FACTORS INFLUENCING STUDENTS' ATTITUDES TOWARDS MATHEMATICS AND ITS AFFECTS ON PERFORMANCE OF MATHEMATICS AMONG SECONDARY SCHOOL LEVEL STUDENTS IN KENYA

A CASE STUDY IN MUKAA SUB-COUNTY IN MAKUENI COUNTY-KENYA

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DECLARATION

This research project is my original work and has not been submitted for an award of any degree in any other university

Signature……………………………………… Date ……………………

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This research project has been submitted for examination with my approval as the university supervisor.

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DEDICATION

I dedicate this research project to my mother Annastaciah Katunge Mulala and brother Jonathan Muoka Mulala who instilled in me a strong moral compass and encouraged me to pursue my studies to Doctorate level.

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ABSTRACT

In the current 21st century, individuals have to deal with overwhelming information generated from computers and calculators to that of mental estimations of daily purchases and it is imperative that students become proficient in mathematics. Not only must learners deal with a wide range of operational skills, such as computing decimals, they must also understand underlying numerical concepts in order to succeed in a variety of day-to-day commercial and work place situations. However, attitudes towards mathematics and associated anxiety have been known to affect students with diverse socio-economic backgrounds; it continues to be an issue of concern to secondary school teachers and administration particularly in Kenya. The purpose of this study was to investigate secondary school student's attitudes towards mathematics and to explore the differences in attitudes towards mathematics among students in Mukaa District-Makueni County, Kenya. A cross-sectional data containing demographic information and attitudes towards mathematics were collected from 200 students made up of 100 boys and 100 girls; 20 teachers and 10 head teachers. They were randomly sampled from ten secondary schools in Mukaa sub- County (district). Self-administered questionnaires were used with the Head teachers, teachers and the students in the selected schools. The data was analyzed using the SPSS version 20 for calculating mean and standard deviations and the results revealed that there was a significant difference in attitudes shown towards mathematics by the students. The background environment, teachers' qualification and attitude, teaching styles and parental attitudes and assistance were identified as explanation factors that account for student's attitudes towards mathematics. After data analysis, the finding of the study shows that students' attitude has a direct influence on the performance of mathematics. Teaching methods influences attitude and hence the performance. Teachers qualification and experience significantly affect the students' confidence. Parental involvement and encouragement influences the child positively to like the subject. The present study asserts that teachers and other stakeholders in the education sector should organize forums such as seminars and workshops for students, parents, teachers and school administrators to enhance and promote positive attitudes towards mathematics. There is a gap in the research since other factors also influence attitude and performance of mathematics. For example, gender bias and therefore further research into the problem should be done. Key words: attitudes, mathematics, secondary students.

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ABBREVIATIONS

DDE   Deputy Director of Education

DEO   Districts Education Officer

HQ   Head Teacher's Questionnaires

KCSE   Kenya Certificate of Secondary Education

MTQ   Mathematics Teachers questionnaires

PASW   Predictive Analysis Software

PTA   Parents Teachers Association

SAM   Student's Attitude towards Mathematics

SMASSE   Strengthening Mathematics and Sciences In Secondary School Education

SMT   Science, Mathematics and Technological

SPSS   Statistical Package for Social Sciences

SQ   Students Questionnaires

U S   United States

UON   University of Nairobi

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Student feeling and perception about mathematics is a major factor that affects his or her attainment and realization of full potential. Neale (2009) defines attitudes towards mathematics as "alienated measures of like or disliking of mathematics, a tendency to engage in or avoid mathematics activities, he belief that mathematics is useful or useless". Several important components emerge from these definitions: attitude is learned, it influences one to take a slated or implied altitude or to have such an attitude as a result of prior influences that may be either positive and there is response consistency. On the same note, Aiken (1996) defines attitude as "a learned predispositions or tendency on the part of an individual to respond positively or negative to some objects, situation, concept or another person.

Teacher's attitudes towards mathematics could presuppose an inclination to pass on what they have received as a duty or as a valuable asset of knowledge that could be beneficial in their learners. On the contrary the learner's altitudes towards mathematics could be valued in relation to natural disposition environmental exposure, scales of value or personal disposition, which needs investigation to establish the missing link in the achievement of mathematics.

Attitudes are regarded by several researchers, as an important/key factor to be taken into account when attempting to understand and explain variability in student performance in mathematics. Mobilizing a set of different definitions concerning attitudes presented since 1935, Eshun (2007, page 2] defines an attitude towards mathematics as "a disposition towards an aspect of mathematics that has been acquired by an individual through his or her beliefs and experiences but which could be changed." When emphasizing the importance of individual experiences, the contexts where students interact with others and with mathematics become important focal points. According to Reid (2006), attitudes express our evaluation of something or someone. They are based on our knowledge, feeling and behavior and they may influence future behavior, a target is essential for attitude. Attitudes are highly composite and they can affect learning comprehensively. Attitudes influence performance and performance in turn influences attitudes.

According to Fishbein Model of value – expectancy (Fishbein, 1975), he argued that a person's attitude determined his/her intended behavior, which could ultimately affect the outcome. Based on the model, he stated that a person would hold certain attitudes towards an object by evaluating it. After going through his process the person then decides whether to hold a favourable or unfavorable view towards it. Indeed such a positive or negative attitude could further influence the person's intentions to engage in various behaviors with regard to that particular object (Fishbein and Ajzen 1975, P14).

Based on the person's behavior, this could be regarded as a significant predictor of the final outcome. Attitudes will affect behavior, influencing what the learner selects from

the environment, how he will react towards teachers, towards the material being used and towards the other students.

In particular, Ajzen and Fishbein's (1980) theory of reasoned action, which is concerned fundamentally with predicting behavior focuses on the distinction between attitudes towards some 'object' and attitudes towards some specific action to be performed towards that 'object' (e.g. between attitudes towards science and attitudes towards doing school science). Ajzen and Fishbein (1980) argue that it is the latter kind of attitude that best predicts behavior. Thus their theory represents a relationship between attitude, intention and behavior. Behavior is seen as being determined by intention, and intention, in turn, is a joint product of attitude towards the behavior and the subjective norm (i.e. beliefs about how other people would regard one's performance of the behavior).

The question in this study is what influences attitudes towards mathematics and how it affects teaching and learning of Mathematics among secondary school level boys and girls. This is because of the urgent need to elevate mathematics as low performance inhibits participation in many occupations and career development. Theoretical arguments have it that, there are indeed numerous researches conducted on testing the relationship between attitude and academic achievement. Based on the past literature, there has been a general consensus that attitude could be regarded as a significant predictor of one's academic achievement. Most of these researches illustrated the more positive one's attitude towards academic subject, the high the possibility for him/her to perform well academically.

In a research conducted in U.S. (House 1995, p. 37), the researcher studied the relationship between students' attitude and academic achievement in college mathematics by inviting 218 fresh students to complete a set of questionnaire. The results indicated that students' attitude were highly correlated with their achievement with college calculus. (House 1995, p. 37).

In pursuit for solution, earlier research by Miheso (2003), Munyao (2003) and Nyambuka (2004) investigated on Mathematics teaching methodologies and language factors, and gender disparities all in relation to performance. However, these studies seem not to provide sufficient solution in the domain of attitudes in relation to mathematics achievement amongst students. Therefore, it is hoped that the present study can provide further insights on the phenomenon.

In a research done by Kate Christian, Fredrick Morrison and Fred Brayn (2002), determined that family education level and childcare environment could influence students achievement in Mathematics. Fraser and Kahle (2008) have also highlighted this aspect in research which shows that learning environments at home, at school, and within the peer group accounted for a significant amount of variance in student attitudes and, furthermore, that class ethos had a significant impact on the scores achieved by students for these attitudes. Attitudes can be seen as more or less positive.

A positive attitude towards mathematics reflects a positive emotional disposition in relation to the subject and, in a similar way, a negative attitude towards mathematics relates to a negative emotional disposition. Sarwat Mubeen et al (2013) (in their journal of humanities and general sciences) on attitude towards Mathematics and academic

achievement, points out that in order to succeed in a subject, positive attitude towards the subject is a necessary prerequisite. For this reason positive attitudes towards mathematics are desirable since they may influence one's willingness to learn and also the benefits one can derive from mathematics instruction

According to Kathleen Manzo (2008), teachers should motivate students that do not receive necessary support from home. Furthermore, this motivation is mostly easily incorporated into elementary classrooms because by middle and high school, students have more solidified attitudes (Manzo, 2008). Lack of motivation could mean an apathetic attitude or lack of self confidence in school. In their research, Fisher and Rickards (1998) found that students' attitude towards Mathematics tend to be more positive in classroom where students perceived greater leadership and helping / friendly behaviors in their teachers and more in their classrooms where students perceived their teachers as admonishing and enforcing strict behaviors.

Despite findings of girls' low confidence in mathematics, studies of classroom environment have shown that the girls' confidence in mathematics have improved greatly in classes which actively involved girls in the learning of mathematics (Boaler, 2000). Similarly Bolaji (2000) conducted a study that examined the influence of student's attitude towards mathematics in the junior secondary school. A random sample of 280 students was used. The research design employed was case study Students' questionnaire was the only instrument used to collect data. If the instruments were triangulated a more in- depth understanding of the case could be gained. The study used descriptive statistics analysis techniques to come up with the conclusions. The research findings revealed that students in the schools, preferred classroom activities regard to the effect of the

curriculum. The teachers' personality and interrelationship with students was a crucial variable in attitude formation. The study further revealed that the form grade of the students were associated with liking mathematics.

The findings of this study may not be valid or reliable as the instrument used to collect data was not appropriate. The research instrument for a case study design is interviews schedule therefore the results of the study may be termed not meaningful. The research recommended students to be helped develop positive attitudes towards mathematics by both teachers and parents. A similar study can be carried out using sure design the results can be generalized to a wider population. Another study was carried out by Yavoz (1991) to investigate the effects of different teaching methods on attitude towards learning mathematics and retained mathematics achievement on the topic of mathematics achievement level of tenth grade students.

The research was conducted on 120 tenth grade students and the topic selected was areas of polygonal regions. Quasi experiment design was employed and purposely sampling was used to select the 120 students. The study did not have a control group but gave treatment to all the sampled students. The data was analyzed by analysis of variance, two-way classification.

The results of the study revealed that, attitude towards mathematics and mathematics achievement level of students taught by discovery method and lecture with computer supported drill and practice method scored significantly higher than the students taught by lecture method with respect to immediate mathematics achievement .The students in the higher achievement group showed significantly higher attitudes towards mathematics

than the students taught by lecture with computer supported drill and practice method. However the researcher didn't say how he controlled the other extraneous variables like high achievement in the mathematics test scores of the students, private coaching and hence validity of the results is questionable. Therefore, it is hoped that the present study will provide further insights on the phenomenon.

In their study Sechaba and Moroke (2000), examined gender differences and black learners' attitudes towards mathematics in selected high schools in South Africa. The study adopted a qualitative approach and a cross- sectional design as the data was gathered at one point in time. It was non casual in nature, and took place in the natural learning environment. Four secondary schools were randomly chosen from the 18 in phuthadityhaba. 20 learners in total made up of 10 boys and 10 girls were interviewed. Meulenberg- Busken's free attitudes interview schedule was used to collect data while Fairclough's (1993) textually oriented Discourse Analysis was used to analyze data. The discussion of results and findings revealed that the difference between boys and girls were very clear at all levels of analysis. In the findings boys showed greater signs of finding comfort in mathematics as a discipline than girls.

In conclusion the study showed that there were gendered attitudes towards mathematics, which were as a result of socialization. Reviewing the design used in this study critically, it doesn't allow for in depth understanding of the problem given that the study was carried out in a natural learning environment. The findings of the study cannot be generalized, as many of the responses are the students' own perceptions which may not be the case in real learning situations. The study didn't target teachers and yet mathematics teachers are a vital resource in the learning of mathematics. A similar study

can be carried out including teacher in the target group and the results can be generalized. Teacher Qualification and professional development has a direct bearing on the students' attitude towards the subject the teacher handles. Hansen (1976) on the international study of achievement in mathematics concluded that there is a relationship between Mathematics and the length and type of the teacher's post- secondary education.

He said that the more training a teacher has received the better would be the achievement of his students. This clearly indicates that a teacher's post- secondary training will expose him to the skills needed to deliver the relevant knowledge and skills, later to his students at the secondary level. A study by Kariuki and Kibera (1996) revealed that 57% of a second year bachelor of education cohort at a local university in Kenya, did not like being teachers, even after having completed their teaching practice. They ended up in this programme after failing to get their first career choices. For them, teaching was a stop gap measure while looking for better careers. Such teachers would naturally go to school to 'work' rather than teach and would not really exert themselves in order to teach well.

The quality of teachers is dependent on the selection of top quality candidates for teaching, their pre-service education and continuous professional development (Kang'ethe & Nafuko, 2000). Sobel Naad Maletsky (1988) presented this view; Teachers must know their staff. They must know the pupils whom they are stuffing. And above all they must know how to stuff them critically. Teachers with proper qualification of the content develop self- confidence and serve a source of inspiration and a good role model to the students. This makes the student to like (have positive attitude to) the subject. The study was interested in finding out teachers' levels of professional training and academic qualifications and how this influences attitude of the learners and how the teachers

professional skills impact on the learners' attitude and how this factor affect the resulting performance in mathematics

In pursuit for solution, Eshiwani (1993) found that factors which influence students' achievement in science subjects and mathematics are directly related to the students' attitude towards these subjects. He reveals that factors include availability of teaching and learning resources such as mathematics models, libraries, textbooks, laboratories, laboratory equipment and chemicals. However there is need to study how these factors are directly related to the students' attitude towards these subjects especially mathematics. Webster (1966) asserts that educational philosophy should aim at improving normal school practices.

This should be aimed at giving children a sense of reality in school, making schools into workshops, laboratories, libraries and inspiring educational experimentation. Attitudes affects almost all if not everything that we do in life, the way we talk, read, work and even the way we do mathematics among other things. Cock Roll (2012) and Kilpatrick indicated that attitudes play an important role in the learning process.

In many instance attitudes are manifested by strong expressed feeling for or against mathematics and are linked with some emotion such as love, hate or fear. It is commonly felt that students' emotions, attitudes and beliefs are not only a result of past learning experience but that the will inevitably play a role also in the way he responds to new learning environments. Therefore teachers and all who are involved in the education of children have a heavy responsibility in helping to create a favourable attitude towards mathematics. For teachers to achieve health and productive learning experiences they

should seek ways to balance the strong cognitive demands that make student have sufficient affective reward.

1.2 Statement of the problem.

Pupils' performance in the mathematics subject in Mukaa District- Makueni County has not been satisfactory, both at the county level and national examinations despite that Mathematics is one of the compulsory subjects taken in both primary and secondary levels of the 8-4-4 system of education. Its knowledge is applied in all disciplines including everyday life. Unfortunately, it is evident from statistics that achievement in mathematics had remained low over the years. Table 1.1, below showed the mean scores for county and national examination for some schools in the District in the years 2011 and 2012.

Table 1.1: Mukaa District: County Mock and KCSE Results

School	Mathematics mean 2011		Mathematics mean 2012	
	County mock	KCSE Exam	County mock	KCSE Exam
School 1	4.37	3.67	4.06	4.22
School 1	4.28	4.86	4.31	4.52
School 1	2.13	2.5	2.66	2.37
School 1	2.75	3.01	2.91	3.46
School 1	6.18	6.44	5.07	5.44
School 1	1.03	1.28	1.82	2.04

Source: DEO'S Office.

The results showed that many schools averagely scored a mean of D or D+ (ranging between 2.0 – 4.5). Mathematics curriculum had been reviewed over time yet the performance seemed not to improve. This has remained a great concern to parents, teachers, government and other stakeholders who have called for a probe into mathematics achievement. Professor Kiptoon, former Secretary in the Ministry of Education (MOEST, 2001) claimed that the poor performance in primary mathematics was attributed to teachers who lacked the subject competence and most of them are unskilled (PTA teachers).

Hence the government in 2001 Through the Ministry of Education introduced distance learning courses called School Based for teachers' development. This is because of the urgent need to elevate mathematics performance as low achievement inhibits participation in many occupations and career development.

1.3 Main Objectives of the study

The main objectives are to investigate,

1. The factors that influence development of students' attitude towards teaching and learning of mathematics

2. The factors influencing students' achievement in Mathematics

1.3.1 Confounding Variables

The confounding variables of this study were to investigate the:

1. Effects of teaching methods on students' attitude.

2. Effect of background of students and parents participation on students' attitude towards mathematics

3. Effects of teaching resource on students' attitudes towards mathematics among secondary school students

4. Relationship between teachers qualification's and students attitude in mathematics

1.4 Research questions.

The study was aimed to answer the following questions.

1. What is the influence of teaching methods on students' attitude towards mathematics?

2. How do background factors influence students' attitudes towards mathematics?

3. Is there any relationship between teaching and learning resource materials and students attitudes towards mathematics?

4. What is the relationship between teachers' qualification's and students' attitude towards mathematics?

1.5 Hypothesis

H0 = There is significant relationship between students' attitude towards mathematics and their mathematics achievement.

H1 = there is no significant relationship between students' attitude toward mathematics and their achievement in mathematics

1.6 Significance of the study

The finding of the study had both theoretical and practical implications on the future of mathematics as a subject in our schools. Theoretically, the study has highlighted the factors that influence the students' attitude in mathematics among secondary school students in Mukaa District and this would assist education planners and curriculum developers to map out strategies by which performance can be improved.

The study is also expected to contribute to the advancement of knowledge about the factors affecting performance of mathematics among secondary school students. The

study would also have practical significance because it would lead to the improvement of strategies aimed at improving the performance in mathematics by fostering students' attitude in mathematics in secondary schools. The study would be of immediate help to curriculum implementers in the formulation of strategies aimed at enhancing students' attitude in mathematics. The study forms a base on which others would develop their studies.

1.7 Scope and limitations of the study

The research was carried out in Mukaa sub-county, Makueni County – Kenya. The study was limited to:-

1. Public and secondary school (mixed and single sex) in the district.

2. Only 10 schools were selected out of the 42 secondary schools in the district.

3. The study targeted only form four students in the respective schools.

4. The study was also limited to mathematics subject.

1.8   Assumption of the study

The study was carried out under the following assumptions

2. The study assumed that teachers responded to the instruments honestly and frankly.

3. That all mathematics teachers were familiar with the mathematics syllabus.

4. That the students had covered the form one, two, three and part of the form four mathematics syllabuses adequately.

1.9 Definition of Terms

School factors

In this study, this refers to the teacher's qualification, teaching resource materials, methodology and teachers gender.

Teacher's qualification:

This refers to professional level of a teacher.

Resources materials

These are instructional materials needed to facilitate concepts and reinforce the understanding of a given concept. e.g text books, models, charts.

KSCE

This is an abbreviation of Kenya Certificate of Secondary Education. A certificate obtained by a student after sitting for a summative examination done at the end of 4 years secondary education course to mark end of that education cycle and for placement.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Mathematics is a basic tool in the development of science and technology, commerce, industry and hence the economic development of a modern society. There has been an interest in the development of desirable attitudes towards mathematics and improved performance. A number of studies have been carried out in various domains in the effort for the search for solutions to the problems facing mathematics as a crucial and important subject.

2.2 Factors Influencing Attitude Development

Attitude can be defined as 'a learned predispositions or tendency on the part of an individual to respond positively or negatively to some objects, situation, concept or another person'' Neale (2009) defines attitudes towards mathematics as 'aggregated measures of liking or disliking of mathematics, a tendency to engage in or avoid mathematics activities, a belief that mathematics is useful or useless'. Several important components emerge from these definitions: attitude is learned , it influences one to take a stated or implied attitude to or to have such an attitude as a result of prior influences that may be either positive and there is response consistency. A study carried out to investigate factors that constitute to attitude development in mathematics showed that attitude development in mathematics is a consequence of diverse and interrelated factors,

which have to do with the students themselves, their teachers, school conditions and ministry of Education.

