

**STUDENTS' ATTITUDES AND THEIR EFFECTS ON  
LEARNING AND ACHIEVEMENT IN MATHEMATICS: A  
CASE STUDY OF PUBLIC SECONDARY SCHOOLS IN  
KIAMBU COUNTY, KENYA.**

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## DECLARATION

This project report is my own original work and has not been submitted for a diploma or degree in any other University.

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## **DEDICATION**

This work is dedicated to my dear parents Mr. & Mrs. Jackson and Priscilla Langat, my husband Stanley Langat and my children Collins, Brian and Glenn.

## **ACKNOWLEDGEMENT**

First and foremost, my gratitude goes to none other than the Almighty God for giving me the grace to endure all the challenges faced during my study period.

I wish to thank Kenyatta University for their kind consideration in giving me a chance to pursue my studies in this institution.

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Special thanks go to my family for their understanding, patience and support during my busy schedules.

God is awesome.

## ABSTRACT

The persistent under-achievement in mathematics has warranted further research to determine what factors have not been considered nor given enough attention in the on-going reform efforts. The attitude of students towards mathematics is a factor that is known to influence students' learning and achievement in the subject. The purpose of this study therefore was to determine the effect of students' attitudes towards their learning and achievement in mathematics by first trying to establish their attitudes regarding the subject and also finding out the factors that influence these attitudes. The study would provide understanding of some of the learners' behaviours as a result of their attitudes towards the subject and would go a long way in helping the learners to develop positive attitudes which is a recipe for better learning and performance in the subject. This study adopted a descriptive survey design due to the implicit nature of the study. The study involved some seven sampled public secondary schools in Kiambu county and the target population were the form four students who were about to sit for their K.C.S.E examinations. Purposive and random samplings were employed in selecting the schools and the students from those schools respectively with the use of students' questionnaires as a method of data collection. The questionnaires were designed to capture some of the students' perceptions and beliefs regarding the subject which were grouped according to themes including liking, difficulty, usefulness and future expectations regarding the subject, learners' mathematical ability and achievement. These factors were adapted from the Fennema-Sherman attitudes scales and the students were expected to respond to these scales. The data was captured and arranged with the use of statistical package for social sciences (spss). The data was then transferred to Excel sheet where analysis was done by calculating simple frequencies and percentages. These findings were used to make inferences and conclusions. The study found out that most students had a positive attitude towards mathematics and that they perceived mathematics as doable, learnable and important yet this did not translate to good grades. The findings also show that perceptions and beliefs, perceived learning abilities and competencies and previous performances of students in mathematics affected their level of motivation leading to low outcomes. The study recommends the use of varied instructional strategies by the teachers, which promote discovery and elicit learner interest. The students should be encouraged to apply the taught knowledge and skills through feedback and assignments. There is therefore, a need to offer and build on experiences and opportunities that inspire the students to engage fully in the material fact and acquire knowledge and skills that would enable them excel in the mathematics because they like and value it.

## **ABBREVIATIONS AND ACRONYMS**

<b>B.O.M</b>	Board of Management
<b>KCSE</b>	Kenya Certificate of Secondary Education
<b>S.A</b>	School Administrators
<b>S.M.C</b>	School Management Committee
<b>SMASSE</b>	Strengthening of Mathematics and Sciences in Secondary Education
<b>SPSS</b>	Statistical Package for Social Sciences

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## **CHAPTER ONE**

### **INTRODUCTION AND CONTEXT**

#### **1.0 Background of the study**

Mathematics like any other compulsory and examinable subject offered in both primary and secondary school levels in Kenya play a key role in shaping how individuals deal with various spheres of private, social and civil life (Anthony & Walshaw, 2009). The Government of Kenya acknowledges the importance of Mathematics and Sciences in achieving Millennium Development Goals and in the attainment of the Vision 2030 as would provide the necessary manpower to steer the country into new technological and industrial development. This is evidenced by the concerted effort by the Government through the Ministry of Education to improve the performance both in primary and secondary mathematics through the implementation of SMASSE project. However, the low performance in the subject has persisted despite the desperate attempts to provide enough teachers, facilities and in-service training for teachers and provision of other necessary materials posing a lot of concerns to all stakeholders in Education. This implies that there are other factors at play that need to be further investigated.

An analysis of performance in K.C.S.E results below reveals that Mathematics is among the poorly performed subject which also is the case in most schools in the country.

