mathematics	9.10	8.79
Anxiety about mathematics	5.20	5.27
Difficulty of mathematics	7.77	7. 80
Mathematics as a male domain	7.66	8.16
Teachers' influence (perception)	13.77	13.3
Total	77.91	77.34

The results from the table show that, respondents obtained positive mean scores on all the six attitude variables. The positive mean scores indicated respondents' agreement or acceptance of the attitude variables. Thus, the positive mean scores implied that respondents agreed that they enjoyed mathematics. That, they had confidence in mathematics. The results also showed that pupils did exhibit anxiety about mathematics. Also, pupils saw mathematics as a difficult subject and a subject reserved for males. Again, pupils did see and agree that the attitude of the teacher toward mathematics influenced their attitudes and achievement.

However, difficulty of mathematics, anxiety about mathematics and mathematics as a male domain represent negative tendencies to effective learning of mathematics Nkani (1993).

The analysis of the mean score difference and standard deviations of pupils on the six attitude variables are reported in Table 14.

Table 14:

Analysis of the mean score difference on the six Attitude Variables by Gender

Variable	Number	Mean	Std. Dev.	t	p-value
Enjoyment of mathematics	400	34.21	5.64	0.69	0.49
Confidence in mathematics	400	8.94	2.21	0 .07	0.16
Anxiety about mathematics	400	5.29	1.67	0 .08	0.78
Difficulty of mathematics	400	7.79	1.72	0.86	0.89
Mathematics as a male domain	400	7.91	1.90	0 .08	0.13
Teachers' influence (perception)	400	13.56	2.53	0 .13	0.10
Total	400	77.70			

Enjoyment of Mathematics

The results from Table 14 show that the t-value was 0.69 with a p-value of 0.49. The p-value of 0.49 was greater than 0.05 alpha level. This suggests that the enjoyment of mathematics was the same for both sex groups.

Confidence in Mathematics

The results also show that the t-value was 0.0[illegible] with a p-value of 0.16. Since the p-value of 0.16 was greater than 0.05 alpha level [illegible] both boys and girls expressed the same confidence in mathematics.

Anxiety about Mathematics

Again, the results from the table show that the t-value was 0.08 with a p-value of 0.78. Since the p-value of 0.78 was greater than 0.05 alpha level this indicated that both sex groups exhibited the same mathematics anxiety.

Difficulty of Mathematics

Similarly, the results from the table show that the t-value was 0.86 with a p-value of 0.89. Since the p-value of 0.89 was greater than 0.05 alpha level this suggests that both boys and girls experienced the same level of difficulty in mathematics.

Mathematics as a Male Domain

The results from Table 14 again show that the t-value was 0.08 with a p-value of 0.13. The p-value of 0.13 was greater than 0.05 alpha level. This suggests that both sex groups were about the same in their agreement that mathematics is a subject reserved for boys.

Teachers' Influence on Pupils' Mathematics Learning (perception)

Results from Table 14 show that the t-value was 0.12 with a p-value of 0.10. Since the p-value of 0.10 was greater than 0.05 alpha level this suggests that the two sex groups experienced the same [illegible] attitude on their mathematics learning and achievement.

Analysis of responses on the teachers' questionnaire

The items of the teachers' questionnaire were also grouped into six attitude variables similar to that of the [illegible] The mean scores of respondents on each attitude variable [illegible]

The results [illegible] the table [illegible] attitude variables [illegible] positive mean scores [illegible] that their attitudes toward mathematics influence [illegible] mathematics learning. Also, students agreed that [illegible] mathematics. That they exhibited mathematics anxiety [illegible] mathematics as a difficult subject. In addition they [illegible] subject reserved for males and that pupils' attitude [illegible] learning influence the teachers' teaching.

Table 15:

Mean Scores of Teachers on the Attitude Variables

Item	Number	Mean	Std. Dev.
Teacher's enjoyment of mathematics	40	2.56	.907
Confidence in mathematics	[illegible]	[illegible]	[illegible]
Anxiety fear of mathematics	[illegible]	2.74	[illegible]
Difficulty of mathematics	40	[illegible]	[illegible]
Pupils' influence (perception)	40	[illegible]	[illegible]
Mathematics as a male domain	40	1.06	0.424

Mean scores on Teachers' six Attitude Variables by Gender.

Mean scores on the six attitude variables were computed and presented in Table16

Table 16:

Gender Mean Scores on Teachers' Attitude Variables

Variables	Male		Female	
	Mean	Std Dev.	Mean	Std. Dev.
Enjoyment of mathematics	2.84	767	2.06	0.938
Confidence in mathematics	3.50	.880	2.39	1.195
Anxiety/fear of mathematics	2.50	.786	2.88	0 .942
Difficulty of mathematics	1.44	.784	1.47	0.507
Pupils' influence (perception)	2.50	0 .880	2.22	0 .878
Mathematics as a male domain	1.09	0.530	1.00	0 .000

Table 16 shows the gender mean scores on each of the teachers' six attitude variables. The results from the table are discussed under each attitude variable as follows.

Teachers' Enjoyment of Mathematics

The results from Table 16 show that both male and female teachers recorded mean scores of 2.84 and 2.06 respectively on the enjoyment variable. These mean scores suggest that the two sex groups agreed that they enjoyed mathematics. Since males recorded slightly higher mean score it suggests that male teachers agreed more than female teachers that they enjoyed mathematics.

Teachers' confidence in mathematics

The results from Table 16 show that both sex groups recorded mean scores of 3.50 and 2.39 This implies that both sex groups agreed that they were confident in mathematics. Since male teachers recorded slightly higher mean scores it suggests that male teachers agreed more than the female teachers that they were confident in mathematics.

Anxiety about mathematics

The two sex groups obtained mean scores of 2.50 and 2.88 for males and females respectively. These mean scores indicate that both sex groups agreed that they exhibited mathematics anxiety. Since the mean score was slightly higher in favour of the female teachers it suggests that female teachers exhibited mathematics anxiety more than the male teachers.

Difficulty of mathematics

The results from Table 16 show that the two sex groups recorded mean scores 1.44 and 1.47 for male and female teachers respectively. These mean scores suggest that both sex groups agreed that they did see mathematics as a difficult subject. Also, the mean scores show that both male and female teachers experienced the same difficulty level in mathematics.