This study discusses the literature related to the factors affecting attitude development towards mathematics among secondary school students. It will particularly focus on students' attitude towards learning mathematics, methods used to teach mathematics, teacher – pupil interaction in the classroom, teacher education and professional development. Teaching – learning resources and Gender differences. These are considered as the pillars of the study. Other sub- topics that will be outlined in this chapter relating to the teaching and learning mathematics are: family background and influence on academic performance, teachers' expectations and their influence to the learner and the academic certification and examinations in Kenya. The study will investigate what influences the students' attitude towards learning mathematics at secondary school level. The study will find how a positive or negative attitude in mathematic develops.

2.2.1 Teacher – Pupil Interactions in the Classroom

As observed by Flanders (2009), as a consequence, teaching should not be seen as providing information for the learners to store, rather it should be aimed at creating a suitable environment in which learners are engaged in meaningful learning tasks in order to construct knowledge for themselves. Luke Odiemo (2015) a lecturer in the University of Nairobi in a psychology class, echoes Flanders by arguing that "teaching is a multimodal information process that include visual, touching, feeling, listening etc; involving the learner into multi-tasks that lead to construction of knowledge." (L Odiemo may 2015 with his masters group in M&E in an advisory session).

In a research conducted by Bolaji (2000), the study examined the influence of students' attitudes towards mathematics in the junior secondary school. A random sample of 280 students was used. The research design employed was case study. Students' questionnaire was the only instrument used to collect data. The study used descriptive statistics analysis techniques to come up with the conclusions. The research findings revealed that students in the schools, preferred classroom activities regard to the effect of the curriculum. The teachers' personality and interrelationship with students was a crucial variable in attitude formation. The study further revealed that the form grade of the students were associated with liking mathematics. The research recommended students to be helped develop positive attitudes towards mathematics by both teachers and parents. The findings of this study may not be very reliable as the instrument used to collect data was not appropriate. The major research instrument for a case study design is interviews schedule. If a similar study can be carried out using survey design the results can be generalized to a wider population.

The relationship between the teacher and the pupils in the Kenyan classroom is authoritarian and impersonal (Anderson, 2010). In addition the author observes that the underlying basis for interaction is that students have come to school to be taught, the teachers' role is therefore to tutor them rather than to provoke them to learn. Students are not treated as thinking beings that had their own views and experiences, which could be used to help them see the relevance of the new information they are learning (Mule, 2007). The author observes that teacher – pupil interactions are greatly affected by class sizes. This is supported by the study of Eggleston, Galton and Jones (1975) who posits that learning in crowded classroom is less effective compared to one that is less crowded.

A similar study was done by Nyambura (2004) to investigate the determinants of classrooms discourse in mathematics learning among secondary students in Nakuru Kenya. Descriptive survey design was employed. Disproportionate stratified sampling was used to select sample schools .Purposive sampling was used to select the students and teacher samples. Observation schedules, students and teacher questionnaires were used to collect data. Data analysis was done by descriptive statistics. The research findings revealed that mathematics teachers used different discourse patterns in their classes. Those teachers in boy's classes used more students centered technique than did the teachers in mixed or girls classrooms. If inferential statistics would have been included in data analysis probably the research findings would also reveal how the teaching discourse patterns influenced the student's attitudes towards mathematics. The study recommended co- operative learning to be employed by teachers especially in girls and mixed classroom through discourse such as discussions.

From this observation we can conclude that, teaching is a multimodal information process that calls for meaningful learning multi-tasks that needs a suitable environment involving co- operation between the learner and teacher, employed by teachers in classroom in order to construct knowledge. This study will attempt to investigate the teacher- pupil interactions in relation to the class sizes. The study will be interested in finding out whether teacher- pupil interactions have a bearing on attitude of the learners towards mathematics and how this affects the resulting performance in mathematics.

2.2.2 Methods Used to Teach Mathematics

Mathematics teachers use different discourse patterns in presentation of their work. Yavoz (1991) carried out a study to investigate the effects of different teaching methods on immediate and retained attitude towards mathematics and the topic of mathematics achievement level of tenth grade students. The research was conducted on 120 tenth grade students and the topic selected was areas of polygonal regions. Quasi experiment design was employed and yet purposely sampling was used to select the 120 students. The study did not have a control group but gave treatment to all the sampled students. The data was analyzed by analysis of variance, two- way classification. The results of the study revealed that the interest (attitude) level of students taught by discovery method showed significantly higher attitudes towards mathematics than the students taught by lecture method. However the researcher didn't say how he controlled the other extraneous variables like high achievement in the mathematics test scores of the students, private coaching and hence validity of the results is questionable.

Traditional instructional practices that center on teacher dominated pedagogy predominates our schools (Changeiywo, 2001). The author observes that learning activities in most secondary schools center on the textbook and past examination papers. Linder (2000) argues that student's perceptions of mathematics may be affected negatively by the way the subject is presented. The author observes that this applies to all other subjects. Research on teaching behavior indicates that there are teaching methods that influence student's attitude more positively than others.

The author further argues that teachers who made use of hands- on activities to illustrate concepts in science and mathematics, as indeed in other subjects as well, helped the students develop a liking in those subjects (Linder, 2000). In his study Wachanga (2004) argues that instead of imparting factual information, the teacher should create situations where learners will ask questions, experiment and discover facts and relationships. Information transmission pedagogy stifles intellectual development because it weakens vigor and efficiency of thought.

The author further observes that the lack of curiosity and innovativeness evident in many spheres of human endeavor all around us may be a reflection of the teaching methods that dulled curiosity rather than nurturing it. Greater attention should be paid to improving classroom aspects of teaching quality Wachanga (2004). Kochlar (1992) reinforces this by arguing that teaching methods should nurture an environment of students' creativity in learning. Students must learn how to use subject- matter concepts in the solution of relevant problems Kochlar (1992)). The author argues that only through this would the learners perceive the applicability of what they are taught in school to situations of experience and this has a direct influence on attitudes towards the content matter of the subject.

This study will attempt to investigate the predominant teaching methodologies, which the teachers in various schools use to teach mathematics. The study will attempt to establish the relationships between the teaching methodologies and how they affect attitude of the learners and the influence on performance in mathematics at secondary school level.

2.2.3 Family Previous Knowledge and Experiences

Attitudes are not innate but are formed as a result of an individual's contact with the object and its environment (Supe, 1992). Chepcheing (2005) asserts that early socialization which children are taken through tends to make them develop attitudes that lend support to the mistaken notion that mathematics and sciences are not for girls. This then makes the girls to have a negative attitude towards science but concentrate on other subjects. The learners' previous knowledge and experiences, expectations, interests and beliefs have an impact on the way learning takes place (Ndirangu, 2004). A student learning physics will understand the value of concepts learnt or taught when he can see their utility in practical life (Shumba, 2003).

The author observes that attitudes are important for effective learning; a negative attitude towards learning mathematics makes the learners to dislike the subject and will not appreciate the efforts of teachers in assisting them to achieve higher in the subject. While a positive attitude will make the learners to like the subject and put in more effort to compliment the work of the teachers (SMASSE project, 2000). This leads to consequent teacher expectations of children' abilities (Persell, 1977). Most of the research involving learners attitudes has utilized the pupil gain on achievement tests as the sole or primary description of changed pupil behavior, such achievement tests have been concerned mainly with recall and recognition behaviors and with application of principles to what Galloway (1985) called academic problems. This study will be interested in establishing whether family previous experience and influence has a bearing on attitude formation and how the previous experience influence performance in mathematics at secondary level.

2.2.4 Family Background

According to Galloway (1985), typically teachers are found to hold stereotype ideas about parents and children from different social groups. Research by Brimer (1969) examined the relationship between pupils and school characteristics in public schools at 'ordinary' (O- level). Questionnaire data from schools, teachers and pupils and examination results were collected in four local authorities. The findings indicate that family influence of early childhood rearing were most effective in the early stages of education in relation to the child's readiness to learn.

It was argued that by the time the 'O' levels were taken, most of the selective variables arising from family background and prior educational background will already have taken effect. This was supported by evidence from the Oxford Mobility study (Brimer, 1969). Mortimore and Blackstome (2002) used questionnaires in their study of twelve London Secondary Schools. They found significant association between parent's occupation and examination success. It was found that in the mixed ability group, the average score was 2.1 for children where fathers held professional jobs compared with 1.1 for children of unskilled manual workers.

A research by Galloway (1985) observed that schools exert a very substantial influence over the learners' behavior and attitudes, the fact that some schools have fewer problems while others are overwhelmed by problems has more to do with school factors than with factors within the catchment area. School factors exert an important influence on the learner's educational process. In addition, the author observes that; given the less powerful position of the lower class children in society, they appear to be more negatively influenced by teacher expectations.

It is not altogether surprising that teachers are commonly disappointed by the lack of parental concern and unhopeful that any further parental involvement could be beneficial (Mortimore & Blackstone, 2002). Parents meanwhile expect clear authorities from the teachers and look to them to provide the skills, behavior and attitude formations, which teachers may assume are to some extent parent's responsibility while parents may wonder about their own role and whether they are capable of helping (Persell, 1977). This study will be interested in establishing whether family background influence has a bearing on attitude formation and how the family background and previous experience influence performance in mathematics at secondary level.

2.2.5 Teaching- Learning Resources

In his research Webster (1966) asserts that educational philosophy should aim at improving normal school practices. This should be aimed at giving children a sense of reality in school, making schools into workshops, laboratories, libraries and inspiring educational experimentation, and have additional resources for teachers. However Eshiwani (1993) found that the availability of textbooks has positive relationship to attitude and achievement in both primary and secondary schools. Every student should have a mathematics textbook because of the nature of the subject, which requires continuous assessment.

Textbooks determine the sequence, scope and the pace of mathematics programme, and should therefore provide adequate exercise for pupils necessary for mastery of concepts and skills. In view of the importance of textbooks of teachers and students, their availability is likely to be reflected in the student's attitude towards the subject. Lack of textbooks contributes greatly to negative attitude towards the subject. Students are forced

to share textbooks especially in core subject like Mathematics and science. The only books available are reference books for teachers and students rely on notes (Daily Nations March, 13 2000pp, 19 column 4). It is imperative that the availability of textbooks and other teaching aids given the seriousness they deserve in schools since they assist to achieve Mathematics goals and objective through student's involvement.

This study will attempt to establish how the available teaching- learning resources in schools are utilized for the teaching and learning of mathematics. The study will be interested in finding out how the availability and usage of the resources contributes towards attitude formation in learning mathematics and how this impacts on learning and performance in mathematics.

2.2.6 Teacher's Attitudes towards the Subject Verses Students Attitude

Teacher's attitudes towards mathematics could presuppose an inclination to pass on what they have received as a duty or as a valuable asset of knowledge that could be beneficial to their learners. On the contrary the learners attitudes towards mathematics could be valued in relation to natural disposition, environmental exposure, scales of value or personal disposition, which needs investigation to establish the missing link in the achievement of mathematics. Researcher Aiken and Aiken (1969), reviewed 54 studies undertaken in the United States of America on attitudes towards science since 1960, and concluded that teachers of science in contrast with the teachers of mathematics.

Generally recognized that teaching for development of favourable attitudes in the learners was an important part of their work. Newton and Tarrant (1992) observed that the attitudes and behaviors of teachers within classrooms may have a strong influence on the

development of attitudes and values towards mathematics by students. In addition the authors pointed out that the teachers' attitude towards the curriculum influence the students' attitude towards the same curriculum. There is a positive relationship between teachers' attitude and their teaching methods (Newton & Tarrant, 1992). The authors point out that a positive attitude is commonly promoted as a necessity for effective implementation of curriculum innovations.

In a research done in Gongola State, in Nigeria, Banu (2008), examined attitudes towards sciences held by secondary school students in relation to their tutors where descriptive survey design was employed. Disproportionate stratified sampling was used to select sample schools .Purposive sampling was used to select the students and teacher samples. Observation schedules, students and teacher questionnaires were used to collect data. Data analysis was done by descriptive statistics.

The research findings revealed that male students in general held a more positive attitude towards science especially mathematics irrespective of the teacher as compared to the female students. There was an indication that 65% of the students generally preferred science subjects to other subjects. Quite a high percentage (70 %) of the students indicated that they would like to join mathematics – related careers as their tutors. He concluded that the quality of teachers and development of more relevant curriculum might improve students' attitude towards mathematics and science subjects.

Similarly, Shumba (2008) surveyed the attitudes of students of form two and form four towards science subjects in Zimbabwe. In his study, he assumed that attitude towards science subjects would serve as an indicator of students' willingness and potential to

acquire and utilize scientific knowledge. After data analysis, it was noted that there was a significant difference between attitudes of those two classes. Form two students reported a significantly positive and favorable predisposition towards science subjects. Form four students had an overall negative attitude towards the sciences and as a group they tended to have greater spread in their attitude score, suggesting that students in this group consisted of those with strongly favorable and strongly unfavorable attitudes towards sciences.

Despite having had a greater exposure to science to form four students showed relatively impoverished attitudes towards sciences. In this study, he cited the teachers' influence as a possible reason with the impoverished attitudes of students. It was noted that, in Form two students were highly motivated by teachers to take sciences unlike Form four where students were expected to have self-drive. It was also indicated that the secondary school science teachers in the Harare Region where the study was carried out reported lack of facilities and resource materials to support hands –on activities.

He pointed out that in the Harare region , the instructional methods used to deliver science content were not likely to support development of favourable attitudes towards science subjects especially mathematics subject by the students. He recommended that the pre- service teacher education should not rely on the convenient lecture method as this could not inculcate positive attitude towards sciences by the prospective teacher.

Sciences are   practical subjects, which should be taught by discovery or inquiry methods (Shumba, 2008). In addition the author also observed that teachers may lack enthusiasm

of making mathematics subject enjoyable to others due to lack of practical instrumentation and experimental techniques.

Attitudes affects almost all if not everything that we do in life, the way we talk, read , work and even the way we do mathematics among other things Cockroft (1982) and Kilpatrick (1992) agree that attitudes play an important role in the learning process. Teachers and all who are involved in the education of children have a heavy responsibility in helping to create a favourable attitude towards mathematics. In many instance attitudes are manifested by strongly expressed feeling for or against mathematics and are linked with some emotion such as love, hate or fear. It is commonly felt that a students, emotions, attitudes and beliefs are not only a result of past learning experience but that they will inevitably play a role also in the way he responds to new learning environments.

Therefore for teachers to achieve healthy and productive learning experiences they should seek ways to balance the strong cognitive demands they want to make on student with sufficient affective reward. Orton (1987) 'abilities, preference, attitudes and motivation all contribute to making some pupils more successful than others. Positive attitudes are considered a desirable accompaniment to learning. Thus teachers' attitudes towards mathematics and the students themselves can impact negatively on the students' mathematics achievement.

Investigations into affective factors like emotions, attitudes and beliefs and their relationship with teachers' learning and achievement are worth investigating. This might

answer the question why is it that mathematics, perhaps more than any other subject, arouses strong emotional reaction in students positive or negative?

2.2.7 Teacher Qualification and professional development

Most of the earlier studies on teacher effectiveness centered mainly on the personal qualities of the teacher and the performance of the student in terms of cognitive ability, for example (Bloom, 1956; Gage, 1963; Brimer, 1969, Burgess, 1973). Teachers are agent of curricula implementation on the ground. Hansen (1996) on the international study of achievement in mathematics concluded that there is a relationship between Mathematics and the length and type of the teacher's post- secondary education.

He said that the more training a teacher has received the better would be the achievement of his student. This clearly indicates that a teacher's post- secondary training will expose him to the skills needed to deliver the relevant knowledge and skills, later to his students at the secondary level. The knowledge, intelligence and professional skills that teachers' possess have a direct bearing on the quality of education and students performance thereof. In any school/institution in any country (Cox & Carpenter, 2009) Sobel Naad Maletsky (2008) presented this view, teachers must know their staff.

They must know the pupils whom they are stuffing. And above all they must know how to stuff them critically. Teachers with proper qualification of the content develop self-confidence and serve a source of inspiration and a good role model to the students. This makes the student to like the subject and do well in them (have better performance). It is therefore very necessary to have well qualified and trained teachers who have flexibility and receptiveness needed in a classroom situation.

Similarly, (Kang'ethe & Nafuko, 2000) argues that most teachers do not have opportunities for in – service education in order to improve their classroom skills. The quality of teachers is dependent on the selection of top quality candidates for teaching, their pre-service education and continuous professional development is lacking. This points to the need for the universities and teacher- education colleges to select only those students who choose teaching as their first career choice to join teacher education and include in-service programmes (Kang'ethe & Nafuko, 2000).

The study will be interested in finding out their levels of professional training and academic qualifications and how this influences attitude of the learners and how the teachers professional skills may impact on the learners attitude and how this factor affect the resulting performance in mathematics. Researcher Sobel Naad Maletsky (2008) presented this view; Teachers must know their staff. They must know the pupils whom they are stuffing. And above all they must know how to stuff them critically. Teachers with proper qualification of the content develop self- confidence and serve a source of inspiration and a good role model to the students. This makes the student to like (have positive attitude to) the subject.

A study by Kariuki and Kibera (1996) revealed that 57% of a second year bachelor of education cohort at a local university in Kenya, did not like being teachers, even after having completed their teaching practice. They ended up in this programme after failing to get their first career choices. For them, teaching was a stop gap measure while looking for better careers. Such teachers would naturally go to school to 'work' rather than teach and would not really exert themselves in order to teach well and inspire the students. This point to the need for the universities and teacher- education colleges to select only those

students who choose teaching as their first career choice to join teacher education programmes. (Kariuki and Kibera, 1996).

The knowledge, intelligence and professional skills that teachers posses, have a direct bearing on the quality of education provided by schools in any country (Cox & Carpenter, 2009). Bishop (1994) argues that the kind of people, who join the teaching profession and the way they are trained, is at the heart of all problems of educational quality, which any worthwhile educational reforms in Africa, must address. He argues that most teachers are poorly paid, suffer from low morale and do not have opportunities for in − service education in order to improve their classroom skills. The study will be interested in finding out their levels of professional training and academic qualifications and how this influences attitude of the learners and how the teachers professional skills may impact on the learners attitude and how this factor affect the resulting performance in mathematics.

2.3 Factors Influencing Achievement in Mathematics

2.3.1 Family Background, Previous Knowledge and Experiences

The learners' previous knowledge and experiences, expectations, interests and beliefs have an impact on the way learning takes place (Ndirangu, 2000). Chepchieng (1995) observes that there is a need to investigate deeply on the influence of family background on academic performance. Usually, the children enrolled in Kenyan schools often come from different socio- economic groups which may be high, moderate or low as reflected by the family income earned, level of parental education, and / or occupation. Placing people in these three categories of socio- economic level creates a social stratification

system, which is a social factor known to have an adverse effect on academic performance in Western countries and currently in Africa (Datta, 1984).

In addition the author observes that; apparently the lower class families are likely to have a limited provision of school books and other necessary learning materials for a supportive learning environment, the Ominde Report (1964) recommended boarding schools, because students at home may find inadequate facilities and no place for study other than the crowed family hut, no library and lack of a studious atmosphere. Since all these are characteristics of low socio – economic groups of the society, they create a socio- economic inequality that is likely to create variation in academic performance of students in any learning subject at school.

Research by Brimer (1969) examined the relationship between pupils and school characteristics and pupils achievement in public examinations at 'ordinary' (O- level) and 'advanced' (A-level). Questionnaire data from schools, teachers and pupils and examination results were collected in four local authorities. The findings indicate that family influence of early childhood rearing were most effective in the early stages of education in relation to the child's readiness to learn. It was argued that by the time the 'O' levels were taken, most of the selective variables arising from family background and prior educational background will already have taken effect. This was supported by evidence from the Oxford Mobility study (Brimer, 1969). Mortimore and Blackstome (2002) used questionnaires in their study of twelve London Secondary Schools. They found significant association between parent's occupation and examination success. It was found that in the mixed ability group, the average score was 2.1 for children where

fathers held professional jobs compared with 1.1 for children of unskilled manual workers.

Attitudes are not innate but are formed as a result of an individual's contact with the object and its environment (Supe, 2002). Chepcheing (2005) asserts that early socialization which children are taken through tends to make them develop attitudes that lend support to the mistaken notion that mathematics and sciences are not for girls. This then makes the girls to have a negative attitude towards science but concentrate on other subjects. The learners' previous knowledge and experiences, expectations, interests and beliefs have an impact on the way learning takes place (Ndirangu, 2000) A student learning physics will understand the value of concepts learnt or taught when he can see their utility in practical life (Shumba, 2003) .

The author observes that attitudes are important for effective learning; a negative attitude towards learning mathematics makes the learners to dislike the subject and will not appreciate the efforts of teachers in assisting them to achieve higher in the subject. While a positive attitude will make the learners to like the subject and put in more effort to compliment the work of the teachers (SMASSE project, 2000). Galloway (1985) typically, found that teachers held stereotyped ideas about parents and children from different social groups. This leads to consequent teacher expectations of children' abilities (Persell, 1977). Most of the research involving learners attitudes has utilized the pupil gain on achievement tests as the sole or primary description of changed pupil behavior, such achievement tests have been concerned mainly with recall and recognition behaviors and with application of principles to what Galloway (1985) called academic problems.

Actually this achievement tests explore only a small portion of the cognitive domain and disregard the affective and psychomotor domains (Bloom, 1956). Burgess (1973) found that higher achieving schools are those which maximize the interaction between ability of pupils in mathematics and expert teaching in related sciences like biology, chemistry and physics. In chemistry at Ordinary ('O' level), the social class of the father's job was positively correlated with good chemistry results although negatively corrected with help given at home (Brimer, 1969).

The author suggests , and it seems plausible, that school effects (factors) are likely to be stronger for subjects which rely on specialized instruments and specialized equipment, which would militate against help being at home in influencing attitude formation. This study will be interested in establishing whether family background and previous experience and influence has a bearing on attitude formation and how the family background and previous experience influence performance in mathematics at secondary level.

2.3.2 Teaching Methods Used to Teach Mathematics

A research done in Nairobi by Miheso (2003), examined factors affecting mathematics performance among secondary school students. 10 schools were selected through stratified sample and a total of 570 form 2 students were randomly selected   from the schools 20 mathematics teachers teaching the sample classes were purposively sampled. Questionnaire, checklist and a mathematics achievement test were used to collect data.

 An ex facto design was employed. The data was triangulated, coded while a multivariate analysis of variance was used to test the effects of the factors at each level of cognitive

development. The findings of the study revealed that variation in mathematics performance was found to be significantly influenced by the type of teaching methods. The findings also indicated that student's attitude was a major predictor of performance. The study further revealed that students of achievement reduced with respect to the increased level of cognitive skills. Critically looking at the one topic tested it will be difficult to randomize and draw concrete conclusions from the achievement test. The level of sample students used in the study may not give a clear picture of the factors affecting performance as they have not covered more than half of the mathematics syllabus.

In a similar study Yavoz (1991), investigated the effects of different teaching methods on immediate and retained mathematics achievement and attitude towards mathematics and the topic of mathematics achievement level of tenth grade students. The research was conducted on 120 tenth grade students and the topic selected was areas of polygonal regions.

Quasi experiment design was employed and yet purposely sampling was used to select the 120 students. The study did not have a control group but gave treatment to all the sampled students. The data was analyzed by analysis of variance, two- way classification. The results of the study revealed that mathematics achievement level of students taught by discovery method and lecture with computer supported drill and practice method scored significantly higher than the students taught by lecture method with respect to immediate mathematics achievement .The students in the higher achievement group showed significantly higher attitudes towards mathematics than the students taught by lecture with computer supported drill and practice method. However

the researcher didn't say how he controlled the other extraneous variables like high achievement in the mathematics test scores of the students and private coaching and hence validity of the results is questionable.

A study by Kirima (2003) investigated the assessment practice of teachers of mathematics in secondary schools in Mombasa district. The main purpose of the study was to determine the procedures used in assessing students mathematics and the coverage in mathematics teacher's test. Data was collected by the use of three instruments namely mathematics teacher's questionnaire, lesson observation schedule and document analysis sheet. Cross- sectional survey research design was employed. Schools well stratified and 29 teachers randomly sampled from them. The study found out that assessment results contributed to the performance of students in mathematics. Teachers also assessed students mainly for formative and summative reasons the study revealed.

Assessing the sample size of the study critically it was too small given that the study was a cross- sectional survey. Survey design has to have a sample size that will be representative of the larger population. The study recommended need for consideration of individual differences during lesson assessment. These assessment practices in mathematics could be associated with attitude formation of the students.

learning activities in most secondary schools center on the textbook and past examination papers. Linder (2000) argues that student's perceptions of mathematics may be affected negatively by the way the subject is presented. The author observes that this applies to all other subjects. Research on teaching behavior indicates that there are teaching methods that influence student's achievement more positively than others (Wenglinsky, 2000).

The author further argues that there was a correlation between high academic achievements of students and classroom practices of the teachers. Teachers who made use of hands- on activities to illustrate concepts in science and mathematics, as indeed in other subjects as well, helped the students perform better in those subjects (Wenglinsky, 2000). Kochlar (1992) reinforces this by arguing that teaching methods should nurture an environment of students' creativity in learning.

Freise (1970) reinforce this by contending that teachers should use problem – solving teaching methods that create a challenge to experiment, explore and look for links between concepts. As students look for answers, they are likely to develop functional understanding because they go through the reasoning involved in the development and application of the concepts they learn (Freire, 1970). Students must learn how to use subject- matter concepts in the solution of relevant problems

According to participants in the SMASSE conference October 8, 2002, shortage of trained mathematics teachers was identified as one of the major obstacles to good performance in mathematics. The few that are there are overloaded with other teaching duties (Daily Nation, October 8, 2002. pp 17). A vacant survey by SMASSE indicates that the most popular teaching methods in schools were teacher- centered and lecturing note taking. These methods are preferred because they are less time consuming. However, they deny learners a chance to have more active and direct participation in teaching and learning process.

Less participation leads to lack of confidence to the students hence attributing to negative attitude that leads to poor performance to the subject. This study will attempt to

investigate the predominant teaching methodologies, which the teachers in various schools use to teach mathematics. The study will attempt to establish the relationships between the teaching methodologies and how they affect attitude of the learners and the influence on performance in mathematics at secondary school level.

2.3.3 Teachers' Qualifications

The relationship between the teacher and the pupils in the Kenyan classroom is authoritarian and impersonal (Anderson, 2010). In addition the author observes that the underlying basis for interaction is that students have come to school to be taught, the teachers' role is therefore to tutor them rather than to provoke them to learn. Students are not treated as thinking beings that had their own views and experiences, which could be used to help them see the relevance of the new information they are learning (Mule, 1994). The author observes that teacher – pupil interactions are greatly affected by class sizes.

This is supported by the study of Eggleston, Galton and Jones (1975) who posits that learning in crowded classroom is less effective compared to one that is less crowded. The interactive – teaching – method was found to be superior to the traditional approach especially with respect to achieving higher order cognitive skills. Nyambura (2004) in a study investigated the determinants of classrooms discourse in mathematics learning among secondary students in Nakuru Kenya. Descriptive survey design was employed.

Disproportionate stratified sampling was used to select sample schools .Purposive sampling was used to select the students and teacher samples. Observation schedules, students and teacher questionnaires were used to collect data. Data analysis was done by

descriptive statistics. The research findings revealed that mathematics teachers used different discourse patterns in their classes. Those teachers in boy's classes used more students centered technique than did the teachers in mixed or girls classrooms. If inferential statistics would have been included in data analysis probably the research findings would also reveal how the teaching discourse patterns influenced the students attitudes towards mathematics.

The study recommended co- operative learning to be employed by teachers especially in girls and mixed classroom through discourse such as discussions. However some researchers began to carry out systematic observation of actual laboratory and classroom activities (Kyle, Penick & Shymansky, 1979). This approach involves the reduction of teacher- student behavior into interpretable categories. It is an attempt to obtain objective, detailed, qualitative and/ or quantitative descriptions of interactions that occur during the teaching- learning processes of science (Kyle, Penick & Shymansy, 1979).

Ginsburg and Opper (1999) argue that instead of imparting factual information, the teacher should create situations where learners will ask questions, experiment and discover facts and relationships. Wachanga (2004) observes that greater attention should be paid to improving classroom aspects of teaching quality.

This study will attempt to investigate the teacher- pupil interactions in relation to the class sizes. The study will be interested in finding out whether teacher- pupil interactions have a bearing on attitude of the learners towards mathematics and how this affects the resulting performance in mathematics. Teacher's attitudes towards mathematics could presuppose an inclination to pass on what they have received as a duty or as a valuable

asset of knowledge that could be beneficial to their learners. On the contrary the learners' attitudes towards mathematics could be valued in relation to natural disposition, environmental exposure, scales of value or personal disposition, which needs investigation to establish the missing link in the achievement of mathematics.

Bolaji (2000) conducted a study that examined the influence of student's attitudes towards mathematics in the junior secondary school. A random sample of 280 students was used. The research design employed was case study. Students' questionnaire was the only instrument used to collect data. The study used descriptive statistics analysis techniques to come up with the conclusions. The research findings revealed that students in the schools, preferred classroom activities regard to the effect of the curriculum. The teachers' personality and interrelationship with students was a crucial variable in attitude formation.

The study further revealed that the form grade of the students were associated with liking mathematics. The findings of this study may not be valid or reliable as the instrument used to collect data was not appropriate. The major research instrument for a case study design is interviews schedule therefore the results of the study may be termed not meaningful. The research recommended students to be helped develop positive attitudes towards mathematics by both teachers and parents. If a similar study can be carried out using survey design the results can be generalized to a wider population. It is commonly felt that a students, emotions, attitudes and beliefs are not only a result of past learning experience but that they will inevitably play a role also in the way he responds to new learning environments.

Therefore for teachers to achieve healthy and productive learning experiences they should seek ways to balance the strong cognitive demands they want to make on student with sufficient affective reward. Orton (1987)" abilities, preference, attitudes and motivation all contribute to making some pupils more successful than others. Positive attitudes are considered a desirable accompaniment to learning. Thus teachers' attitudes towards mathematics and the students themselves can impact negatively on the students' mathematics achievement.

This study will therefore Investigations affective factors like emotions, attitudes and beliefs and their relationship with teachers' learning and achievement. This might answer the question why is it that mathematics, perhaps more than any other subject, arouses strong emotional reaction in students positive or negative?

2.3.4 Teaching Resources

According to SMASSE Project (2005) mathematics as a subject requires an integration of both theoretical and practical work to make it easily understood by the students. This therefore calls for application of a myriad of teaching aids to enable learners to concretize mathematics principles, concepts and facts. The mathematics teacher thus, must apply the student- centered approach to teach. This requires various resources / learning materials and facilities to facilitate the teaching – learning process Dollan & Clarke, 1997).

In his study, Eshiwani (1993) found that factors which influence students' achievement in science subjects and mathematics are directly related to the students' attitude towards these subjects. He reveals that factors include availability of resources such as

laboratories, libraries, textbooks, laboratory equipment and chemicals. Webster (1966) asserts that educational philosophy should aim at improving normal school practices.

This should be aimed at giving children a sense of reality in school, making schools into workshops, laboratories, libraries and inspiring educational experimentation.

For additional resources for teachers, Eshiwani (1993) found that the availability of textbooks has positive relationship to attitude and achievement in both primary and secondary schools. Every student should have a mathematics textbook because of the nature of the subject, which requires continuous assessment. Textbooks determine the sequence, scope and the pace of mathematics programme; it should therefore provide adequate exercise for pupils necessary for mastery of concepts and skills. In view of the importance of textbooks of teachers and students, their availability is likely to be reflected in the student's performance in Mathematics (Mutunga, 2006).

According to SMASSE Project conference march 13, 2000 Students are forced to share textbooks especially in core subject like Mathematics and science. The only books available are reference books for teachers and students rely on notes (Daily Nations March, 13 2000 pp, 19 column 4). It is imperative that the availability of textbooks and other teaching aids given the seriousness they deserve in schools since they assist to achieve Mathematics goals and objective through student's involvement. Sciences are practical subjects, which should be taught by discovery or inquiry methods (Shumba, 2008). In addition the author also observed that teachers may lack enthusiasm of making mathematics subject enjoyable to others due to lack of practical instrumentation and experimental techniques.

This study will attempt to establish how the available teaching- learning resources in schools are utilized for the teaching and learning of mathematics. The study will be interested in finding out how the availability and usage of the resources contributes towards attitude formation in learning mathematics and how this impacts on learning and performance in mathematics.

2.4 Conceptual Framework

An academic achievement in mathematics is a function of several variables. This study investigated the way teacher's qualification, teaching method, gender and availability of teaching resource materials influenced the students' attitude in mathematics and hence its influence in mathematics performance. Figure 2.1 below show each of the school factors has a direct relationship to academic achievement in mathematics.
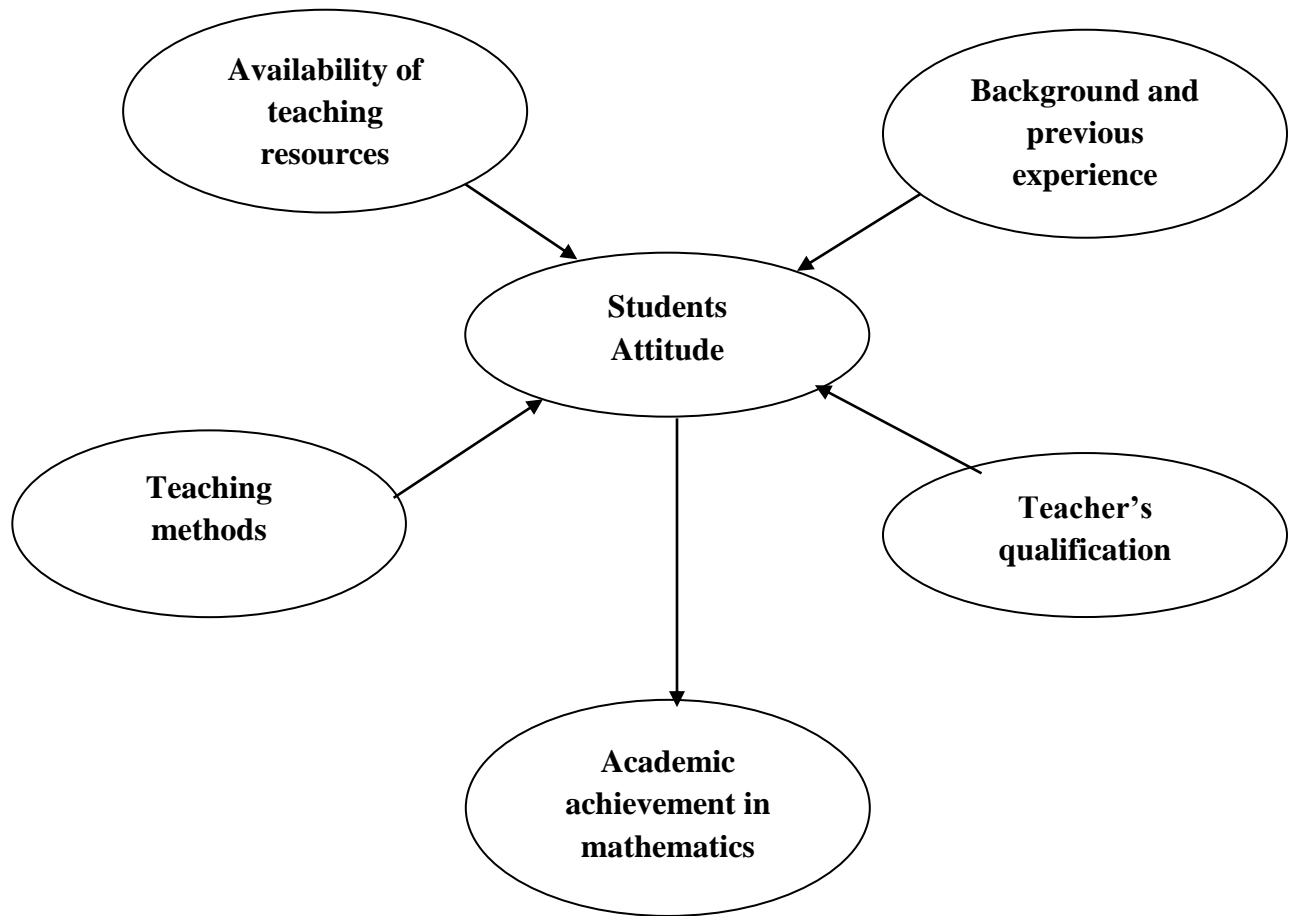
Figure 2.1: Conceptual Framework

The above framework shows the relationship between the independent and the dependent variables. The independent variables can be used to improve the students' scores by having qualified teachers, good teaching methods and availability of teaching resources. The dependent variables are those that the researcher measures in order to come up article change that can be done. The students' attitude will bring out a good reflection of the students' performance in both internal and external examinations.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introductions

This chapter aimed at discussing the research methodology used in sampling of schools, teachers and students. This included research design, target population, sampling techniques, research instruments, validity and reliability. Also data collection procedure and the statistical techniques used for analyzing the data were explained.

3.2 Research Design

Research design refers to the way a study is planned and conducted, the procedures and techniques employed to answer the research problem or question (Mcmillan and Schumacher, 1984). This study adopted correlational design by allowing collection of a large amount of data from a sizeable population in a highly economical way. The data collected was qualitative. The survey method is perceived as authoritative by people in general.

Survey research gathers data from large and small population by selecting and studying sample chosen from the population to gather information, summarize, present and interpret for the purpose of clarification. Hence the survey design enabled the researcher to discover the correlation between attitude of students and teachers and mathematics achievements by selecting samples from the target schools in the district. Survey design also sought to obtain information that describes existing phenomenon by asking individuals about their perception, attitude, behavior or values.

3.3 Target population

Saravanel (1982) define a population as an aggregate of all units possessing certain specified characteristics on which a sample wishes to draw inferences. That is, it is the totality or universe of units from which samples of various sizes may be drawn. Mcmillan and Schumacher (2010), states that target population is a group of elements or cases whether individuals or objects or events that conform to the specific criteria and to which the results of the research can be generalized. The target population of this study was secondary school students in the sub county (District) who were in form four in the year 2015.

The sub-county had a total of 42 secondary schools as reflected by DDE'S office records in the year 2015, 38 public and 4 private. The study targeted public and private mixed and single sex secondary schools from the 42 schools in the sub-county. The study targeted all the form four students (male & female) and their mathematics teacher. The researcher targeted only form Four students as they had been through in all the forms 1-4 work and were about to sit for the KCSE examinations. The mathematics teachers had also been targeted as they had an opportunity of teaching and encountering the targeted students.

3.4 Sampling procedures and sample size

A sample is a smaller group obtained from the target population. In the study, a sample was selected to represent the whole population with salient characteristics. Sampling refers to taking apportion of the population or universe as representative of the population

(Kerlinger, 2006). The sampling techniques were the methods employed in selecting a representation portion from each of the population relevant to the study.

3.4.1 Schools in the sub-county (District) :-by cluster sampling

Mukaa sub-county had a total of 4 educational divisions namely: Kasikeu, Kiou, Kiimakiu and Makaa. with total of 42 schools categorized as follows; 5 boys secondary schools , 7 girls secondary schools and 30 mixed schools .