Mathematics as a male domain

Both sex groups recorded mean scores of 1.09 and 1.00 for males and females respectively. The mean scores suggest that both sex groups had the same opinion about mathematics been a subject reserved for males.

Pupils' influence (perception)

The results from Table 16 show that both sex groups recorded positive mean scores of 2.50 and 2.22 for males and females respectively. The positive mean scores suggest that both sex groups agreed that pupils' [illegible] mathematics influenced the teachers' attitude toward mathematics teaching. Since male teachers recorded slightly higher mean [illegible] indicates that more males than female agreed that they experienced the influence of pupils' attitude on their mathematics teaching.

Results of the Achievement Test.

The data gathered on the achievement test were analysed [illegible]. The results of the mean scores and standard deviations of respondents (pupils) were presented in Table 17.

Table 17:

Analysis of Mean scores of Pupils on the Achievement Test by Gender.

Item	Sex	Number	Mean	Standard deviation
Achievement	Boys	200	32.17	[illegible]
Test	Girls	200	33.01	3.5649

The results from Table 17 show that the mean score values were 32.17 and 33.01 for boys and girls respectively. Girls achieved slightly higher mean score value than the boys, but the difference was not as large as one might expect.

Main Analysis

Hypotheses

Hypothesis 1.

H₁ It was hypothesised that there is no significant [illegible] primary class six boys' and girls' attitudes toward mathematics. The difference between the attitude mean score of boys and [illegible] the independent t-test. The t-test was used because the [illegible] Also, the study sought to determine any difference that existed between boys' and girls' attitude toward mathematics. The results [illegible] in Table [illegible]

The results from the table show that the attitude mean scores were 12.[illegible] and 12.89 for boys and girls respectively for the six attitude variables. From the table the t-value was 0.02 with a p-value of 0.99. The p-value of 0.99 was greater than 0.05 alpha levels. This shows that the difference was not significant. The null hypothesis was not discredited. This implies that both boys and girls in primary class six did not differ in their attitudes toward mathematics. This finding supports the findings of (TIMSS,1994-95). TIMSS reported that in many countries no significant difference existed between boys' and girls' attitude toward mathematics in the elementary schools. On the contrary TIMSS noted that in Austria, Hong Kong, Japan and the Netherlands elementary schools boys' attitudes toward mathematics were significantly more positive than girls'. Also, this finding contradicts the findings of Burnett (1996). He noted that there was a significant difference between primary schools boys' and girls' attitude toward mathematics in favour boys .

& MOF,1997 1992-97). They reported that significant differences in mathematics achievement existed and the performances were in favour of boys

Table 19:

Analysis of the difference between the mean achievement test scores of boys and girls

Sex	Number	Mean	standard dev	t	p-value
Boys	200	32.17	3.63	-2.32	0.02
Girls	200	33.01	3.56		
Total	400	65.18			

Level of significance = 0.05

Hypotheses 3 and 4

Hypothesis 3:

H_{03}: It was hypothesised that pupils' attitude toward mathematics does not contribute significantly to their achievement in the subject

Hypothesis 4:

H_{04}:It was hypothesised that teachers' attitude toward mathematics does not contribute significantly to pupils' achievement in the subject.

Hypotheses 3 and 4 were tested using the multiple regression given by the equation of the form $Y = a + b_1x_1 + b_2x_2$

Where Y = pupils' achievement

x_1 = pupils' attitude

x_2 = teachers' attitude

And a b_1 and b_2 are constants

The results of the regression analysis are presented in Table 20. From the table the coefficient of the pupils' attitude was 0.22 with t-calculated value of 6.25. This t-value of 6.25 was greater than t-critical value of 1.96. Also the p-value of 0.01 was less than 0.05 alpha levels. There was therefore evidence against the null hypothesis for hypothesis 3. The null hypothesis was then rejected at the significant level of (p-value< 0.05). This implies that pupils' attitude toward mathematics contributed significantly to their achievement in the subject.

This finding supports the findings of Ma & Kishor (1997). Based on 113 studies involving primary schools Ma and Kishor reported that there was a relationship between pupils' attitudes toward mathematics and pupils' achievement. Also, TIMSS (1994-95) noted that in more than one-third of the countries studied positive relationships were observed between primary school pupils' attitude toward mathematics and their achievement. McLeod (1992) also reported that primary school pupils' attitude toward mathematics related to their achievement.

Similarly, hypothesis 4 was tested. From the table the coefficient of the teachers' attitude was 0.365 with a t- calculated value of -3.59 This t-calculated value of -3.59 was greater than t-critical value of 1.96 .The p- value of 0.01 was also less than 0.05 alpha level. There was evidence against the null hypothesis. The researcher therefore rejected the null hypothesis at the alpha level of (p-value< 0.05). This implies that primary class six teacher attitude toward mathematics related significantly to primary class six pupils' achievement in the subject. This finding also supports the studies of (Christou, Philippou & Hiliophotou, 1999, Caraway, 198[illegible]). They reported that there was a positive relationship between elementary school teacher's attitude toward mathematics and pupils' achievement.

Table 20:

Summary of regression analysis of pupils' achievement on pupils' and teachers' attitudes.

Predictor	Coefficient	St. dev.	t-value	p- value
Constant	9.631	3.652	2.53	0.011
Pupil attitude	0.224	0.034	6.25	0.000
Teacher attitude	0.365	0.102	-3.59	0.000

Additional Findings of the Study

Additional findings on the pupils' and teachers' attitudes toward mathematics, pupils' achievement test item analysis and pupils' achievement are also presented.

Analysis of correct responses to various items on the achievement test by type of location.

[illegible] achievement test [illegible] location [illegible]

Table 21:

Percentage of Pupils correctly responding to various Test Items by location.

Test items	1	2	3	4	5	6	7	8	9	10
Urban	74.[illegible]	72.8	79.6	51.6	70.0	66.4	61.2	50.8	61.2	69.2
Rural	[illegible]	69.0	66.0	51.3	47.3	67.3	[illegible]	[illegible]	[illegible]	[illegible]

Test items	11	12	13	14	15	16	17	18	19	20
Urban	71.4	60.4	55.6	54.0	57.6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Rural	73.3	62.7	58.7	66.7	61.3	76.7	62.[illegible]	[illegible]	66.7	72.7

Test items	21	22	23	24
Urban	[illegible]	55.2	52.0	74.[illegible]
Rural	74.7	75.3	69.0	61.3

The results from the table show that respondents from the rural schools recorded slightly higher correct responses to the test items than the urban respondents.

[illegible] one-half of the test items [illegible] rural respondents. These include items [illegible]

Also, respondents from the urban schools recorded slightly higher correctly responses to only one-fourth of the items. These include items 1, 2, 3, 5 and 21

Respondents from both rural and urban schools recorded equal correct responses to only two items and these include items 4 and 12. Test item 4 recorded the least percentage correct responses for both rural and urban pupils. The highest percentage correct responses were to items 9 and 21 for rural and urban respondents respectively. In all about half of the total number of respondents from both rural and urban schools responded correctly to about one-fourth of the test items.

Mean and Standard Deviation on each Achievement Test item.

The mean and standard deviation by gender on each of the achievement test items were computed and presented in Table 22.

Table 22:

Mean scores by Gender on the Individual Achievement Test Items

Achievement Test Items	Means of respondents by sex			
	Boys		Girls	
	Mean	St. Dev.	Mean	St. Dev.
1.	1.79	.41	1.68	.47
2.	1.80	.40	1.70	.46
3.	1.76	.43	1.74	.44
4.	1.48	.50	1.55	.49
5.	1.69	.47	1.55	.49
6.	1.73	.45	1.61	.49

These findings support previous studies of (Barnes, 1983 Beh Allen and Payne 1985) Their evidence suggest that males are not superior in all aspects of mathematics. Willis (1989) noted small difference in mathematics achievement between male and female students

Additional Findings that emerged from the Achievement test and attitude variables.

The total achievement test scores and pupils' enjoyment of mathematics were analysed to enable the researcher describe respondents' responses and their level of achievement. The overall total achievement test scores obtained by pupils out of the 24 test items were rated as follows: 0-5=Very Unsuccessful. 6-11=Unsuccessful. 12-17=Successful. Above 17 Very Successful. The results are presented inTables23.

Table 23:

Analysis of the achievement test scores and responses by pupils on their enjoyment of mathematics (in percentages).

Total achievement	Enjoyment of mathematics Scores	
	Disagree	Agree
	Percentage %	Percentage %
Very Unsuccessful	7.6	18.5
Unsuccessful	43.0	51.0
Successful	40.8	27.3
Very successful	8.7	3.2

The results from the table show that though many respondents agreed that they enjoyed mathematics, about half of the number that agreed were unsuccessful in the achievement test. Only one-fourth of the respondents who agreed that they enjoyed mathematics were successful in the achievement test.

Similarly, from the table, some respondents disagreed that they enjoyed mathematics and less than half of the number who disagreed were unsuccessful in the achievement test.

Also, among respondents who disagreed with the attitude variable, more than one-third but less than two-thirds of them were successful in the achievement test. These results suggest that respondents' responses did not reflect their achievement.

Analysis of the achievement test scores and responses by pupils on teacher influence.

Table 24 provides the results of the achievement test scores and pupils' responses on teacher influence. The total scores obtained by pupils out of the 24 test items were also rated as follows 0-5=Very Unsuccessful, 6-11 unsuccessful, 12-17=Successful, Above 17 Very Successful. The results are presented in Table 24.

Table 24:

Analysis of total achievement test scores and responses on teacher influence

Total achievement	[illegible]	
	Disagree	Agree
	Percentage	Percentage
Very Unsuccessful	[illegible]	[illegible]
Unsuccessful	44.0	51.4
Successful	35.4	30.1
Very successful	6.7	36.2

The results from Table 24 show that some respondents disagreed with the teachers' attitude variable. Thus, they disagreed that the attitude of the teacher toward mathematics did not influence their mathematics learning and achievement. Though respondents disagreed with the teachers' attitude variables, results from the table show that less than half of the number that disagreed were unsuccessful in the achievement test.

Similarly, results from the table show that among respondents who agreed with the teachers' attitude variables about one-half of them were unsuccessful in the achievement test. That is, these respondents agreed that they experienced the influence of the teachers' attitude variables on their mathematics learning and achievement. These results suggest that pupils' achievement did not depend on what they said

Additional Findings of the study concerning the responses on pupils' attitude

Questionnaire items were considered and presented in percentages. To begin with, on item four, more than one-third [illegible] respondents [illegible] mathematics lesson made [illegible] This may be due to [illegible] challenging [illegible] method of teaching or other [illegible]

On item five, more than one-third of the respond[illegible] agreed [illegible] they could do better in mathematics if their teachers [illegible] patient with them in class. This result suggests that respondents attributed their inability to excel in mathematics to their class teachers.

Responses to item six revealed that one-third of the respondents agreed that the way their teachers taught mathematics made them dislike the subject. However, girls agreed slightly more than boys [illegible]

Responses to item seven also revealed that [illegible] the respondents agreed that their teacher encouraged them to learn mathematics. However, boys agreed a little more than girls. This result may indicate that boys received more encouragement, attention, feedback, [illegible] time [illegible] teacher-pupil interaction more than girls Tiedemann (20[illegible])

The results further revealed that about one-third of the respondents agreed that their teacher thought they were stupid. However, girls agreed a little more than boys did. These results suggest that the expectations and opinion that teachers hold about their students may influence the attitudes and achievement of the student.

Additional Findings of the study concerning the responses on pupils' attitude

Questionnaire items were considered and presented in percentages. To begin with, on item four, more than one-third but less than two-third of the respondents agreed that mathematics lessons made them feel bored in class. This may be due to non challenging classroom environment, method of teaching or otherwise.

On item five, more than one-third of the respondents strongly agreed that they could do better in mathematics if their teachers were patient with them in class. This result suggests that respondents attributed their inability to excel in mathematics to their class teachers.

Responses to item six revealed that one- third of the respondents agreed that the way their teachers taught mathematics made them dislike the subject. However, girls agreed slightly more than boys did.

Responses to item seven also revealed that about one-half of the respondents agreed that their teacher encouraged them to learn mathematics. However, boys agreed a little more than girls. This result may indicate that boys received more encouragement, attention, feedback, "wait time" and teacher-pupil interaction more than girls Tiedemann (2000).