Table 3.1 Number of schools in the division

Division	No of Schools			
	Boy	Girls	Mixed	Total
Mukaa	1	2	5	8
Kasikeu	2	2	10	14
Kiimaku	0	1	8	9
Kiou	2	2	7	11
Total	5	7	30	42

Source ; DEO's Office. Mukaa Sub-County.(District) 2015

3.4.2 Schools

 The sample schools were stratified into boys secondary, girls' secondary schools and mixed secondary schools. Table 3.2 shows the number of secondary schools by category according to the type of school set-up and the number of schools selected for study per category. A total of seven schools were sampled from the sub-county District

Table 3.2 Number of sampled schools in the district

Type of school set-up	No. of schools	No. of schools to be selected
Single gender boys	5	2
Single gender girls	7	3
Mixed (boys & girls)	30	5
Total	42	10

Source: Researcher 2015

3.4.3 Teachers

The researcher assumed that each school had at least three mathematics teachers. Single random sampling was used to select 2 mathematics teachers in each of the sampled schools. A total of 20 teachers were sampled from the sub-county (district).

3.4.4 Students

The researcher sample form four students from the sampled schools.

This level of students were chosen because it is perceived by many scholars that attitudes are associated more with complex difficult tasks in terms of achievement. The form four students had also virtually covered many areas in the mathematics syllabus. In streamed sample schools, the form four streams were selected through simple random sampling, the names of the class streams were folded and put in a container and one stream was picked randomly. Simple random sampling was preferred here as it gives equal chance for all the streams to be selected. The 20 students were then selected through systematic random sampling from the class list bearing their names.

For mixed secondary schools simple random sampling was used to select 10 boys and 10 girls from the list of the class. A total of 200 students were sampled from the 10 schools.

3.5 Data collection procedure

3.5.1 Research   Instrument

The study used questionnaires as the main tool / instrument for data collection in the survey as follows:-

1. Mathematics teachers questionnaires (MTQ)

2. Students questionnaires (SQ)

3. Head teachers questionnaires (HQ)

The questionnaires consisted of some closed ended items, 5 point likert – scale type of attitude items that was assessed the usefulness of mathematics, like and dislike of mathematics and 4 point likert scale type that assessed adequacy of mathematics content. Respondents were required to mark each of the categories: 5.Strongly Agree (SA), 4. Agree (A), 3. Neutral (N), 2. Disagree (D) and 1.Strongly Disagree (SD) and also of the category 4. Always (A), 3.Often (O), 2.Rarely (R) and 1. Never (N)

3.5.2 Validity of Research   Instruments

Validation of the data collection instrument is very important as it checks the appropriateness of the instruments. Content validation was done to establish the representative sample of the content domain. Content validity is the measure of the degree to which data collected using a particular instrument represents a specific domain

of indicators of a particular concept (Muganda & Mugenda 1999). Validity of an instrument is demonstrated when an instrument is seen to be 'asking the right question framed in the least ambiguous way' Validity answers the question "are my findings true/" (Kerlinger 1983). The pilot study aimed at establishing construct validity of the instruments (Muganda & Mugenda 1999).

3.6 Reliability of the Instrument

Instrument Reliability refers to the degree of consistency that an instrument demonstrates when applied repeatedly under similar situations (Kerlinger, 1983). Mugenda & Mugenda (1999) define reliability as a measure of the degree to which a research instrument yields consistent results or data after repeated trials. The more reliable an instrument is, the more confident we can have, meaning that the same results will be obtained in case the research was to be re-administered to the same respondents (Gay et al, 2006). Both external and internal reliability were used to check whether similar conditions would obtain consistent results. In this study external reliability was established using the split - half technique using the Pearson's product moment correlation coefficient using the formulae

$$p = \frac{1 - r}{2r}$$

3.7 Data Collection Procedures

The data was collected by administering questionnaire to students and the teachers. In administering the questionnaire the respondents were assured that the information they provide was to be treated with utmost confidentiality and was to be used for the research

purpose only.   The researcher gave the questionnaire to the respondents in person. Clarifications were made where necessary. Sufficient time was allowed for them to respond to the items accurately. Data for the study was collected for a period of one month. Before the data collection for this study began, a formal   letter was written to the principals of the schools as an introduction letter by the chairman of the Department of psychology University of Nairobi (UON).

This was requesting for a research permit. This permit request was availed formally to the heads (principals) of the schools that had been selected for research. This also enabled the heads of schools to give the researcher permission into their schools and to have access to the students and teachers. The researcher spends about two hours in a school.

3.8 Data Analysis

The data analysis includes sorting, editing, coding and processing the data (Borg & Gall, 1996). This was done use of Ms Excel and the Statistical Package for Social Sciences (SPSS) version 20 renamed Predictive Analysis Software (PASW, 2009). The data was analyzed by use of descriptive and inferential statistics. At the end of data collection, all the completed questionnaire examined by the researcher. They were coded 1-5 as per the likert scales and appropriately organized for analysis. The information was keyed into the computer for statistical analysis.

The coding was done by assigning number or simples to represent responses. Thus the alphanumeric or string coding was used. A codebook was developed showing the values or attributed associated with each question and what numerical or symbolic values   represented   each question and each of the   values assigned to it. The

questionnaire respondents both   teachers and students were assigned identification codes to protect their privacy and to make it easier to identify the respondents by numerical characters.

CHAPTER FOUR

RESEARCH FINDINGS

4.1 Introduction.

This chapter presents the findings of the study as analyzed using Excel and SPSS version 20.0. This begins with the demographic characteristics of the sampled groups followed by presentation of the study findings based on the objectives. Factors influencing attitude development of students towards mathematics and its effects in mathematics performance and the relationship between the two, all with a gender dimension. It deals with the analysis and interpretation of the data collected from the 10 sampled secondary schools that responded to the questionnaires.

The findings are to investigate the factors influencing attitude towards learning and teaching mathematics in secondary schools. Most of the analysis are done specifically on students attitude, teaching resource materials, qualification of teachers, students background knowledge, teaching methods, parents' educational level and peer influence. The results have been presented as per the identified factors and those that the researcher intended to discuss.

4.2 Demographic Information

4.2.1 Students' Demographic Information

The entire section involves biographical information. Table 4.1 shows that the respondents were male and female representing 50% in each sex.

Table 4.1: Gender of Students sampled.

Students' Gender		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	100	50.0	50.0	50.0
	Female	100	50.0	50.0	100.0
	Total	200	100.0	100.0	

Source. Research findings

The respondents in the research were 100 boys and 100girls (table 4.1) randomly selected from 2 boys schools, 3 girls schools and 5 mixed schools as indicated by table 4.2 below.

Table 4.2: Category of schools in the sample space

Category of School		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Boys	2	20.0	20.0	20.0
	Girls	3	30.0	30.0	50.0
	Mixed	5	50.0	50.0	100.0
	Total	10	100.0	100.0	

Source: Research findings

In terms of age the respondents, table 4.2 and figure 4.1 shows that majority of them are aged 18 years (43.0%) and minority aged over 19 years (6.0%). No respondent was below 17 years of age. Ages 17 – 19 years amounted to 94.0%
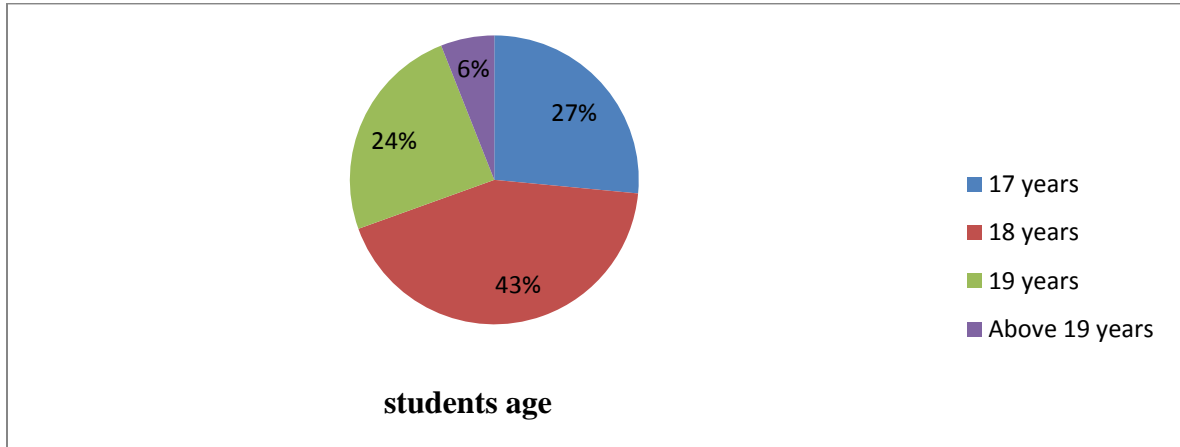
Figure 4.1 Age of the students

Table 4.3: Age of the students in the sample space

Student's Age		Frequency	Valid Percent	Cumulative Percent
	Below 17 years	0	0	0
	17 years	54	27.0	27.0
	18 years	86	43.0	70.0
	19 years	48	24.0	94.0
	Above 19 years	12	6.0	100.0
Total		200	100.0	

Source: Research findings

Table 4.4: Age of the Parents of the Sampled Students

Parents' Age		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	below 35years	2	1.0	1.0	1.0
	35-40 years	49	24.5	24.5	25.5
	41-45 years	65	32.5	32.5	58.0
	45 -50 years	54	27.0	27.0	85.0
	Above 50 years	30	15.0	15.0	100.0
	Total	200	100.0	100.0	

Source: Research findings

Table 4.5: Principals' Marital Status.

Principals' Marital Status				
	Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Married	9	90.0	90.0	90.0
Single	1	10.0	10.0	100.0
Total	10	100.0	100.0	

Source: Research findings

Table 4.5 shows that 90% of the principals who responded to the questionnaires were married. Single was 10%.

Table 4.6: Age of the Principals in the Sample Space

Principals Age				
	Frequency	Percent	Valid Percent	Cumulative Percent
Below 40 years	0	0	0	0
41 – 45 years	2	20.0	20.0	20.0
46 - 50 years	5	50.0	50.0	70.0
Over 50 years	3	30.0	30.0	100.0
Total	10	100.0	100.0	

Source: Research findings

Table 4.6 show that 50% of the respondents were aged between 46 – 50 years, over 50 years were 30%, 20% were aged between 41 – 45 and none was below 40 years.
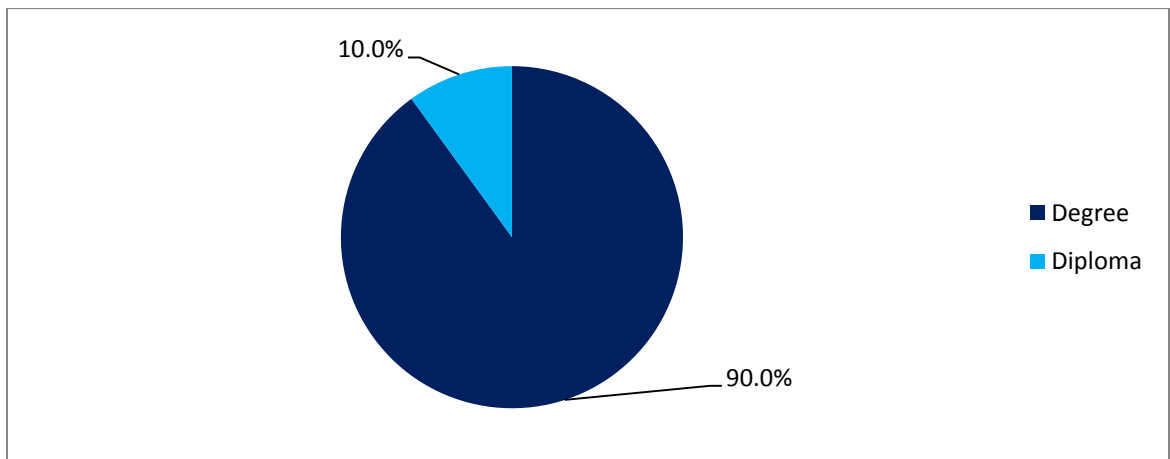
Figure 4.2: Principals' Qualification.
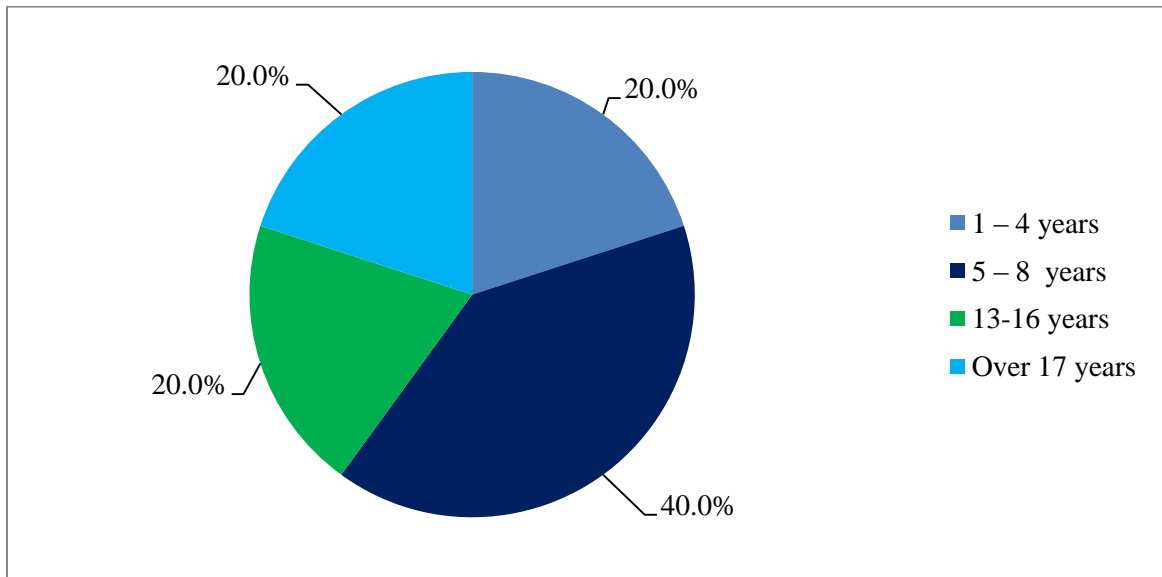
Figure 4.3: Years' of Experience of the Principals as a Principal

Table 4.7: Gender of the mathematics teachers in the sample

			Frequency	Percent
	Male	14	70.0	70.0
	Female	6	30.0	30.0
	Total	20	100.0	100.0

Source: Research findings

Table 4.7 shows that 70% of the mathematics teachers who responded were males while 30% were females.

Table 4.8: Marital Status of Mathematics Teachers Sampled.

Marital Status		Frequency	Percent	Valid Percent	Cumulative Percent
	Married	15	75.0	75.0	75.0
	Single	5	25.0	25.0	100.0
	Total	20	100.0	100.0	

Source. Research findings

In table 4.8, the result shows that 75% of the mathematics teachers who responded were married while 25% were single.

Table 4.9: Age of the Mathematics Teachers Sampled.

Teachers' Age		Frequency	Percent	Valid Percent	Cumulative Percent
	Below 25 years	3	15.0	15.0	15.0
	26-30 years	4	20.0	20.0	35.0
	31-35 years	4	20.0	20.0	55.0
	36-40 years	6	30.0	30.0	85.0
	Above 40 years	3	15.0	15.0	100.0
	Total	20	100.0	100.0	

Source: Research findings

Table 4.9 shows that 30% of the mathematics teachers who responded were aged between 36 – 40 years, 20% were aged between 26 – 30 & 31 – 35years, 15% below 20 years and 15% above 50 years.

4.3 Objective 1: Factors Influencing Attitude Development

4.3.1 Teaching Methods

Students were asked whether Mathematics lessons were interesting when discussing in class with a teacher.

Table 4.10, shows statistically that more than a half (62.0%) of the respondents strongly agree that class discussion with the teacher makes the lesson interesting. 18.5% also agree. Very few students disagree (2.5%) and strongly disagree (6.5%). Few of the respondents (10.5%) were neutral.

Table 4.10: Mathematics Lessons are Interesting when Discussing in Class with a Teacher

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	13	6.5	6.5	6.5
	Disagree	5	2.5	2.5	9.0
	Neutral	21	10.5	10.5	19.5
	Agree	37	18.5	18.5	38.0
	Strongly Agree	124	62.0	62.0	100.0
	Total	200	100.0	100.0	

The normal curve (figure 4.4) is skewed negatively with a mean = 4.27 and a S.D =± 1.159 indicating that majority of the students have their lessons interesting when discussing in class with a teacher.

Mathematics lessons are interesting when discussing in class with a teacher
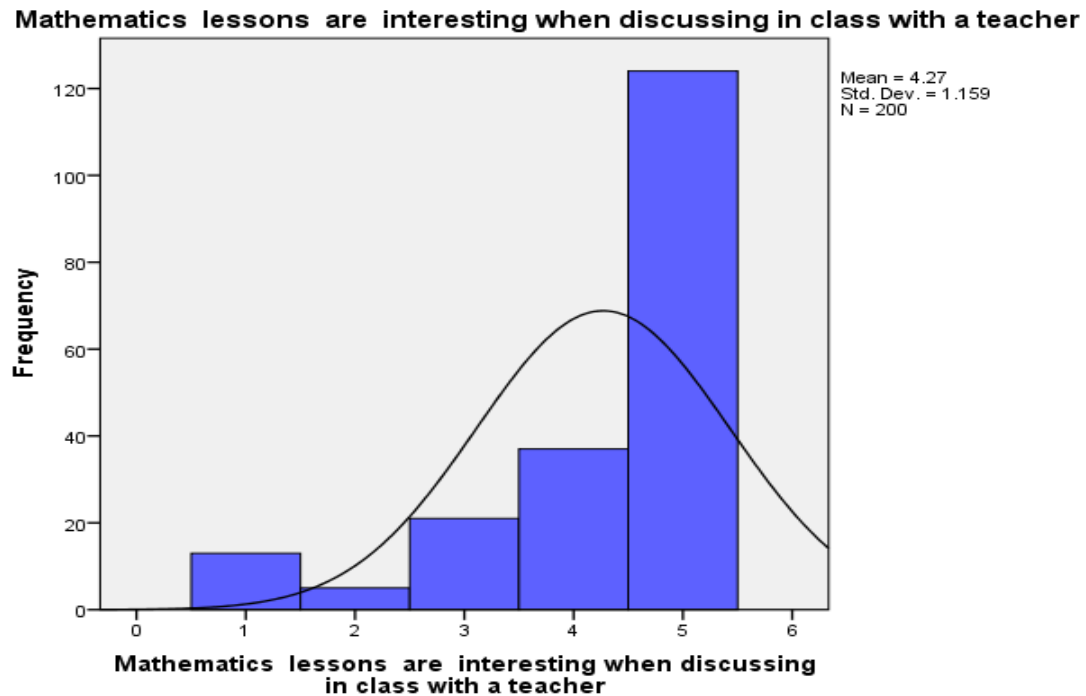
Figure 4.4: mathematics lessons are interesting when discussing in class with the teacher

Table 4.11, shows that 59.5% of the respondents agree (33.0%) and strongly agree (26.5%) that the method used by their teacher makes them like mathematics. 18.5% are neutral with the method of instruction while very few (11.0%) each disagree and strongly disagree liking mathematics because of the method used.