The results further revealed that about one-third of the respondents agreed that their teacher thought they were stupid. However, girls agreed a little more than boys did. These results suggest that the expectations and opinion that teachers hold about their students may influence the attitudes and achievement of the student.

To determine the most liked subject the study also revealed that more than half of the respondents agreed or expressed that they liked other subjects, but they liked mathematics more. However, bo[illegible] slightly more than girls. Besides, ma[illegible] expressed their st[illegible] than boys did.

To determine respondents' desire to [illegible] the study [illegible] mathematics beyond the JSS level, the study revealed [illegible] one-third [illegible] the respondents agreed that they would stop the study [illegible] mathematics. In an attempt to determine the opinion and feelings concerning the usage of mathematics after leaving school, the study revealed that one-third of the respondents expressed or agreed that they would not use mathematics after leaving school. However, boys slightly more than girls agreed to the given statement. These results indicate that girls saw less use of mathematics after leaving school than boys did. Besides, more boys agreed that boys need mathematics in life more than girls.

The study further revealed that more than half of the respondents agreed that they enjoyed working mathematics with friends. [illegible] determine the opinion and feelings concerning attributions to performance in mathematics over two-thirds of the respondents agreed that their success in mathematics tests depended on their luck. More girls than boys agreed to the given statement that is, 74.5 and 65.5 percent for girls and boys respectively. Similarly, more girls than boys agreed that mathematics often seemed difficult.

Responses on some Individual attitude Questionnaire items by Teachers

The following provides the results of the respon[illegible] individual attitude quest[illegible] items by teachers to [illegible] statements. Respondents' opinion and feeling [illegible] derived in teaching mathematics revealed that [illegible] than female expressed strong agreement that they enjo[illegible] mathematics. [illegible] about four times the number of males than females [illegible] mathematics. Besides, more females than males agreed that teaching mathematics bored them.

To determine teachers' opinion concerning the types of mathematics worked or taught, the study showed that more males than female teachers expressed strong agreement for working all types of mathematics. That about four times the number of males than female teache[illegible] working [illegible] types of mathem[illegible]. The lower percentage resp[illegible] female teache[illegible] suggest that they avoided working some types of mathematics.

The study further revealed that more female than male teachers exp[illegible] their wish to stop teaching mathematic[illegible] if they had [illegible] more than three times the number of female than male teachers wished to stop teaching mathematics. Similarly, about twice the number of female than male teachers expressed their feelings of dislike for mathematics.

The study again revealed that more than half the number of the respondents expressed strong feeling of anger with respect to pupils' responses to simple questions during mathematics lessons. This result confirmed pupil[illegible] opinion that their teachers were not patient with them.

Summary

This chapter [illegible] the results [illegible]

The [illegible]

[illegible]

Chapter [illegible]

Summary

This chapter presented the results, findings and discussions of the study. The results revealed the following. Primary class six boys and girls did not differ in their attitudes toward mathematics. Also, boys and girls in primary class six did differ in their achievement in mathematics. Finally, teachers' and pupils' attitudes toward mathematics related to pupils' achievement. The next chapter provides the summary, conclusion and recommendations of the study.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

This chapter presents the summary, conclusion and recommendation of the study

Summary

The study aimed at finding answers to the following hypotheses.

1. there is no significant difference between boys' and girls' attitudes toward mathematics.
2. there is no significant difference between boys' and girls' achievement in mathematics.
3. pupils' attitudes toward mathematics do not relate to their achievement in the subject.
4. teachers' attitudes toward mathematics do not relate to pupils' achievement in the subject.

A descriptive sample survey design was used. The simple random method was used to select the circuits, schools and respondents in the Manya Krobo District in the Eastern Region of Ghana. Ten pupils made up of five boys and five girls were selected from each of the selected schools. In all 200 boys and 200 girls that is, 400 respondents were involved in the study. Besides, 40 primary class six teachers consisting of 22 males and 18 females were also involved.

Two sets of attitude questionnaires and an achievement test were used to collect data for the study. The two sets of the questionnaire of a four point Likert scale type and the achievement test were developed by the researcher girls' attitudes toward mathematics. This means that both boys and girls did not differ in their attitudes toward mathematics.

This study supports the findings of TIMSS (1994-5). TIMSS reported that in many of the countries studied no significant difference existed between elementary school boys' and girls' attitude toward mathematics.

The two sex groups had mean scores of 12.99 and 12.89 for boys and girls respectively on the six attitude variables. The mean scores were about the same and this may be that both boys and girls in primary class six had same levels of : understanding of mathematics, motivation, perceived usefulness and importance of mathematics.

This finding contradicts the finding of Burnett (1996). He reported that there was significant difference between primary school boys' and girls' attitudes towards mathematics in favour of boys. The result from this study that there was no significant difference between boys' and girls' attitudes toward mathematics also contradicts the findings of Swetman (1991). He noted that female students' attitudes toward mathematics were significantly more positive than the male students' attitudes. Swetman (1995) again noted that initially girls have more positive attitudes toward mathematics than boys, but as girls grow older their attitudes decline.

This finding also contradicts the findings of Gill (1994), that girls have positive attitude toward school, but negative attitude toward mathematics.

Hypothesis 2

Hypothesis 2: The null hypothesis was that : There is no significant difference between boys' and girls' achievement in mathematics. The results revealed that boys and girls in primary class six did differ in their Mathematics achievement in favour of girls

Even though the results indicated that boys and girls did differ significantly in their mathematics achievement there was little difference in their mean scores. That is, 33.01 and 32.17 for boys and girls respectively with girls recording slightly higher mean score.

This finding supports the findings of Mohammed (2005). He noted that girls out-performed their male counterparts. This finding also supports the findings of Willis (1989). He noted a small difference in Mathematics achievement between boys and girls and that the differences vary from culture to culture. Benhow (1992) and Friedman (1989) also noted that the differences in Mathematics performance between males and females are decreasing over the years.

The findings of this study on the other hand contradicts the findings of (Wilmot,2001; Acana,2001; Adarkwa,2004; TIMSS,1994-5; MOE,1997). Their studies reported that significant differences in mathematics achievement existed between boys and girls in favour of girls. Hanna et al (1990) noted that as children get older, differences in performance increase, so that by age 13 boys are significantly superior to girls both in their mathematical performance and their attitudes toward mathematics. They concluded that gender related differences in mathematics vary among countries and even between different groups within a country.

Hypothesis 3

Hypothesis 3: The null hypothesis was that: Pupils' attitudes toward mathematics do not contribute significantly to their achievement in the subject. The statistical analysis using the multiple regressions indicated that pupils' attitudes toward mathematics contributed significantly to their achievement in the subject. That is, pupils' attitude toward mathematics was related to their achievement.

The finding supports the findings of (Ma & Kishor,1997).They found significant relationship between pupils' attitude toward mathematics and their achievement. Also, TIMSS (1994-5) reported that in more than one-third of the countries studied positive relationships were observed between primary pupils' attitudes toward mathematics and their achievement in the subject. Also, in Isreal Nasser & Birenbaum (2004) in a study involving Arabs and Jewish fourth-sixth graders reported that in both groups pupils' attitudes toward mathematics related to their achievement.

On the other hand the finding contradicts the findings of Moses (1991). He found that students' attitude toward mathematics was not directly related to their achievement. These differences in relationships in this study and other studies as well may be due to the various locations and time settings at which such studies were carried out.

Hypothesis 4

Hypothesis 4: The null hypothesis was that: Teachers' attitudes toward mathematics do not contribute significantly to pupils' achievement in the subject. The results indicated that teachers' attitude toward mathematics contributed significantly to pupils' achievement in the subject. That is teachers' attitude toward mathematics was related to pupils' achievement.

This finding supports the findings of Christou, Philippou & Hiliophotou, 1999; Caraway, 1985; Taylor, 1987, Haladyna et al 1982; Bishop and Nickelson 1983; Begle, 1979. They found significant relationship between teachers' attitudes toward mathematics and pupils' achievement.

Additional Findings of the Study on pupils' Attitude Variables

The following additional findings were revealed by the study.

1. Both boys and girls expressed that they enjoyed mathematics, that they liked mathematics, that mathematics is interesting, [illegible], but a few. However, the results revealed that boys agreed slightly more than girls.
2. Boys and girls expressed their confidence in mathematics. The former than the latter expressed strong agreement for their confidence in mathematics. This finding supports the findings of Meyer and Koehler (1990). They observed that females have less confidence in their abilities to do mathematics.
3. Both boys and girls did see mathematics as a difficult subject, but girls agreed slightly more than boys that mathematics is difficult. Also, more girls than boys agreed that mathematics tests often seemed difficult.

   This finding supports the previous studies by Stuart ([illegible]). He noted that even at age eleven pupils described mathematics to be difficult.
4. Although boys and girls did agree that mathematics is a subject reserved for males, the latter did agree slightly more than the former.

4. More boys than girls agreed that they liked other subjects, but they liked mathematics more than the other subjects.

5. Both boys and girls expressed their desire to stop the study of mathematics at the JSS level. Girls agreed slightly more than the boys.

6. More than two-thirds of the pupils expressed that they would not use mathematics after leaving school, more girls than boys saw less use of the subject after leaving school.

7. Girls agreed more than their male counterparts that boys need mathematics in life more than girls did.

These findings support previous studies by Wolleat, Fennema & Beker 1981, Thorndike-Christ, 1991; Edkard ,1995. They noted that students' perceptions of the usefulness of mathematics determined their desire to take more mathematics. That female student often does not perceive mathematics as being useful.

8. More than one-fourth of the pupils attributed their performance in mathematics tests to their luck. Girls agreed more than boys.

9. More boys than girls agreed that they enjoyed learning mathematics with friends

Teacher Issues

The study revealed the following

1. Primary six classes were dominated by male teachers.
2. More than one-fourth of the respondents [illegible] level as their highest academic qualification [illegible] holder who was found teaching in primary class [illegible]
3. About two-thirds of the teachers found teaching in primary six class were certificate "A" 3 years post secondary teachers.
4. One Assistant Director and two Principal Superintendents were the only teachers with the highest rank found teaching in primary six class. Majority of the teachers did not attain any rank as at the time of the study.
5. A large number of the teachers only studied mathematics as a core subject. Only 5 out of the 40 teachers studied mathematics as elective subject.

Teachers' Attitude Variables

The study revealed the following:

1. Male and female teachers expressed that they enjoyed mathematics. Male teachers agreed slightly more than their female counterparts.
2. Although both males and females expressed their confidence in mathematics, male teachers were more confident than the female teachers.
3. More female than male teachers exhibited mathematics anxiety.
4. Male and female teachers did see mathematics as a difficult subject, but the latter agreed slightly more than the former that mathematics is difficult.
5. The two sex groups agreed that mathematics is a subject reserved for males, but the males agreed more than their female counterparts.

This finding supports the findings of Lindsay, Lirtle and Carpenter (1995). They noted that males tend to stereotype mathematics as a male domain more than their female counterparts.

6. Both male and female teachers agreed that they experienced the influence of the pupils' attitudes toward mathematics. However, male teachers agreed more than their female counterparts.

7. There was weak relationship between Highest academic qualification and type of mathematics studied.

The study further revealed the following additional findings

1. More male than female teachers expressed strong agreement that they enjoyed teaching mathematics.
2. Female teachers agreed more than their male counterparts that mathematics teaching bores them.
3. Although male and female teachers agreed that they liked working all types of mathematics, male teachers agreed more than their female counterparts.
4. More female teachers than their male counterparts expressed their wish to stop teaching mathematics if they had their own way.
5. Respondents also expressed strong feeling of anger with pupils when they fail to grasp simple concepts in mathematics. However, female teachers agreed more than their male counterparts.

Additional Findings on the Achievement Test.

Even though the results under hypothesis 2 indicated that there w[illegible] significant statistical difference in mathematics achievement between boys [illegible] girls the study further revealed the following

1 The boys recorded slightly higher mean [illegible] test items

2 There were few items on which girls [illegible] higher mean scores than boys

3 Both sex groups [illegible] equal mean [illegible]

These findings support previous studies by Ba[illegible] (1985), [illegible] and Payne, 1985. Their evidence suggests that males are not superior in all aspects of mathematics. Hyde, Fennema and Lamon (1990) also observed that males generally achieve better than females at high cognitive level on mathematics tasks.

The reason for the differences in performance may be that perhaps both boys and girls concentrated on the topics they excelled in. Also perhaps the girls concentrated on topics considered by the teacher to be important.