Table 4.11: I like mathematics of the way it is taught

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	22	11.0	11.0	11.0
	Disagree	22	11.0	11.0	22.0
	Neutral	37	18.5	18.5	40.5
	Agree	66	33.0	33.0	73.5
	Strongly Agree	53	26.5	26.5	100.0
	Total	200	100.0	100.0	

Figure 4.5, shows that the curve is slightly negatively skewed with a mean = 3.53 and a S.D =± 1.291 indicating that majority like mathematics because of the methodology while minority do not.
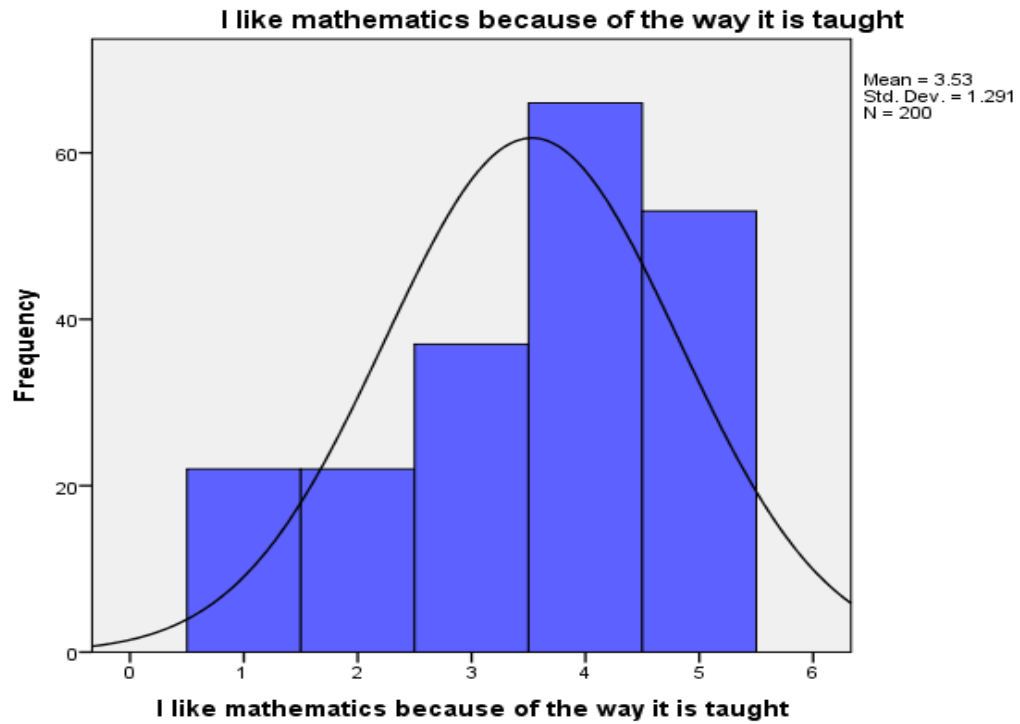
Figure 4.5: I like mathematics because of the way it is taught

Table 4.12, shows over 50% of the respondents always (53.0%) like doing mathematics on the chalkboard. 25.0% often like this method but some 15.0% rarely and 7.0% never at all like doing mathematics on the chalkboard.

Table 4.12: Solving mathematics problems on the blackboard makes me like mathematics

Frequency	Percent	Valid Percent	Cumulative Percent
Never	14	7.0	7.0	7.0
Rarely	30	15.0	15.0	22.0
Often	50	25.0	25.0	47.0
Always	106	53.0	53.0	100.0
Total	200	100.0	100.0	

The normal curve (figure 4.6) is negatively skewed with a mean =3.24 and a S.D =$\pm$ 0.952 indicating that majority like solving mathematics problems on the chalkboard.
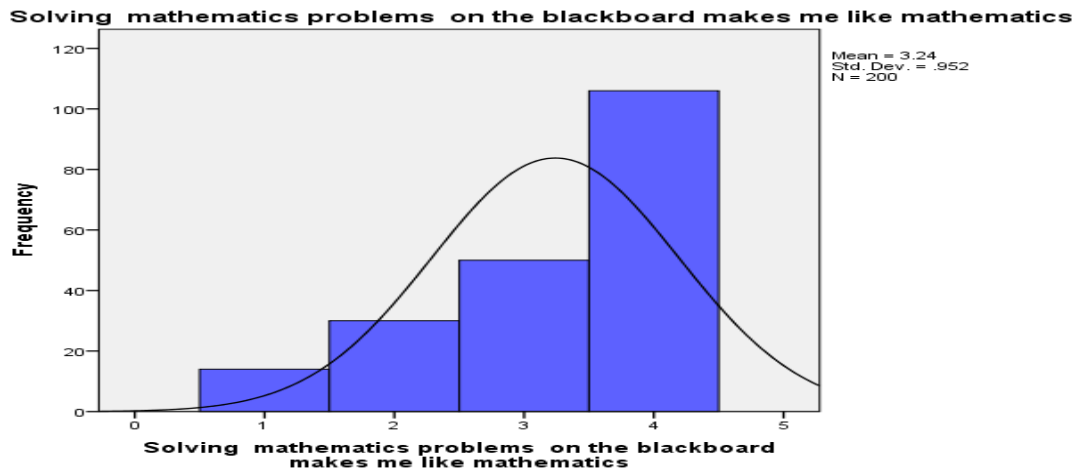
Figure 4.6: solving mathematics problems on the blackboard makes me like mathematics

4.3.2 Family Background and Previous Knowledge

Students were asked whether they started learning mathematics at home. Table 4.13, shows that statistically a larger number (36.0% and 31.0%) of students agree and strongly agree that they started learning mathematics at home. 17.5% (11.0% and 6.5%) of the respondents disagree and strongly disagree that they started learning mathematics at home.

Table 4.13: I Started Learning Mathematics at Home

	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly Disagree	13	6.5	6.5	6.5
Disagree	22	11.0	11.0	17.5
Neutral	31	15.5	15.5	33.0
Agree	72	36.0	36.0	69.0
Strongly Agree	62	31.0	31.0	100.0
Total	200	100.0	100.0	

Looking at the normal curve (figure 4.7) which is negatively skewed with a mean = 3.74 and a S.D = ± 1.196 it shows that majority lie between neutral and strongly agree they started learning mathematics at home.

I started learning mathematics at home

Frequency

Mean = 3.74
Std. Dev. = 1.196
N = 200

I started learning mathematics at home
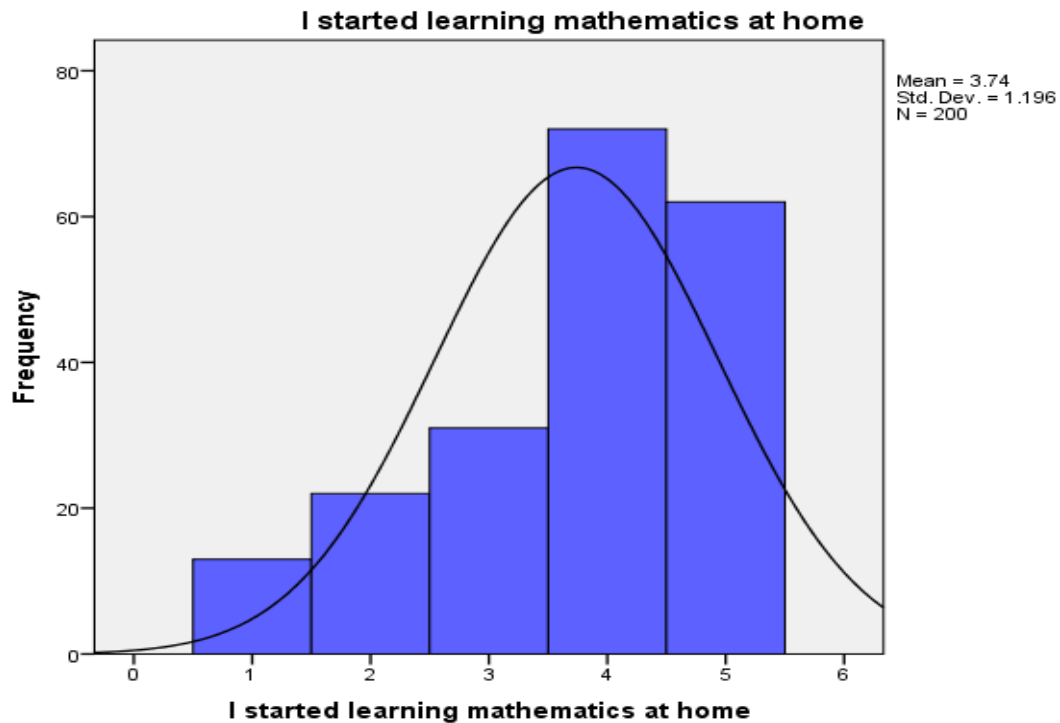
Figure 4.7: I started learning mathematics at home

As shown in table 4.14 an equal argument is given by students on the side of their parents' participation with 17.0% each strongly agreeing, strongly disagreeing and neutral. 26.0% disagree that their parents assist them to learn mathematics. The normal curve (figure 4.7) is not skewed with a mean = 2.97 and a SD =± 1.363 showing that equal numbers of the respondents are assisted and not assisted to do mathematics by their parents.

Table 4.14: My Parents at Home Assists me in Learning and Doing Mathematics

Assignments

	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly Disagree	34	17.0	17.0	17.0
Disagree	52	26.0	26.0	43.0
Neutral	34	17.0	17.0	60.0
Agree	46	23.0	23.0	83.0
Strongly Agree	34	17.0	17.0	100.0
Total	200	100.0	100.0	

Table 4.15: Family Background Status

Family background status				
		Frequency	Valid Percent	Cumulative Percent
Valid	Well-off	125	62.5%	62.5%
	poor	75	37.5%	100.0%
Total		200	100.0	

4.3.3 Teaching and Learning Resources

Statistically teaching resources and attitude have some significance as shown by table 4.16. Over 60% of the respondents show that they enjoy learning mathematics depending of the materials the teacher uses. 17.0% were neutral, 10.0% strongly disagree and 9.5% disagreed that learning materials makes them enjoy learning mathematics.

Table 4.16: Use of mathematics models by teachers makes me enjoy learning mathematics

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	20	10.0	10.0	10.0
	Disagree	19	9.5	9.5	19.5
	Neutral	34	17.0	17.0	36.5
	Agree	35	17.5	17.5	54.0
	Strongly Agree	92	46.0	46.0	100.0
	Total	200	100.0	100.0	

The normal curve (figure 4.8) is slightly skewed negatively with a mean =2.20 and a S.D
± 1.371 indicating that majority enjoy learning mathematics due to the materials used by
the teacher.
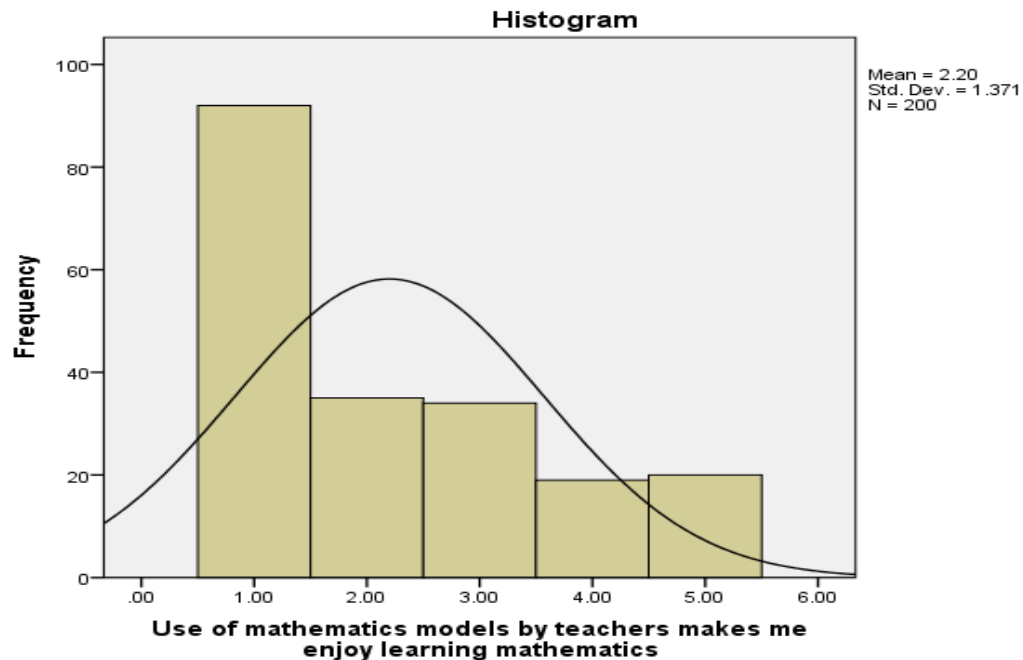
Figure 4.8: Use of mathematics models by teachers makes me enjoy learning

mathematics

Table 4.17, shows that statistically there is minimal significance between interest in
teaching and availability of learning resources. 20.0% agree that they have no interest and
5.0% strongly agree that they have no interest in teaching when they lack teaching
resources. Majority 60.0% disagree and 10.0% strongly disagree that they are affected.

Table 4.17: I have no interest in teaching mathematics when there is no model

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	10.0	10.0	10.0
	Disagree	12	60.0	60.0	70.0
	Neutral	1	5.0	5.0	75.0
	Agree	4	20.0	20.0	95.0
	Strongly Agree	1	5.0	5.0	100.0
	Total	20	100.0	100.0	

Figure 4.9, and the normal curve slightly skewed positively with a mean =3.50 and S.D = $\pm$1.10.indicating that the interest is medium.
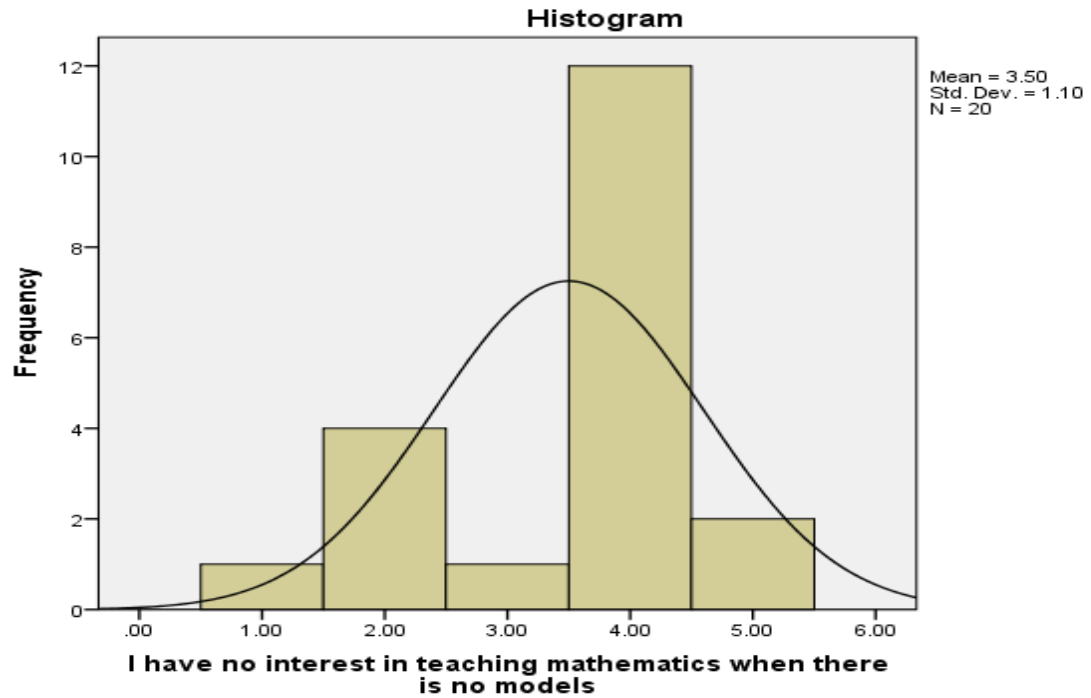
Figure 4.9: I have no interest in teaching mathematics when there is no models

Teachers were asked whether lack of text books discourages them in teaching mathematics. Table 4.18 shows that majority of the teachers (45.0%) are often discouraged by lack of text books. 20.0% of the respondents are always affected and 35.0% are rarely affected by lack of text books.

Table 4.18: Lack of text books discourage me in teaching mathematics

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Rarely	7	35.0	35.0	35.0
	Often	9	45.0	45.0	80.0
	Always	4	20.0	20.0	100.0
	Total	20	100.0	100.0	

Figure 4.10 clearly explains the feeling due to lack of text books. Majority are often affected with a mean = 2.85 and a S.D = $\pm$ 0.745.indicating that most of the learners are rarely or often affected by lack of text books. The curve is normal
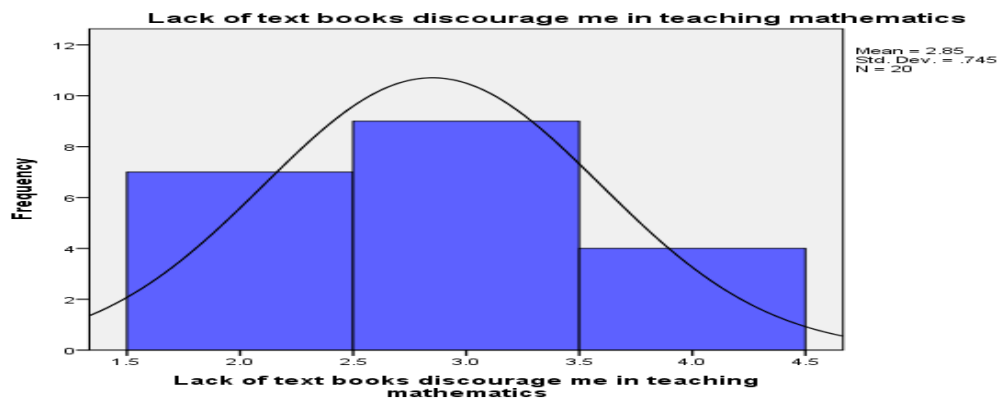
Figure 4.10: Lack of text books discourage me in teaching mathematics

4.3.4 Teachers' Qualifications

Table 4.19, statistically shows teachers motivate students to like mathematics. 80.0% of the respondent indicates that teachers always influence them positively to like mathematics. Few (8.5%) often, (5.0%) rarely and (6.5%) are never influenced by their teachers positively to like mathematics. Table 4.19 statistically shows teachers motivate students to like mathematics. 80.0% of the respondent indicates that teachers always influence them positively to like mathematics. Very few (8.5%) often, (5.0%) rarely and (6.5%) are never influenced by their teachers positively to like mathematics.

Table 4.19: My teachers influence me positively to like mathematics.

		Frequency	Percent	Valid Percent	Cumulative Percent
	Never	13	6.5	6.5	6.5
	Rarely	8	4.0	4.0	10.5
Valid	Often	17	8.5	8.5	19.5
	Always	160	80.0	80.0	99.0
Total		198	99.0	99.0	

The normal curve (figure 4.11) is negatively skewed with a mean = 3.64 and a S.D = $\pm$ 0.842, indicating that most of the teachers over 80% influence their students positively towards liking mathematics.

Histogram

Mean = 3.64
Std. Dev. = .842
N = 198
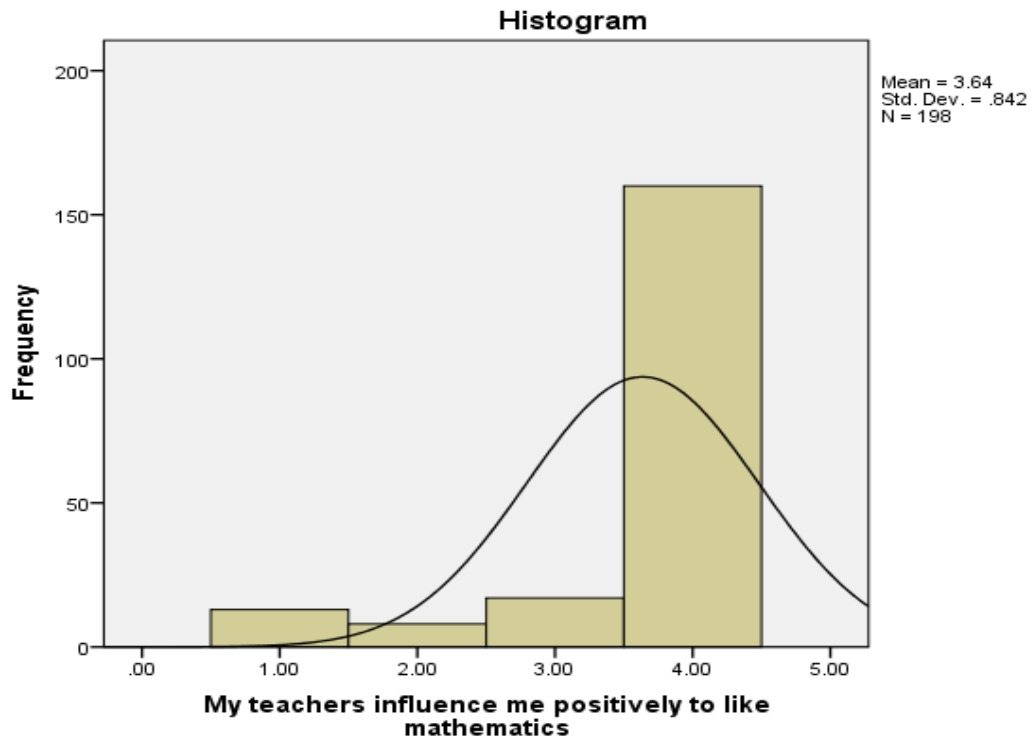
Figure 4.11: My teachers influence me positively to like mathematics

Table 4.20: I like mathematics because of it is taught by qualified teachers

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	6	3.0	3.0	3.0
	Disagree	7	3.5	3.5	6.5
	Neutral	42	21.0	21.0	27.5
	Agree	60	30.0	30.0	57.5
	Strongly Agree	85	42.5	42.5	100.0
	Total	200	100.0	100.0	

The normal curve (figure 4.12) is negatively skewed with a mean = 1.94 and S.D = $\pm$ 1.023 indicating that majority lie between neutral and strongly liking mathematics.

Histogram

Mean = 1.94
Std. Dev. = 1.023
N = 200
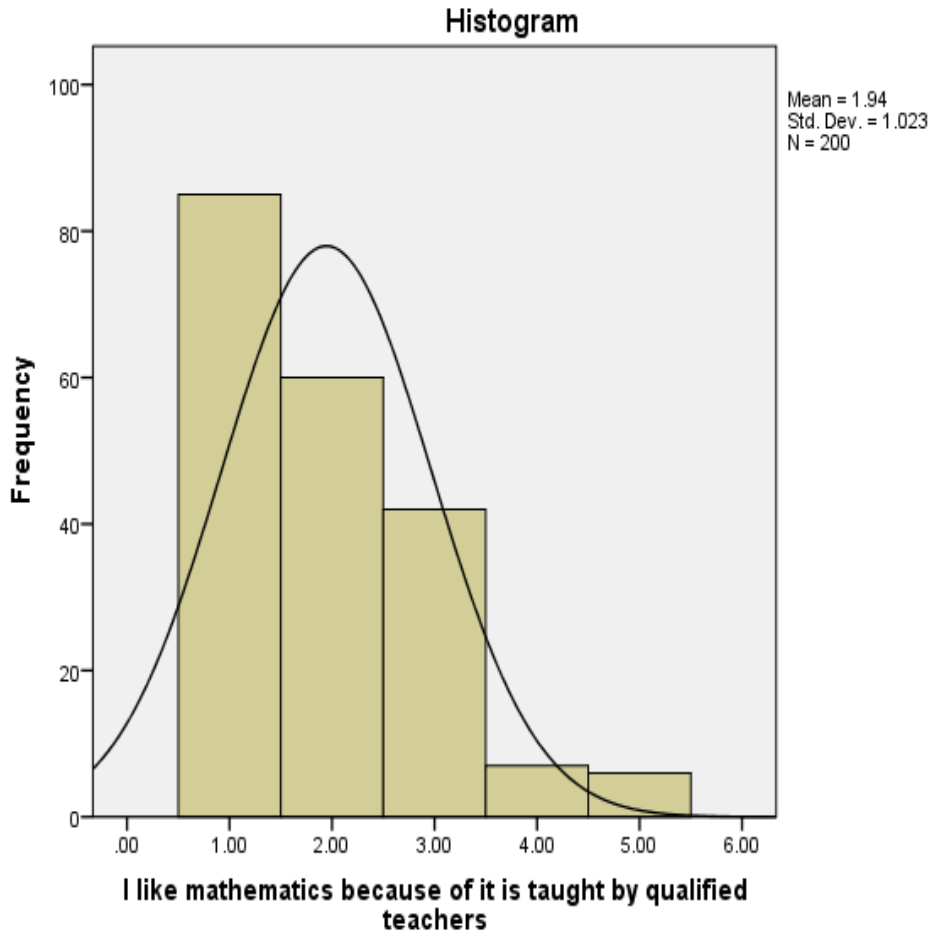
Figure 4.12: I like mathematics because of it is taught by qualified teachers

Table 4.21: Teaching experience of mathematics teachers in the sample space

Teaching Experience		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 – 4 years	6	30.0	30.0	30.0
	5 – 8 years	3	15.0	15.0	45.0
	9 – 12 years	4	20.0	20.0	65.0
	13-16 years	5	25.0	25.0	90.0
	Over 17 years	2	10.0	10.0	100.0
	Total	20	100.0	100.0	

Source: Research findings

Respondents show that highest experienced teachers serving over 17 years were 10%. 25% had served for 13 – 16 years and 30% of the respondents were within 1- 4 years.
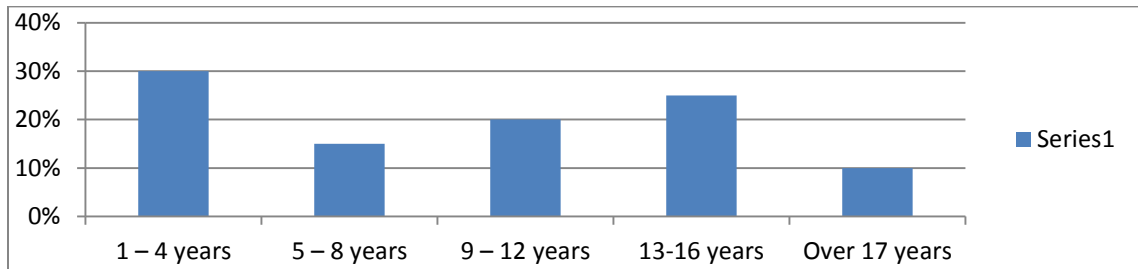
Figure 4.13: Teaching experience of mathematics teachers in the sample space

Table 4.22: Mathematics Teachers' qualifications

Summary of qualifications for Math teachers					
	1 Teacher	2 Teachers	3 and above	Valid Per cent	N
Math teachers with Master Degree	20%	0%	0%	20%	10
Trained graduate Math teachers	30%	40%	10%	80%	10
Diploma holders math teachers	30%	0%	0%	30%	10
Untrained math teachers	50%	10%	0%	60%	10
S 1 math teachers	0%	0%	0%	0%	10
ATS math teachers	0%	0%	0%	0%	10

Source: Research findings

Data in the table 4.22 clearly shows that, most schools have one untrained mathematics teacher preferably a university student taking undergraduate course or a form 4 graduate waiting to join university. Few mathematics teachers have done masters. Majority about 80% of the mathematics teachers are graduate and Diploma holders.

4.4.5 Regressions of the Factors Influencing Attitude Development

To test the extent to which teaching methods, family background and previous knowledge, teaching and learning resources and teachers' qualification influence attitude development towards mathematics, the researcher used a multiple regression. The results were presented as given in the tables below. The items were; teaching methods (TM), family background and previous knowledge (FBPK), teaching and learning resources (TLR) and teachers' qualification (TQ).

Table 4.23: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.758[a]	.575	.562	.39768

a. Predictors: (Constant), TM, FBPK, TLR and TQ.

From the model table 4.23, the results shows that teaching methods (TM), family background and previous knowledge (FBPK), teaching and learning resources (TLR) and teachers' qualification account for 57.5% of attitude development among students towards mathematics.

Table 4.24: Anova

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.551	8	.19025	0.114	.002[b]
	Residual	.234	7	.0004		
	Total	1.050	24			

a. Dependent Variable: (Attitude Development) AD

. Predictors: (Constant), TM, FBPK, TLR and TQ.

The analysis of variance table 4.24 shows that the relationship between teaching methods (TM), family background and previous knowledge (FBPK), teaching and learning resources (TLR), teachers' qualification (TQ) and attitude development towards mathematics by the students is significant at a p value of 0.002, df=8 and F value of 0.114.

Table 4.25: Regression Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	.251	.154		13.886	.0001
	TM	.310	.028	.244	1.542	.001
	FBPK	.153	.003	.081	2.863	.004
	TLR	.219	.029	.293	1.614	.030
	TQ	.293	1.684	0.103	.110	.0031

This table 4.25 shows that holding the above factors constant, the students' attitude towards mathematics is positive at 0.251. However teaching methods affects attitude development by 0.310, family background and previous knowledge affects attitude development by 0.153, teaching and learning resources affects students' attitude development by 0.219 while teachers' qualification affects students' attitude development by 0.293. Therefore teachers and curriculum developers should invest more on the methods employed in teaching mathematics because it has the greatest effect, more teaching and learning resources should be provided to the teachers and students and the ministry should ensure that the teachers of mathematics are qualified enough to help students develop a positive attitude towards mathematics.

4.4 Objective 2: Factors Influencing Students' Achievement in Mathematics

4.4.1 Teaching Methods

Table 4.26 statistically shows that there is a significance between working hard and performance in the subject with over 70% of the respondents (27.0% and 44.5%) agree and strongly agree respectively that liking mathematics makes them work hard. 16.5% are neutral and very few disagree (6.5%) and strongly disagree (5.5%).

Table 4.26: I work Hard in Mathematics Discussion because I like the subject

	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly Disagree	11	5.5	5.5	5.5
Disagree	13	6.5	6.5	12.0
Neutral	33	16.5	16.5	28.5
Agree	54	27.0	27.0	55.5
Strongly Agree	89	44.5	44.5	100.0
Total	200	100.0	100.0	

Figure 4.14, shows a high significance between performance the subject and working hard. The curve is negatively skewed with a mean = 3.99 and a S.D $\pm$ 1.171 Indicating that majority work hard because they like the subject.
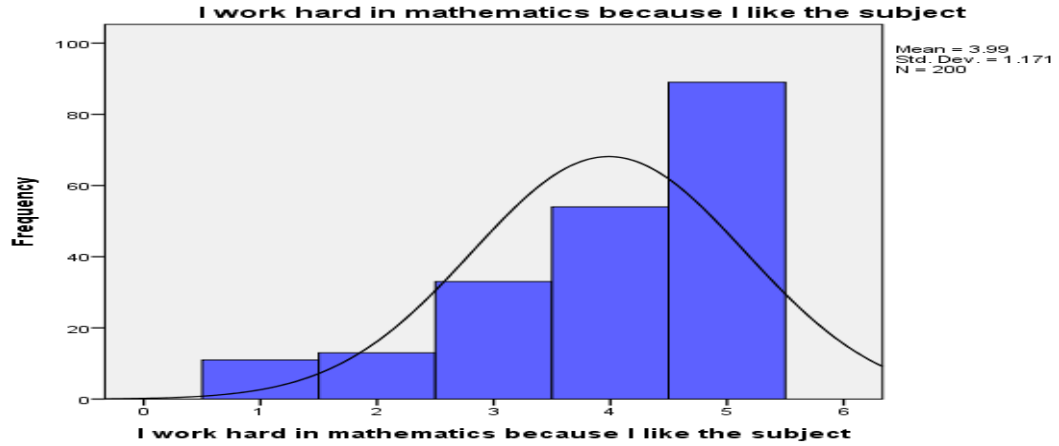
Figure 4.14: I work hard in mathematics because I like the subject

Table 4.27 shows students class participation is very low. Statistically a high number of the students rarely or often (40.0% each) ask questions in a mathematics class.

Table 4.27: My Students Ask Questions in Class and Respond Appropriately

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Rarely	8	40.0	40.0	40.0
	Often	8	40.0	40.0	80.0
	Always	4	20.0	20.0	100.0
	Total	20	100.0	100.0	

A normal curve (figure 4.15) shows that rarely or do often students ask questions in a mathematics class with a mean = 2.8 and a S.D = ± 0.768.

86
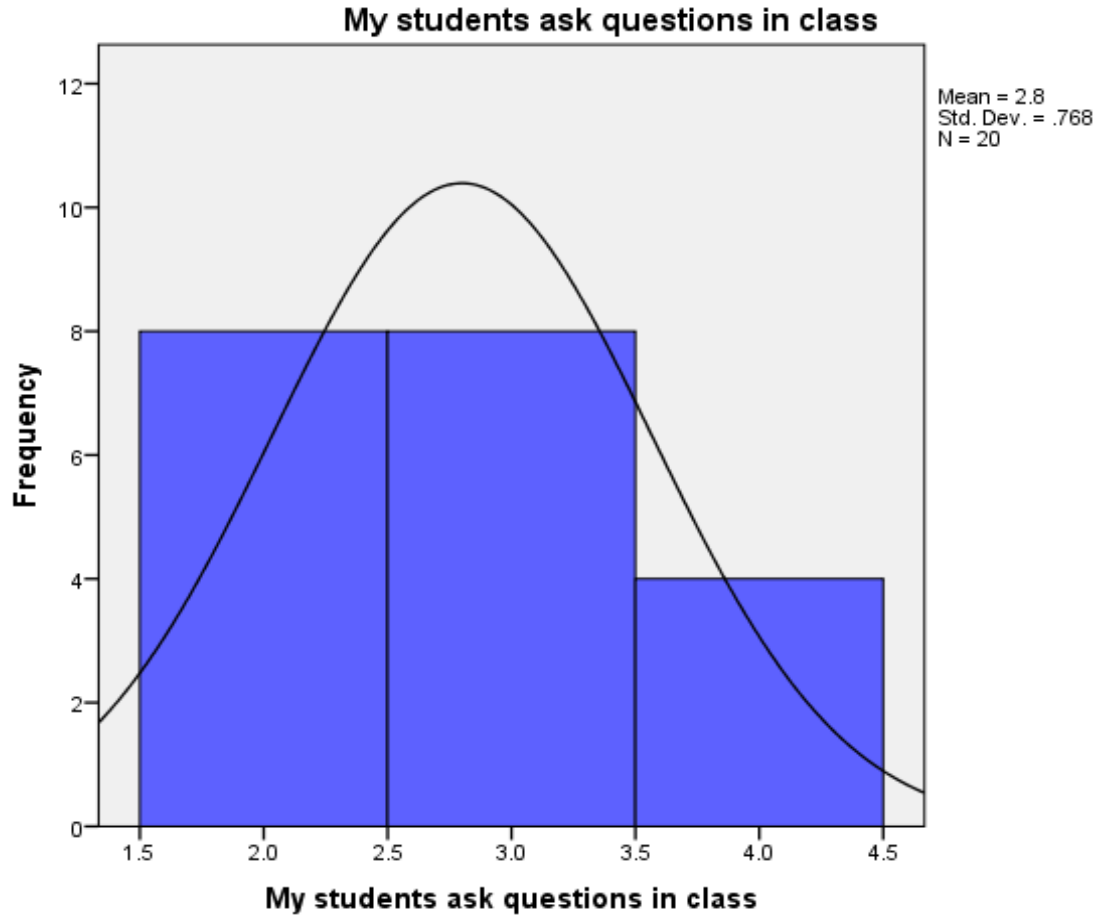
Figure 4.15: My students ask questions in class and respond appropriately

Table 4.28 shows that majority of the respondents like mathematics due to teacher's qualification with 30.0% and 42.5% agreeing and strongly agreeing respectively. Very few students dislike mathematics where 6.0% strongly disagree and 7.0% disagree liking mathematics. 21.0% were neutral and not tell whether they like or do not like mathematics depending of the instructors' qualifications.

Table 4.28, shows majority of the mathematics teachers (75.0%) are often affected by the low achievement of their students. Few teachers (10.0%) are rarely affected and about (15.0%) are always affected by the low achievement by their students.

Table 4.28: Low achievement in mathematics by students affects my feeling and teaching method

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Rarely	2	10.0	10.0	10.0
	Often	15	75.0	75.0	85.0
	Always	3	15.0	15.0	100.0
	Total	20	100.0	100.0	

Figure 4.16, shows that majority of the teachers are affected by the low achievement of their students with a mean of 3.05 and a standard deviation of $\pm$ 0.51. The normal curve is negatively skewed meaning that majority are often affected by the low achievement of their students.
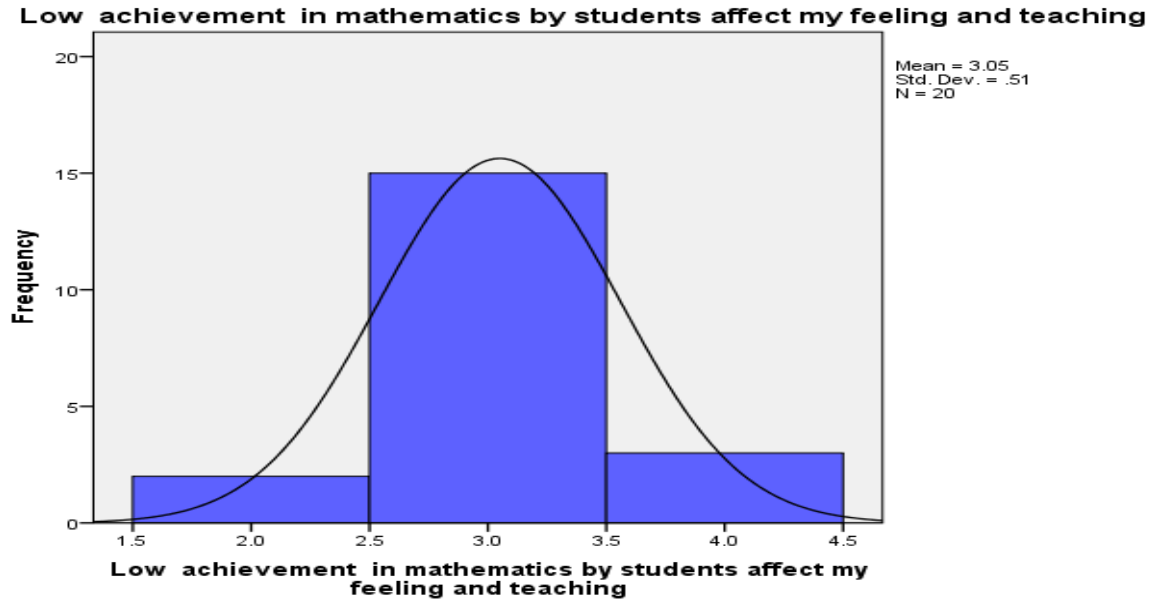
Figure 4.16: Low achievement in mathematics by students affects my feeling and teaching method.

4.4.2 Family Background and Experience

Students were asked whether parents at home assist them in doing mathematics. In table 4.29 an equal argument is given by students on the side of their parents' participation with 17.0% each strongly agreeing, strongly disagreeing and neutral. 26.0% disagree that their parents assist them to learn mathematics which makes them do well.