This finding [illegible] supports the findings by Ca[illegible] (1990). He noted that girls do better on topics which are perceived by the teachers as important so as to please the teachers.

4 Apart from item 21 of the achievement test on which only 73 wrong responses were recorded, about one - fourth to nearly half of the respondents recorded wrong responses in the remaining 23 items.

The right responses recorded by pupils may be the result of over learning of the subject matter. On the other hand the wrong responses recorded may be the result of forgetting. Again, perhaps concepts were not properly formed by pupils and that, inappropriate methods might have been used by teachers to present mathematical concepts.

Additional Findings on Pupils' Achievement and their Attitudes

The study also revealed the following under this section.

1. Although some respondents expressed their agreement with the influence of the teachers' attitudes on their mathematics learning and achievement, a number of them were unsuccessful in the achievement test. Among those who disagreed with the variable, a fraction of them was also unsuccessful.
2. Among the groups of respondents who agreed or disagreed with their attitudes toward mathematics, large proportions of them were unsuccessful in the achievement test.

These findings revealed that what pupils said did not actually reflect their achievement. Probable, the pupils spoke favourably to please the researcher and their class teachers.

Conclusion

The following conclusions could be made from the findings of this study on primary class six pupils' and teachers' attitudes toward mathematics and pupils' achievement in the subject in the Eastern Region of Ghana. The attitude mean scores of boys and girls for the six attitude variables were 12.00

and 12.89 respectively. The difference was not significant at 0.05 alpha level. Boys and girls did not differ in their attitudes towards mathematics.

The difference in mathematics achievement [illegible] primary [illegible] boys and girls was significant at 0.05 level. [illegible] mean achievement scores for boys and girls were [illegible] and [illegible] respectively. Girls out-performed their [illegible] counterpart.

Primary [illegible] pupils' attitudes [illegible] related to their achievement in the subject. In addition, primary [illegible] pupils and teachers' attitudes towards mathematics have influence on pupils' achievement in the subject. When [illegible] the factors that influence pupils' achievement in the subject the attitudes of pupils and teachers should not be ruled out or ignored. This study provides evidence that both boys and girls recorded mean scores of [illegible] and [illegible] respectively that they experienced the influence of the teachers' attitudes on their mathematics learning and achievement. In addition to this, [illegible] one-half of the teachers expressed [illegible] feeling [illegible] anger with pupils when they fail to cope with simple mathematical concepts.

Primary [illegible] agreed more than girls that they enjoyed mathematics and were confident in mathematics. [illegible] agreed slightly more than girls that they experienced the influence of the teachers' attitude on their mathematics learning and achievement.

Girls agreed slightly more than boys that mathematics is difficult. Again, girls exhibited mathematics anxiety more than the boys. Similarly, girls agreed more than boys that mathematics is a subject reserved for boys.

Primary [illegible] classes seemed to be dominated by male teachers in the Manya Krobo district. It may not be so in other places. About four times the number of male than female teachers expressed strong agreement that they enjoyed teaching mathematics. Also, about three times the number of female than the male teachers expressed their wish to stop teaching mathematics if they had their own way.

The study further revealed that more than one half of the number of the teachers expressed strong feeling of anger with respect to pupils' response to simple questions during mathematics lessons. Finally, about twice the number of female than the male teachers expressed their feelings of dislike for mathematics teaching.

Recommendations from the findings of the study

Based on the findings of this study the following recommendations are made.

1. From the findings of the study and the available data gathered, there was significant difference between primary class six boys' and girls' achievement in mathematics. Educational authorities and stakeholders should make this known to the pupils so as to foster healthy competition among the two sex groups. This will then improve achievement in mathematics. Teachers must also encourage girls to know that they can equally do well in mathematics or out- perform boys.

2. Since teachers' and pupils' attitudes toward mathematics influenced/related to pupils' achievement in the subject, these should be made known to them (teachers and pupils) so that they could reflect on their own attitudes and make efforts to adapt more positive attitudes. Teachers must also encourage

pupils to know that mathematics is not a difficult subject or a subject reserved for males.

3. Mathematics teachers need to be competent in the subject they teach but since primary school teachers only studied the subject as a core subject the Ghana Education Service (GES) should organise periodic in-service training courses for all teachers in the primary schools. Research should be carried out to identify areas in the preparation of pre-service teachers that need improvement in mathematics. Besides, individuals and agencies need to be encouraged to write relevant textbooks for pupils' use.

4. More female teachers should be encouraged to teach primary six classes and mathematics. They may serve as role models to the female students.

Recommendations for Further Research.

1. The study used only one district that is the Manya Krobo District in the Eastern Region. To generalise the findings for all primary class six pupils in Ghana, there is the need to extend the study to include other schools, districts and regions.

2. There is the need to undertake more studies on attitudes toward mathematics at the primary school level so that negative attitudes could be detected early and measures taken to address them.

3. The reviewed literature revealed that studies on attitudes toward mathematics at the primary school level are lacking in Ghana there is the need to carry out more studies to add up to the existing ones

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APPENDIX A

UNIVESITY OF CAPE COAST

DEPARTMENT OF PRIMARY EDUCATION

FACULTY OF EDUCATION

E-mail: UCCdpe@afrianonline.yahoo.com

P O Box PMB
Cape Coast
Ghana
Date 19th Feb 04

Our Ref. No: PED 49.1 189
Your Ref. No..................................

The District Director
G.E.S

Manya Krobo Yilo Krobo Districts

LETTER OF INTRODUCTION

The bearer of this letter Mr. Christopher K. Addy, is a Postgraduate student at the Department of Primary Education, University of Cape Coast. He is undertaking a project on **Primary School Teachers' and Pupils' Attitudes Toward Mathematics and their effects on Pupils' Achievement.** In connection with this, he needs to conduct a pre -test to test the instruments and later collect data in schools in the District.

The project is academic in purpose and data collected will be treated as confidential. I should, therefore, be grateful if you could give Mr. Addy the necessary assistance that will enable him carry out his project

Yours faithfully,

Ag. Head of Department

APPENDIX B

UNIVERSITY OF CAPE COAST

FACULTY OF EDUCATION

DEPARTMENT OF PRIMARY EDUCATION.