Table 4.29: Parents Assists in Doing Assignment at Home

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	34	17.0	17.0	17.0
	Disagree	52	26.0	26.0	43.0
	Neutral	34	17.0	17.0	60.0
	Agree	46	23.0	23.0	83.0
	Strongly Agree	34	17.0	17.0	100.0
	Total	200	100.0	100.0	

The normal curve (figure 4.17) is not skewed with a mean = 2.97 and a S.D =$\pm$ 1.363 showing that equal numbers of the respondents are assisted and not assisted to do mathematics assignment by their parents
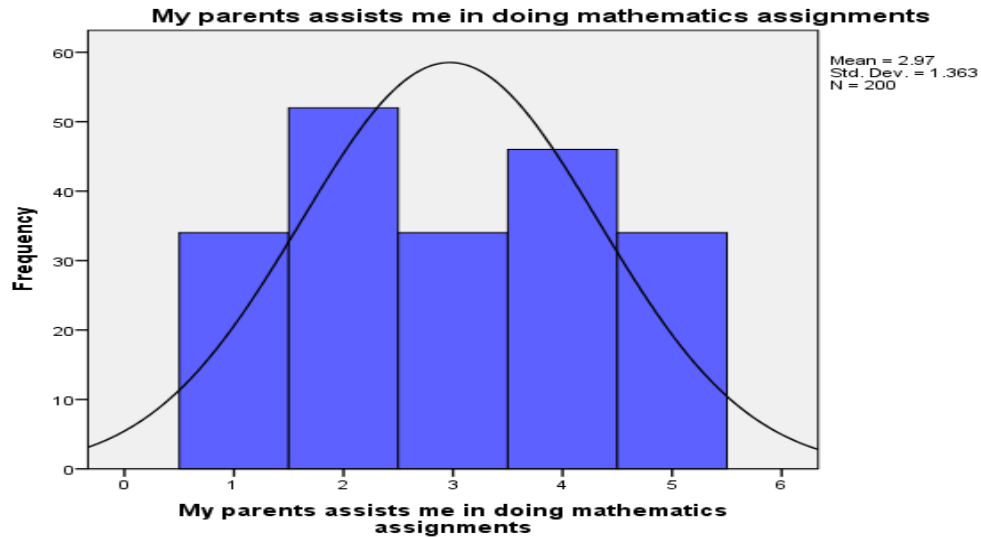
Figure 4.17: My parents assist me in doing mathematics assignments

As shown in table 4.29 an equal argument is given by students on the side of their parents' participation with 17.0% each strongly agreeing, strongly disagreeing and neutral. 26.0% disagree that their parents assist them to learn mathematics. The normal curve (figure 4.18) is not skewed with a mean = 2.97 and a S.D $=\pm$ 1.363 showing that equal numbers of the respondents are assisted and not assisted to do mathematics by their parents.

4.4.3 Teaching and Learning Resources

Table 4.30, 70.0% of the respondents strongly disagree that mathematics performance can never be good with lack of teaching materials. Majority of the respondents, over 85% disagree. About 15% feel that performance can improve with less teaching materials.

Table 4.30: Mathematics Performance can still be good even with less teaching materials

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Strongly Disagree	14	70.0	70.0	70.0
Disagree	3	15.0	15.0	85.0
Neutral	3	15.0	15.0	100.0
Total	20	100.0	100.0	

The graph (figure 4.18) shows that the normal curve is positive skewed with a mean=4.55 and S.D = $\pm$ 0.759 indicating that majority disagreed that mathematics is a subject for girls only.
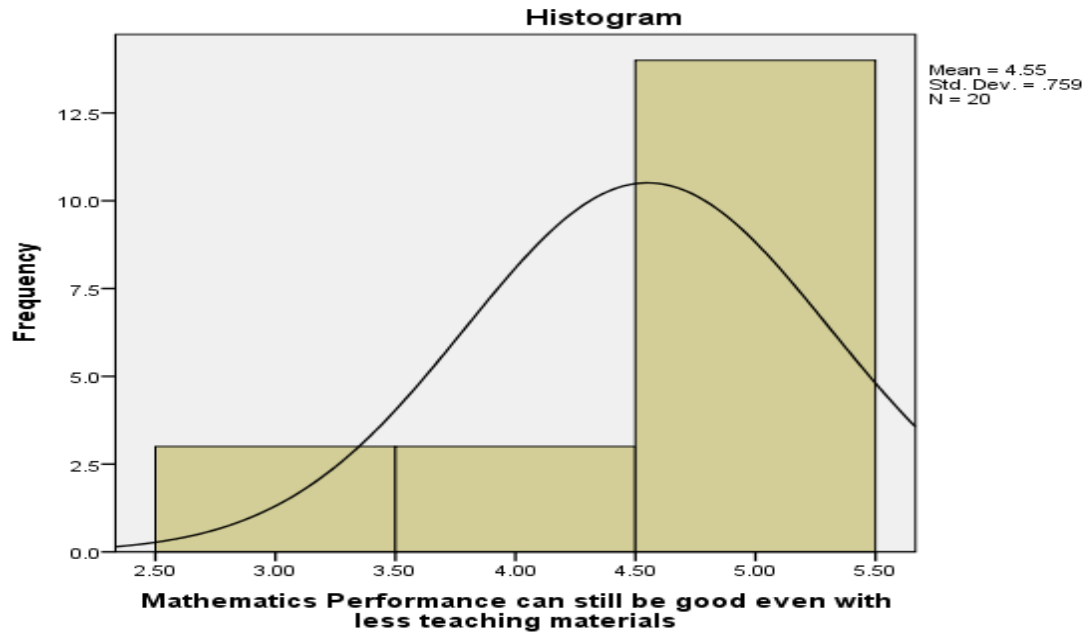
Figure 4.18: Mathematics Performance can still be good even with less teaching materials

Table 4.31, shows that 40.0% agree and 5.0% strongly agree with use of mathematics models, performance of their students has improved. 30.0% of the respondents were neutral, 20.0% disagreed and 5.0% strongly disagreed that use of models has an effect.

Table 4.31: use of mathematics models has improved my class performance

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	5.0	5.0	5.0
	Disagree	4	20.0	20.0	25.0
	Neutral	6	30.0	30.0	55.0
	Agree	8	40.0	40.0	95.0
	Strongly Agree	1	5.0	5.0	100.0
	Total	20	100.0	100.0	

The mean response was 2.80 with a standard deviation of $\pm$ 1.005. Showing that there was diverse feeling with majority agreeing female students enjoy learning mathematics. The normal curve is slightly negatively skewed meaning that majority agreed female students enjoy learning mathematics.
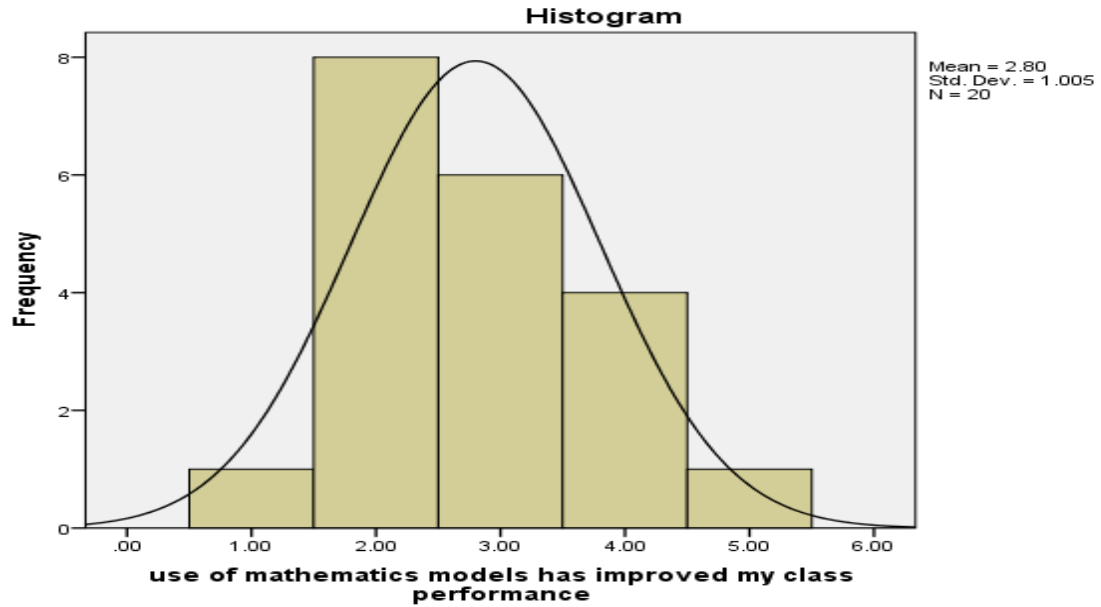
Figure 4.19: use of mathematics models has improved my class performance

Table 4.31, shows majority of the mathematics teachers (75.0%) are often affected by the low achievement of their students. Few teachers (10.0%) are rarely affected and about (15.0%) are always affected by the low achievement by their students.

4.4.4 Teachers' Qualifications

As shown by table 4.32, almost all teachers do agree that with experience their students' performance improves. 35% agreed and 65% strongly agree that experience has improved their subject performance of their students.

Table 4.32: experience has improved my students' performance

		Frequency	Percent	Mean	Std. Dev
Valid	Agree	7	35.0		
	Strongly Agree	13	65.0	4.65	0.489
	N	20	100.0		

The normal curve (figure 4.20) is slightly negatively skewed with a mean of 1.65 and standard deviation $\pm$ 0.489. It generally shows that over 80% of the mathematics teachers agreed that experience has positively affected students' performance.
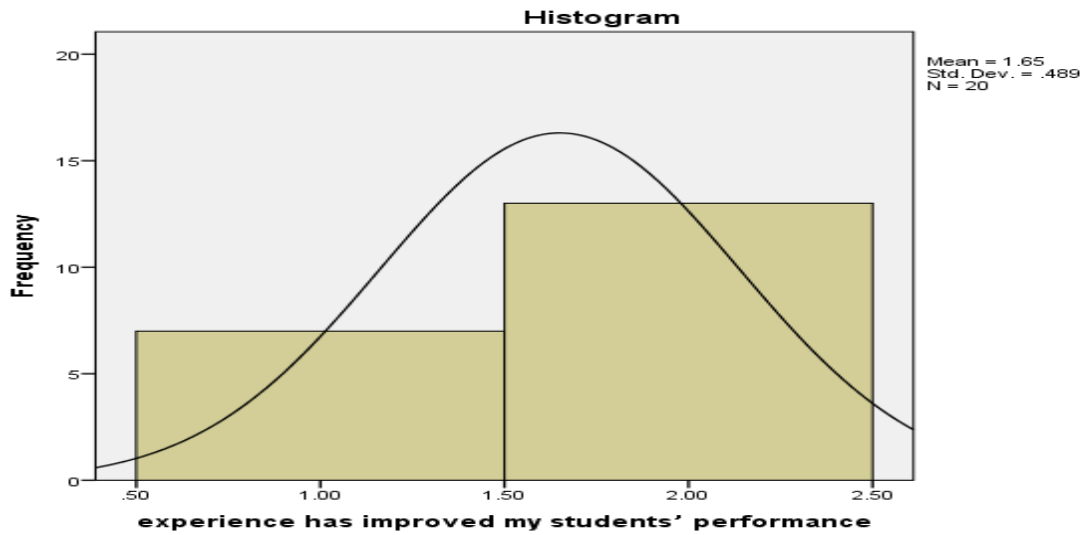
Figure 4.20: Experience Has Improved My Students' Performance

4.4.5 Regression of the factors Influencing Students' Achievement in Mathematics

In this relationship, teaching methods (TM), family background and previous knowledge (FBPK), teaching and learning resources (TLR), teachers' qualification and experience (TQE) the students' achievement in mathematics was tested.

Table 4.33: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.821[a]	.815	.762	.39768

 Dependent variable: Student Achievement in Mathematics (SAM)

The table 4.33, shows teaching methods (TM), family background and previous knowledge (FBPK), teaching and learning resources (TLR), teachers' qualification and experience (TQE) accounts for 81.5% of the students' achievement in mathematics.

Table 4.34: Anova

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.661	8	.16525	4.235	.003[b]
	Residual	.417	16	.0834		
	Total	1.078	24			

a. Dependent Variable: Student Achievement in Mathematics (SAM).

The analysis of variance in table 4.34, shows that the between shows teaching methods (TM), family background and previous knowledge (FBPK), teaching and learning resources (TLR), teachers' qualification and experience (TQE) and students' achievement in mathematics is significant at 0.003 (P value is equal to 0.003), degrees of freedom is 8 while f is 4.235.

Table 4.35: Regression Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.133	.104		13.886	.002
TM	.530	.053	.244	1.542	.0003
FBPK	.102	.009	.081	2.863	.004
TLR	.413	.002	.293	1.614	.0010
TQE	0.426	0.003	.0394	3.869	0.001

From the regression coefficients in table 4.35, shows that students' achievement in mathematics is constant at 0.133 holding the above factors constant. However when the methods used in teaching the students are considered, their achievement improves by

0.530, the resources used in teaching and learning mathematics improves the students' achievement by 0.413, the family background and previous knowledge improves the students achievement by 0.102 while teachers' qualifications and experience improves the students' performance by 0.426. Therefore the policy makers in the education sector and teachers should employ more resources in devising better and advancing the methods used in teaching students mathematics. At the same time the ministry should provide to the teachers of mathematics in-service courses and assessments to improve their teaching skills and experience which should also embrace the use of the changing technology and ensure that the students and schools are adequately provided for in terms of teaching and learning resources.

CHAPTER FIVE

DISCUSSION, RECOMENDATION AND CONCLUSION

5.1 Introduction

This chapter presents summary of the findings, the internal and external validity of the study, the generalizability of the findings and testing of hypothesis, discussion of the findings and their contribution to the general theoretical framework, recommendations and further areas of research.

5.2 Generalization

5.2.1 Internal Validity

The present study data were able to answer the study questions, although some methodological shortcomings affected the external validity. However, some methological improvements have been suggested for future researches hereunder.

The use of multiple assessments over time could provide a clearer view of the causal relations between variables. Furthermore, a longitudinal design could help us to achieve a better understanding not only of the changes in time, but also of the development of attitudes toward mathematics and the effects of other variables such as background, motivation, and social support. Likewise, the use of a small group study and the monitoring of the group including multiple assessments over time, also using qualitative data, could provide a deeper comprehension of the heterogeneity of attitudes among subjects and allow the researcher to take into account the effects of aging on the group.

As suggested by Hannula (2002) qualitative data collected from observations, interviews, and case studies can be useful in studying attitudes more accurately and to recognize possible factors behind the characteristics of attitudes and any changes that take place.

Another limitation of this study is the fact that only self-report measures were used. It is possible to reduce the bias introduced by single-source data using appropriate statistical procedures as we have done in this research. Although, a worthwhile addition to a future study to overcome this problem would be to incorporate more than one data source, namely, data collected through classroom observations and analysis of teacher-reports.

5.2.2 External Validity

The results of this study are statistically generalizable among the student population since all the variables that influence attitudes towards mathematics learning among students (and between boys and girls) were statistically significant. This can be attributed to the relatively larger sample population. However, the results from teachers and head teachers were not statistically significant and therefore cannot be extrapolated among the respective populations. This can be explained by the small sample populations of teachers and head teachers selected to participate in this study.

To address this methodological challenge in the future, it will be imperative to randomly select representative number of teachers and head teachers in the randomly sampled schools in order to eliminate any bias and ensure that the findings can be statistically extrapolated among the larger populations.

5.3 Discussion of the Findings

The main purpose of the present study was to investigate factors that influence students' attitudes towards teaching and learning of mathematics and their effects on performance in Mathematics among secondary school students. The study sought to characterize attitudes towards mathematics among Form 4 students and to analyze the effects of gender, peer, parental and teachers' assistance and encouragement and math performance on these attitudes. Results showed that, in general, the students had positive attitudes towards mathematics, although scores were not very high and distributed mostly around the midpoint.

5.3.1 Objective 1. Factors Influencing Development of Attitude Towards Mathematics

The study has found that, students can develop either positive or negative attitude towards mathematics as a results of several factors. The study looked at how teaching methods, students background and parental participation, teaching/learning resources and teachers experience and qualification. These factors have been found to have a significant relationship to attitude development towards learning and teaching mathematics.

5.3.1.1 Influence of Teaching Methods on students' Mathematics attitude

This study has found that there is a significant relationship between methods of instruction and students' attitude towards mathematics. The way the teacher presents the lesson and involvement of the students in the lesson strongly affects the students. This study supports the claims that how teachers/instructors teach may determine whether or not the student will develop a positive attitude towards the subject (Asante, 2012). Teachers who give their students opportunities to attempt mathematics tasks in class and

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guide them through the process are likely to cultivate positive attitudes in their students (Asante, 2012).

Despite the importance of teacher instructional methods as a significant predictor of attitudes, it cannot be overemphasized the effect of positive statement that build the self-belief among students Fraser and Kahle (2007). However, the improvement in attitudes is likely to be more significant when taking into consideration different environments, but the main contribution is determined in the class environment.

Research on this topic has shown that teacher instructional methods and support with regard to autonomy affected student motivation, among other aspects, and that different pedagogical goals also explained variations in student attitudes towards math (Maat and Zakaria, 2010; Brophy, 2010; Asante, 2012). Taken together, these findings highlight the role of the teacher in supporting student learning through adopting appropriate instructional methods that build students' self-belief and positive attitudes and even motivation and have some implications for education and instructional practices.

5.3.1.2 Influence of Family background and Previous Knowledge

The study has found that there is significant relationship between students' attitude towards mathematics and students background. Where students start learning mathematics at home with parental assistance and influence, the child tends to develop interest in the subject. The results revealed that, in general, students held positive attitudes towards mathematics and also highlighted the main effects of parental support and encouragement on these attitudes.

When emphasizing the importance of individual experiences, the contexts where students interact with their parents/peers and with mathematics become important focal points. Fraser and Kahle (2007) have also highlighted this aspect in research which shows that learning environments at home, at school, and within the peer group accounted for a significant amount of variance in student attitudes and, furthermore, that class ethos had a significant impact on the scores achieved by students for these attitudes.

In order to have a more complex perspective towards this topic, the present research has attempted to examine the combined effects of the individual, social contextual and motivational variables on attitudes toward mathematics. The results of the integration of data provide a more in-depth understanding of the different variables which allow for the exploration of different routes in promoting positive attitudes toward mathematics. On the other hand, researches concerning the relationship between motivation, social support from teachers and peers, and attitudes are scarce.

5.3.1.3 The Influence of Teaching and Learning Resources on students' attitude towards mathematics

The present study asserts that the complexity of factors that can influence mathematics performance indicate that high achievement in mathematics is a function of many interrelated variables related to students, families, teachers, peers and the school environment. It supports the idea that among student variables, attitudes are regarded as key factor to be taken into account when attempting to understand and explain variability in student performance in mathematics.

This study is anchored on the notion that a positive attitude towards mathematics reflects a positive emotional disposition in relation to the subjects' teaching aids and, in a similar way, a negative attitude towards mathematics relates to a negative emotional disposition (Kogce et al., 2009). These emotional dispositions have an impact on an individual's behavior, as one is likely to achieve better in a subject that one enjoys, has confidence in or practically finds useful. For this reason positive attitudes towards mathematics are desirable since they may influence one's willingness to learn and also the benefits one can derive from mathematics instruction (Kogce et al., 2009).

Considering that attitudes towards learning can be related to motivation, the decrease in attitudes towards mathematics can be associated with the overall decrease in intrinsic motivation, competence-related beliefs, interest and task values that occur during adolescence (Sanchez, Zimmerman and Ye, 2004). This decline is experienced in mathematics in particular. Motivation theorists have argued that during adolescence interests are directed towards other fields of experience which could explain the fall in school-related attitudes and interest. An additional explanation is related to the organization of the mathematics curriculum which becomes more demanding as students move through grade levels, requiring increasingly abstract levels of understanding (Hannula, 2002). However, challenge is also an important feature of motivation (Stipek, 2002) in as much as the challenge is not that great that it would be experienced as overwhelming, leading to feelings of helplessness.

5.3.1.4 The Influence of Teachers' Qualification and Experience Students' Attitude Development towards Mathematics

This study has found that there is a significant relationship between teacher's qualification, mastery of content and students' attitude towards mathematics. Students have shown that they have confidence with professional teachers more than the non-professional ones by showing great interest to those with mastery of the content. The present study findings are consistent to past studies (Mohammed and Waheed, 2011; Kogce et al., 2009; Scafidi and Bui, 2010) as it establishes a positive relationship between teachers' qualification and the students' attitudes towards mathematics.

A study involving literature review conducted by Mohamed and Waheed (2011) which was aimed at understanding attitudes and the influences on their development in relation to differences between students, identified three groups of factors that play a vital role in influencing student attitudes: factors associated with the students themselves (e.g., mathematical achievement, anxiety, self-efficacy and self-concept, motivation, and experiences at school); factors associated with the school, teacher, and teaching (e.g., teaching materials, classroom management, teacher knowledge, attitudes towards math's, guidance, beliefs); finally factors from the home environment and society (e.g., educational background, parental expectations).

As Aunola et al. (2006) have shown, teacher goals may influence students' motivation and attitudes not only through their instructional practices and the tasks they propose to students, but also through the messages they send out about learning in general. In this sense if teachers create situations that promote pleasure, are seen as self-determinate and

students feel competent; intrinsic motivation can increase, and this may also promote positive attitudes towards mathematics (Niemic and Ryan, 2009).

A teacher who is supportive to students, who shapes student expectations about learning in a positive way, who sets meaningful tasks which are somewhat, but not excessively challenging, and promotes cooperative learning environments will probably stimulate intrinsic motivation in their students and, as a corollary, may contribute to the development of more positive attitudes towards math (Ghaith, 2003).

5.3.2 Objective 2. Factors Influencing Students' Achievement in Mathematics

The present study asserts that the complexity of factors that can influence mathematics performance indicate that high achievement in mathematics is a function of many interrelated variables related to students background, parental participation, teaching methods, teachers qualification and experience and teaching aids. It supports the idea that among many' variables, tools (resources) used by the teacher, parental involvement and influence, instructional methods and teacher mastery of the content are regarded as key factor to be taken into account when attempting to understand and explain variability in student performance in mathematics.

5.3.2.1 Influence of Teaching Methods on students' Achievement in Mathematics

This study has found that there is a significant relationship between methods of instruction and students' achievement. The way the teacher presents the lesson, guides them on problem solving in class and involvement of the students in problem solving, improves their mathematics response ability which lead to better performance. This study supports the claims that how teachers/instructors teach may determine whether This study

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supports the idea that learning environment-related variables produces an increase in the explanation of the variability of attitudes and performance. (Aunola et al., 2006). Those with low mathematics abilities are likely to have a more negative attitude towards the subject. They do not have the inclination to improve their skills in mathematics. Although the majority of research indicates that poor attitudes towards mathematics are related to poor presentation of the subject, but it has not always been found to be so, although the present study did seek to establish the cause-effect relationship with academic achievement.

5.3.2.2 Influence of Family Background and Previous Knowledge on students achievement in mathematics

The study has that; students who started learning mathematics at their homes or assisted by their parents to do assignment tend to perform well. The study asserts that, learners' previous knowledge and experiences, expectations, interests and beliefs have an impact on the way learning takes place (Ndirangu, 2000). Research by Brimer (1969) examined the relationship between pupils and school characteristics and pupils achievement in public examinations at 'ordinary' (O- level) and 'advanced' (A-level). Questionnaire data from schools, teachers and pupils and examination results were collected in four local authorities.

The findings indicate that family influence of early childhood rearing were most effective in the early stages of education in relation to the child's readiness to learn. It was argued that by the time the 'O' levels were taken, most of the selective variables arising from family background and prior educational background will already have taken effect. This was supported by evidence from the Oxford Mobility study (Brimer, 1969). Mortimore

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and Blackstome (2002) used questionnaires in their study of twelve London Secondary Schools. They found significant association between parent's occupation and examination success. It was found that in the mixed ability group, the average score was 2.1 for children where fathers held professional jobs compared with 1.1 for children of unskilled manual workers.

Attitudes are not innate but are formed as a result of an individual's contact with the object and its environment (Supe, 2002). Chepcheing (2005) asserts that early socialization which children are taken through tends to make them develop attitudes that lend support to the mistaken notion that mathematics is a hard subject. The author observes that attitudes are important for effective learning; a negative attitude towards learning mathematics makes the learners to dislike the subject and will not appreciate the efforts of teachers in assisting them to achieve higher in the subject. While a positive attitude will make the learners to like the subject and put in more effort to compliment the work of the teachers (SMASSE project, 2000). Galloway (1985) typically, found that teachers held stereotyped ideas about parents and children from different social groups. This leads to consequent teacher expectations of children' abilities (Persell, 1977).

5.3.2.3 The Influence of Teaching and Learning Resources on students' achievement in mathematics

The present study asserts that the complexity of factors that can influence mathematics performance indicate that high achievement in mathematics is a function of many interrelated variables related to students, families, teachers, and teaching aids. It supports the idea that among teachers' variables, tools used by the teacher are regarded as key

factor to be taken into account when attempting to understand and explain variability in student performance in mathematics.

This study is anchored on the notion that a positive attitude towards mathematics reflects a positive emotional disposition in relation to the subjects' teaching aids and, in a similar way, a negative attitude towards mathematics relates to a negative emotional disposition (Kogce et al., 2009). These emotional dispositions have an impact on an individual's behavior, as one is likely to achieve better in a subject that one enjoys, has confidence in or practically finds useful. For this reason use of teaching resources and teaching aids in teaching mathematics are desirable since they may influence one's willingness to learn and also the benefits one can derive from mathematics instruction (Kogce et al., 2009).

5.3.2.4 Influence of Teachers' Qualification and Experience on Students' Achievement in Mathematics

From the study, it is found that content mastery and qualification is moderately positively correlated with academic achievement. It was confirmed that students develop confidence and positive attitudes towards mathematics as per the teachers' expectation. In other words, good mathematics grades motivate the students and helps develop their self-belief and concept towards mathematics and stops them seeing the subject as a difficult one. Motivational variables increase the amount of variance explained in attitudes, showing a close relationship between key features of intrinsic motivation, attitudes towards mathematics and achievement.

Most of the earlier studies on teacher effectiveness centered mainly on the personal qualities of the teacher and the performance of the student in terms of cognitive ability, for example (Bloom, 1956; Gage, 1963; Brimer, 1969, Burgess, 1973). Teachers are agent of curricula implementation on the ground. Hansen (1996) on the international study of achievement in mathematics concluded that there is a relationship between Mathematics and the length and type of the teacher's post- secondary education. He said that the more training a teacher has received the better would be the achievement of his student. This clearly indicates that a teacher's post- secondary training will expose him to the skills needed to deliver the relevant knowledge and skills, later to his students at the secondary level.

The knowledge, intelligence and professional skills that teachers posses, have a direct bearing on the quality of education and students performance thereof in any school/institution in any country (Cox & Carpenter, 2009) Sobel Naad Maletsky (2008) presented this view, teachers must know their staff. They must know the pupils whom they are stuffing. And above all they must know how to stuff them critically. Teachers with proper qualification of the content develop self- confidence and serve a source of inspiration and a good role model to the students. This makes the student to like the subject and do well in them (have better performance). It is therefore very necessary to have well qualified and trained teachers who have flexibility and receptiveness needed in a classroom situation.

5.4 Recommendations

This study it can be said that, since the students' positive attitude towards mathematics is at medium level, it shows that there are still possible room for improvement. However, it is interesting to know that despite the lower performance of the students in mathematics, the attitude of the respondents of this study is fairly positive.

The results of the present study give impetus to the development of further research that seeks to characterize and understand different variables which may influence student performance. This will help to make possible strategies for future action in schools, families, and communities, in order to bring about an improvement in attitude towards mathematics and performance.

1. Since the findings of the present study confirm that attitudes are deeply related to motivation and social support, teachers can leverage on this information and develop strategies in educational contexts, to improve their support and student engagement in order to improve not only attitudes but also mathematical performance among students throughout their schooling.

2. It is highly recommended that the maximum effort should be given to improve the students' attitude towards mathematics by organizing forums such as seminars and workshops where teachers and other education stakeholders can support, motivate and cultivate positive attitudes among their students.

5.5 Area for Further Research

Based on the findings of the present study, the following research gaps exist and which may form the topic of research in the future:

a) To find out the cause-effect relationship between attitude and the family background, gender, peer/parental and teacher support/encouragement, school environment and the intrinsic motivation, a research of an experimental design can be conducted;

b) Studies could be conducted to find if there is a relationship between students' attitude and actual (not perceived) academic performance of students in the schools of Makueni County and in the entire country.

5.6 Conclusion

Finding of the study shows that students' attitude has a direct influence on the performance of mathematics. Results shows that attitude is moderately and positively correlated with academic achievement Teaching methods influences attitude and hence the performance. Teachers qualification and experience significantly affect the students' confidence. Parental involvement and encouragement influences the child positively to like the subject.

It was confirmed that students develop positive attitudes towards mathematics as when they achieve higher. In other words, good mathematics grades motivate the students and helps develop their self-belief and concept towards mathematics and stops them seeing the subject as a difficult one. Motivational variables increase the amount of variance explained in attitudes, showing a close relationship between key features of intrinsic motivation and attitudes towards mathematics.

The findings concerning the relationship between mathematics achievement and attitudes towards mathematics are consistent with research showing that good achievers develop more positive attitudes than lower achievers. Achievement is usually related to self-belief in competence and self-belief in competence can be related to attitudes towards math, which suggests that when students succeed at a mathematics task, it increases their sense of competence and this may promote more positive attitudes

This is promising considering the fact that mathematical skills are very vital in the 21st century when virtually all sectors require such skills. Educational stakeholders can therefore improve the attitudes of the students towards mathematics and help them adapt in the current world

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APPENDICES

APPENDIX I: REFERENCE LETTER
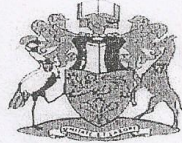
UNIVERSITY OF NAIROBI
FACULTY OF ARTS
DEPARTMENT OF PSYCHOLOGY

Telegrams: Varsity Nairobi
Telephone: 3318262 ext.28439
Telex: 22095

P.O. BOX 30197
NAIROBI
KENYA

September 15, 2015

TO WHOM IT MAY CONCERN
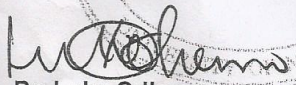
RE: SIMON KYANIA MULALA – E58/63705/2013

The above named is a student in the Department of Psychology studying Masters Psychology in M.Ed of Arts in counseling Psychology programme at the University of Nairobi. He is doing a research on *"Factors affecting attitude towards learning/teaching mathematics in Secondary School students in Mukaa Sub-County in Makueni County".* The requirement of this course is that the student conducts research and collects data in the field on the topic area.

In order to fulfill this requirement, I would like to re-affirm that the said student is a registered student and is intending to go and carry out field work. Any assistance accorded to him will be highly appreciated.

Should there be any queries do not hesitate to contact the Chair of the Department of Psychology, University of Nairobi.
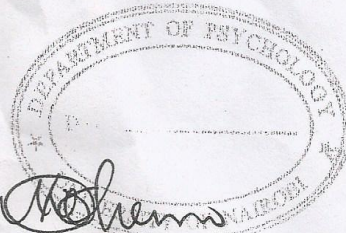
Dr. Luke Odiemo
Chairman,
Department of Psychology

APPENDIX II: HEADTEACHERS QUESTIONNAIRE

I am a graduate student at the University of Nairobi pursuing master's degree in Education. I am conducting a research on attitudes of teachers and students towards mathematics in relation to students' mathematics achievement in Mukaa sub-county

Instructions

The questionnaire is in two sections and kindly respond to all sections approximately.

Do not write your name anywhere in this paper.

Please respond by putting a tick [✓] for the information required in each item and where necessary kindly provide the additional information as may be needed.

The information you provide will be kept confidential.

Section I: Demographic Information

Category of School

Boys [   ],   (ii) Girls [   ],   (iii) Mixed [   ]

Your Gender

Male   [   ],   (ii) Female [   ]

Marital status.

 (i)Married[   ]   (ii) single[   ]

Age.

 (i) Below 40[   ]   (ii) 40 - 45[   ]   (iii)46 - 50[   ]   (iv)above 50[   ]

The number of years you have served as a principal (years of experience as a principal)

(i)1-4years [   ], (ii) 5–8 yrs [   ], (iii) 9 –12 yrs [   ],   (iv) 13-16 yrs [   ],   (v) Over 17

yrs   [   ]

Qualification level.

        (i) Degree [   ]   (ii) Diploma [   ]   (iii)   Certificate [   ].

The current school enrolment as per class.

(i) below 30 [   ],   (ii) 31 – 40[   ],   (iii)   41 - 50 [   ],   (iv)Over 50 [   ]

8. The number of schools you have served as a principal.

(i) 1 [   ]   (ii) 2 [   ]   (iii) 3 or more than 3 [   ]

What has been the performance of mathematics in KCSE since 2011 to date? Please
indicate in the table below.

Year	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	E	No. of Students
2011													

2012													
2013													
2014													

Indicate how many teachers of mathematics in your school fall into the following categories: -

Category	Number of teachers
Masters	
Trained graduate	
Untrained	
Diploma education	
S.I	
A.T.S	

Section II. More Information

Put a tick (✓) against the statement, which most accurately describes your feelings or that which is correct. For questions, write your answer(s) in the spaces provided

Note the meaning of the following: 5.Strongly agree(SA),   4.Agree(A),   3. Neither (N),

2.Disagree (D),   1.Strongly Disagree(SD)

Statement	Responses				
	SA	A	N	D	SD
School inspectors rarely come for their routine duty					
Emphasis is put on the utility value of mathematics					
Mathematics teachers use schemes of work and lesson plans during mathematics lesson					
The hours allocated for teaching Mathematics are enough					

APPENDIX III: QUESTIONNAIRE FOR TEACHERS

I am a graduate student at the University of Nairobi pursuing master's degree in Education. I am conducting a research on attitudes of teachers and students towards mathematics in relation to students' mathematics achievement in Mukaa sub-county

Instructions

The questionnaire is in three sections and kindly respond to all sections approximately.

Do not write your name anywhere in this paper.

Please respond by putting a tick [✓] for the information required in each item and where necessary kindly provide the additional information as may be needed.

The information you provide will be kept confidential.

Section I: Demographic Information

Category of School

Boys [ ],   (ii) Girls [ ],   (iii) Mixed [ ]

Your Gender

Male [ ],   (ii) Female [ ]

Marital status.

Married[ ]   (ii) single[ ]

Age.

(i) Below 25 years[   ]   (ii) 26-30[   ]   (iii) 31-35[   ]   (iv)36-40[   ]   (v)above 40[   ]

Teaching experience

(i)1 – 4 years [   ], (ii) 5 – 8 [   ],   (iii) 9 – 12 [   ],   (iv) 13-16 [   ], (v) Over 17 years   [   ]

Qualification level.

   (i) Degree [   ]   (ii) Diploma [   ]   (iii)   Certificate [   ].

Level of training.

(i) Trained teacher [   ]   (ii) Untrained teacher [   ].

How many students are in your mathematics class

(i) 1 – 20 [   ],   (ii) 21 – 40[   ],   (iii)   41 - 60 [   ],   (iv)Over 61 [   ]

Section III: Mathematics Teachers Attitude Scale

Read the following statements and indicate the extent you think they are true from your own experience by putting a tick [√] appropriately

5. Strongly agree (SA),   4.Agree (A),   3. Neither (N),   2. Disagree (D),   1. Strongly Disagree (SD)

Section II: Information About Teaching Mathematics

Read the statements below and indicate the extent you think they are true from your experience. Check how you agree with the statements by putting a tick [✓] in an appropriate place. 4.Always ((A), 3. Often (O). 2. Rarely (R) and 1. Never (N)

Statement	Responses			
	A	O	R	N
My students mathematics score is above average				

APPENDIX IV: QUESTIONNAIRE FOR STUDENTS

I am a student at University of Nairobi pursuing master's degree in Education. I am conducting a research on attitudes of students towards mathematics in relation to their mathematical achievement in Mukaa sub-county

Instructions

The questionnaire is in three sections and kindly respond to all sections approximately.

Do not write your name anywhere in this paper.

Please respond by putting a tick [✓] for the information required in each item and where necessary kindly provide the additional information as may be needed.

The information you provide will be kept confidential.

Section I: Demographic Information

Category of School

i). Boys [ ],   Girls [ ],   Mixed [ ]

 Which Gender do you belong?

(i)Male   [ ],   (ii) Female [ ]

Age.

17 years [ ],   (ii) 18 years [ ],   (iii) 19 years [ ],   (iv) above 19 years [   ]

Family background status.

(i) Well-up [   ],   (ii) poor [   ],

Class repeated.

form1 [   ],   (ii) form 2 [   ],   (iii) form3 [   ],   (iv) form4 [   ],

Parent's age.

  (i) below 35years [   ],   (ii)   35-40 [   ],   (iii) 41-45 [   ],   (iv) 45 -50 [   ],
above 50[   ],

Educational level of parents.

 (i) Primary [   ],   (ii) secondary [   ],   (iii) middle college [   ],   (iv)
university [   ]

Section III: Information on Liking Mathematics

Read the statements below and indicate the extent you think they are true from your
experience. Check how you agree with the statements by putting a tick [✓] in an
appropriate place. 5. Strongly agree (SA), 4.agree(A), 3. Neutral (N), 2.Disagree (D),
1.Strongly Disagree (SD)

Statement	Responses				
	SA	A	N	D	SD
i like mathematics					

I started learning mathematics at home					
My parents assists me in doing mathematics assignments					
Mathematics lessons are interesting when discussing in class with a teacher					

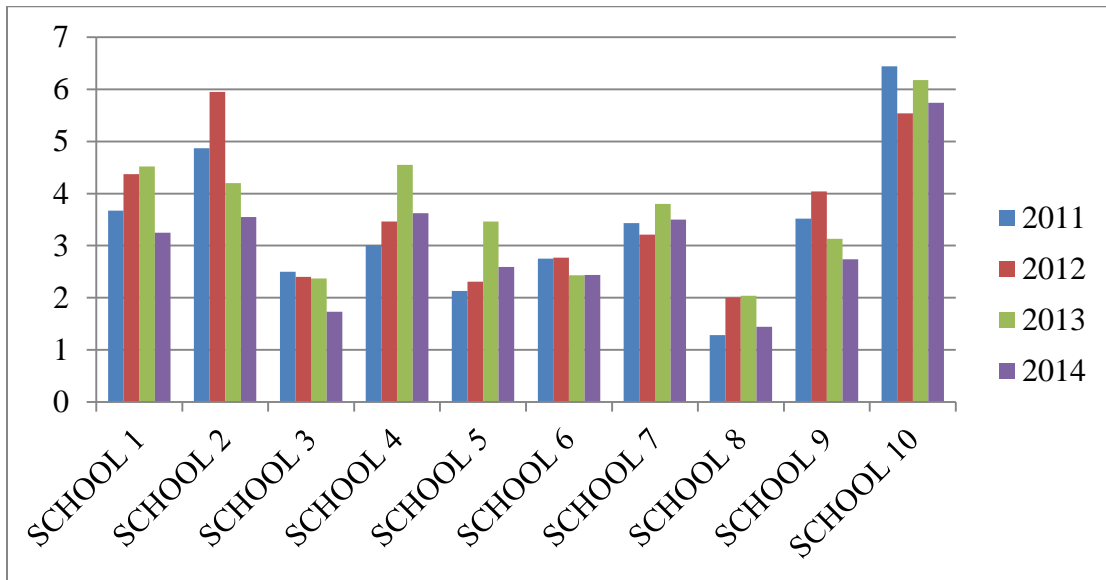Section IV. More Information on Learning Mathematics

Read the statements below and indicate the extent you think they are true from your experience. Check how you agree with the statements by putting a tick [✓] in an appropriate place. 4. Always ((A), 3. Often (O). 2. Rarely (R) and 1. Never (N)

APPENDIX V: KCSE PERFORMANCE IN MATHEMATICS

Summary of the school mean scores of the sampled schools from 2011-2014

Summary of School KCSE Mean Scores in mathematics for 4 years				
	2011	2012	2013	2014
School 1	3.67	4.37	4.52	3.25
School 2	4.87	5.95	4.2	3.55
School 3	2.5	2.4	2.37	1.73
School 4	3.01	3.46	4.55	3.62
School 5	2.13	2.31	3.46	2.59
School 6	2.75	2.77	2.43	2.44
School 7	3.43	3.21	3.8	3.5
School 8	1.28	2	2.04	1.44
School 9	3.52	4.04	3.13	2.74
School 10	6.44	5.54	6.18	5.74

Graph for mathematics KCSE mean scores (performance) for years 2011-2014.

KCSE Mean Scores in mathematics for 4 years