STUDY ON PRIMARY SCHOOL TEACHERS'AND PUPILS' ATTITUDES TOWARD MATHEMATICS AND PUPILS' ACHIEVEMENT

Dear Pupil.

This project is academic in purpose. Thus, it is to collect information on your personal opinion and feelings about Primary School teachers' and pupils' attitudes toward mathematics and Pupils' Achievement in the subject.. The information that you are going to provide will help educators, teachers. and stakeholders to determine further improvement that will help pupils to enjoy mathematics in school.

I should therefore be grateful if you could answer the questionnaire as honestly as possible.

I assure you that the information that you provide will be treated confidentially that is why your name is not required in the questionnaire

Thank you.

Yours truly,

(ADDY CHRISTOPHER K.)

SECTION A

Place a tick [ ] in the appropriate boxes or fill in the blank spaces

1. Name of School ... . .

2. Sex Boy [ ] Girl [ ]

3. Age ....

SECTION B PUPILS' QUESTIONNAIRE

This section is to find out how you feel about mathematics. Please read the statements carefully and place a tick [ ] against each question with the options, which correspond to your agreement or disagreement to the statement.

Tick: if you Strongly agree [SA]

If you Agree [A]

If you Disagree [D]

If you Strongly Disagree [SD]

STATEMENTS	SA	A	D	SD
EXAMPLE: I think my mathematics teacher enjoys teaching me.				
4. Mathematics lessons make me feel bore in class				
5. I could do mathematics better if my teachers are patient with me in class.				
6. The way my teacher teaches mathematics makes me to dislike the subject.				
7. My mathematics teacher encourages me to learn mathematics.				

8. I think my mathematics teacher thinks I am stupid				
9. I have always been afraid of mathematics.				
10..I avoid mathematics because I am not very good with numbers.				
11. I like mathematics more than any other subject.				
12 . Mathematics is very interesting.				
13 I would like to stop the study of mathematics at the JSS levels.				
14 I do not like mathematics.				
15. I think mathematics is the most enjoyable subject that I learn at school.				
16. I would not use mathematics after leaving school.				
17. Girls fear mathematics more than boys.				
18. I enjoy working mathematics with friends.				
19. I prefer to work mathematics on my own.				
20. If I do well at mathematics people praise me.				
21. I do not think mathematics is important				
22. Boys and girls can obtain equal scores in mathematics tests				
23. I count myself lucky when I do well in mathematics tests				
24. I usually feel confident about mathematics tests.				
25. I would never do well in mathematics even if I am taught by the best teacher.				
26. Boys need mathematics in life more than girls				
27. It is useful for girls to learn mathematics.				

28. I usually get most of my mathematics correct.					
29. I find it difficult to solve mathematics problems on my own.					
30. Mathematics is one of the most difficult subjects that I learn at school.					
31. Mathematics tests often seem difficult for me.					

APPENDIX C

STUDY ON PRIMARY SCHOOL TEACHERS' AND PUPILS' ATTITUDES TOWARD MATHEMATICS AND PUPILS' ACHIEVEMENT IN THE SUBJECT

Dear Teacher

The purpose of the study [illegible] opinion and feelings about Primary School [illegible] Pupils' Attitudes toward mathematics and pupils' Achievement in the subject. The information that [illegible] are going to provide will help educators [illegible] help pupils [illegible] mathematics in schools.

Answer the questions as honestly as possible. I assure you that the information that you provide will be treated confidentially, that is why your name is not required in the questionnaire.

Thank you.

Yours truly,

(CHRISTOPHER ADDY)

SECTION A

Please put a tick [illegible] appropriate [illegible]

1 Name [illegible]

2 Sex Male [ ] [illegible]

3 Age Below 20 [ ] 21-25 [illegible]

36-40 [ ] [illegible]

4 Highest Academic Qualification

SSCE [ ] GCE [ ] [illegible]

Others (specify)

5 Highest Professional Qualification

Cert 'A' 4 year [ ] Cert 'A' [illegible]

Diploma [ ] Degree [ ]

6 Rank in the GES (Ghana Education Service)

7 Years of teaching experience

8 [illegible]

Core subject [ ] [illegible]

9. Number of pupils in your class

Boys.... Girls .... Total ....

SECTION B

TEACHERS' QUESTIONNAIRE

This section is to find out how you feel about [illegible] primary six pupils attitudes toward mathematics.

Please read the statements carefully and place a tick [illegible] statement with options which correspond to your [illegible] agreement or disagreement to the statement

Tick if you strongly Agree (SA)

If you agree (A)

If you disagree (D)

If you strongly disagree (SD)

STATEMENTS	SA	A	D	SD
Example: Mathematics is my best subject				
10. I enjoy teaching mathematics				
11. I feel good towards mathematics teaching				
12. I like working all types of mathematics problems				
13. Teaching mathematics bores me.				
14. I would stop teaching mathematics if I have my own way				
15. I do not like teaching mathematics.				
16. . I think mathematics is an important part of the school curriculum.				
17. I feel confident about teaching mathematics				
18. I avoid mathematics because I not very good with numbers.				
19. I get no satisfaction from teaching mathematics				

20. I interact with boys more than girls during mathematics instruction.

21. Most teachers have a feeling of dislike for mathematics

22. Most pupils miss my mathematics lessons.

23 . Pupils do seem to understand me when I teach them mathematics.

24. I feel nervous when pupils fail to grasp simple mathematics concepts.

25. I feel discouraged about the way pupils perform in mathematics

26. Pupils responses to simple questions in mathematics makes me feel angry.

27 Girls fear mathematics more than boys

28. Usually boys participate in mathematics lessons more than girls.

29. Boys and girls can obtain equal scores in mathematics tests.

30.On the average boys perform better in mathematics tests than girls.

31. Boys need mathematics in life more than girls.

32. It is useful for girls to learn mathematics.

33. If I work carefully I find mathematics easy.

34. Mathematics is one of the most difficult subjects that pupils learn at school

35. Mathematics problems often frighten me

36. I find it difficult to solve mathematics problems

numbers and letters

37. Mathematics tests often seem difficult

38. Mathematics is easy to me

APPENDIX D

MATHEMATICS

TIME: 1 HOUR **ANSWER ALL QUESTIONS**

DO ALL ROUGH WORK ON THE QUESTION PAPER

There are [illegible]

to D. You are [illegible]

your question pa[illegible]

should be done [illegible] the [illegible]

An example is given [illegible]

If 2k [illegible] 15 find the value of K

A 8 B [illegible]

(C) 4 D 9

The correct [illegible]

Answer question [illegible] on the one [illegible]

Multiply [illegible] 3 x 74

[illegible] B [illegible]

C [illegible] D [illegible]

If $\frac{\cdot}{2} = \frac{\cdot}{12}$ find t to make the sentence true

A 1 B. 6

C. 3 **D. 2**

2.Subtract [illegible]

-2868

A [illegible] B [illegible]

C 8[illegible] D [illegible]

4. **If 4 oranges cost ¢1200.00, find the cost of 12 of them.**

A. ¢3,600.00 B. ¢36,000.00

C. ? 400.00 D. ¢1,200.00

Use '>', '<' or '==' to make the sentences true for questions 5 to 7.

5. $\frac{1}{2} \ldots \frac{1}{4}$

A. $\frac{1}{2}$ $\frac{1}{4}$ B. $\frac{1}{2} = \frac{1}{4}$

C. $\frac{1}{4} - \frac{1}{2}$ D. $\frac{1}{2}$ $\frac{1}{4}$

6. **(225 - 191) ... (225 + 191)**

A. 34 < 416 B. 34 > 416

C. 34 = 416 D. 416 < 416

7. $(5\frac{1}{4} \times \frac{1}{7}) \ldots \frac{3}{4}$

A. $\frac{3}{4}$ $\frac{3}{4}$ B. $\frac{3}{4}$ $\frac{3}{4}$

C. $\frac{2}{4}$ $\frac{3}{4}$ D. $\frac{3}{4}$ $\frac{3}{4}$

8. **7320 ÷ 60 = n . find the value of n.**

A. 1220 B. 7260

C. 120 D. 122

9. **W = 0.6 x 0.7. Find the value of w.**

A. 0.42 B. 0.042

C. 4.2 D. 42

Use the information below to answer questions 10 to 12.

Factors of 12 are [1,2,3,4,6,12]

Factors of 18 are [1,2,3,6,9,18]

10. **The common factors of 12 and 18 are**

    A. [12,18] B. [1,2,3,6]

    C. [1,2,3] D. [1,6]

11. **The highest common factors of 12 and 18 is**

    A. [1] B. [12]

    C. [18] D. [6]

12. **The sum of the common factors of 12 and 18 is**

    A. 18 B. 30

    C. 12 D. 7

13. **Express $^3/_4$ as a percentage.**

    A. 25% B. 75%

    C. 70% D. 30%

14. **Express the ratio 32:64 in the lowest term**

    A. 1:2 B. 1:3

    C. 1:32 D. 2:1

15. **Solve 3 + n = -3**

    A. 3 B. –3

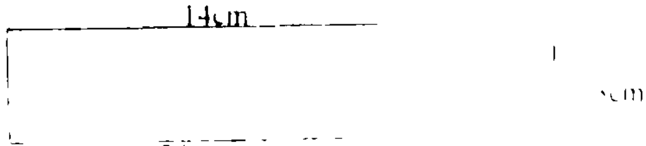
    C. 6 D. –6

16. **James scored 80% in a class test. Express this score as a fraction in its lowest term.**

A. $\frac{5}{4}$ B. $\frac{1}{[illegible]}$

C. $\frac{2}{5}$ D. [illegible]

17 **Find the area of the figure below**



A. 17cm B. 24cm

C. $42cm^2$ D. $14cm^2$

18 **Write the value for 2^5**

A. 32 B. 16

C. 10 D. 25

19 **A man sells 40 bottles of Fanta everyday. How many bottles does he sell in January?**

A. 1240 B. 124

C. 31 D. 1200

20. **What is the place value of the underlined digit in 3<u>5</u>623?**

A. 5 B. 500

C. 5000 D. 50

21. **Multiply:**

$$\begin{array}{r} 163 \\ \underline{\times\ 24} \end{array}$$

A. 978 B. 798
C. 187 D. 3912

Use the information below to answer questions 22 to 23.

Nine boys obtained the following scores in science quiz: 5,4,6,5,7,9,3,5, and 3

22. What was the common score?

A. 3 B. 5

C. 9 D. 6

23. **How many pupils obtained the common score?**

A. 3 B. 5

C. 2 D. 9

24. **If w = 125 + 35, find the value of w.**

A. 415 B. 451

C. 57 D. 4115

APPENDIX [illegible]

Answers for the Achievement Test Items

1. C
2. B
3. D
4. A
5. D
6. A
7. D
8. D
9. A
10. B

[illegible] D

12. C

[illegible] A

[illegible] D

[illegible] B

[illegible] C

APPENDIX F

List of selected circuits in the Manya Krobo District

Rural Circuits

Asesewa Circuit A

Asesewa Circuit B

Sekesua Circuit

Urban Circuits

Kpong/Akuse Circuit

Agomanya Circuit

Odumase Circuit

APPENDIX C

List of selected schools from the District

Asesewa Anglican Primary

Asesewa Methodist Primary

Asesewa Pentecost L/A Primary

Brepaw Kpeti Presby Primary

Aworworso Kpeti Primary

Akohia Presby Primary

Asesewa R/C Primary

Asesewa Presby Primary

Odomenta L/A Primary

Asasehene Methodist Primary

Dzomoa R/C Primary

Otrokper R/C Primary

Dawa Korlewa L/A Primary

Sekesua Presby Primary

Sekesua Bishop Andor Primary

Kpong E.P./LA Primary

Kpong Islamic Primary

Kpong R/C Primary 'A'

Kpong R/C Primary 'B'

Kpong Methodist Primary 'A'

Kpong Methodist Primary 'B'

Kpong L/A/Presby Primary

Nuaso St. Clement Primary

Nuaso Presby Primary

Matse Israel L/A Primary

Manya Kpongunor Presby Primary A

Manya Kpongunor Presby Primary B

Manya Kpongunor Presby Primary C

Agormanya Methodist Primary A

Agormanya Methodist Primary B

Agormanya R/C Primary A

Agormanya R/C Primary B

Agormanya R/C Primary C

Odumase Presby Primary A

Odumase Presby Primary B

Piengwa Yohwenor L/A Primary

Odumase Mate Primary

Odumase Anglican Primary A