**Table 1.1 K.C.S.E Analysis 2009- 2011 (Mean %)**

<b>Subject</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>
English	39.3	38.9	40.8	37.9	27.5
Kiswahili	38.6	43.6	40.1	35.8	41.6
Maths	21.1	23.1	22.0	28.7	27.6
Biology	27.2	29.2	28.3	26.2	31.6
Physics	31.3	35.2	32.6	37.9	40.1
Chemistry	19.1	24.9	19.9	27.9	24.8
History	45.9	45.8	47.7	40.9	44.7
Geography	38.9	37.5	40.5	46.6	42.4
C.R.E	42.2	46.1	44.5	44.0	48.0
Agriculture	38.8	34.0	40.4	35.0	33.6
Home science	51.9	54.8	54.0	56.9	57.0

**Source: - Kenya National Bureau of statistics abstract**

Bearing in mind the importance attached to the subject, the continued under-achievement would lead to ripple effects which would undermine the future development of the country. It limits the learner's choice on career opportunities and also makes learning and mastering of other subject across the curricular difficult, otherwise the well set objectives of the subject can hardly be achieved due to underachievement in the subject (kiswili, 1995). While most reform efforts seems to embrace the importance of proper learning objectives and instructional methods, they fail to realize the full impact of students attitudes and beliefs can have on learning and achievement. This study confirms the fact that instructional design alone however relevant it may be, cannot alone result in better learning and achievement. The instructional designers must embrace other crucial factors

touching on the affective domain which have been proved to affect student learning in a bid to strive and build a bridge between the goals or objectives of mathematics and the student performance. It is important to note that students are not just cognitive individuals but also social persons with beliefs, emotions that influence their learning and achievement (Zan et al, 2006).

Though research studies show that achievement in mathematics is a function of many interrelated variables which can be grouped as student factors, school factors and home factors, Student attitudes are regarded by many researchers as a key factor to be taken into account when attempting to understand and explain the student achievement in mathematics (Kogce et al, 2009). There is a need therefore, to further investigate how factors like student's attitudes influence their own learning and achievement in the subject as would provide a level ground for understanding some of the learner's behaviors as a result of attitudes. This study was thus concerned with the effect of attitudes which the learners develop or bring into a classroom environment of which may interfere with their learning processes and finally on their learning outcomes. There is a need to understand the learners themselves, their attitudes and perceptions towards the subject with the aim of suggesting strategies for improvement in the teaching and learning of the subject.

Attitude as a major factor affecting learning processes, may be implicit hence has not attracted enough attention from all stakeholders in education and therefore, it is important to consider the fact that learners can mainly contribute to their learning outcomes as a result of their belief and perceptions about the subject matter e.g. whether they like it or not and whether they see any value in it. Attitudes are seen as more or less positive and encompass emotions, beliefs, values and behavior and

hence affect individual way of thinking, acting and behaving which has a lot of implications to teaching and learning (Mensah et al, 2013). They have a strong effect on behavior which helps in understanding and predicting peoples' behavior in a wide range of contexts. Attitudes though not directly observable are inferred from observable responses and behaviours which reflect a pattern of beliefs and emotions. They are elicited by certain stimuli and gradually get established into a consistency or a tendency (Wikipedia, the free encyclopaedia). A person's behaviour and choices when confronted with tasks are determined more by his beliefs and personal experiences rather than by his knowledge of specific tasks (Pilippou & Christou, 1998).

Several research studies support the fact that students' success in Mathematics depends upon the learners' attitude towards the subject as this determines their ability, willingness to learn, choice of action and response to challenges. It determines the level of engagement, interest, personal effort without which one can hardly perform (Garden & Smith, 2001). Negative dispositions induces tendencies of fear, anxiety and stress where one resorts to other non productive practices which finally prevents them from experiencing the richness of Mathematics and many approaches that could be used to develop competencies in the subject. Consequently, the student exhibit low motivation, decreased level of participation, boredom and behaviour problems including class or lesson avoidance .This is infact evident when the teacher is doing his best presentation in class, but the student may seem to be alienated and aloof (Furinghetti and Perkhonen, 2002).

It should also be noted that failure to learn or achieve in mathematics is not confined to less able but also many capable students who fail to bring out their best abilities.

On the other hand, when students build positive attitudes towards the subject, they become engaged in the material fact and are motivated to excel in the subject because they value it, enjoy it and are interested in the subject.

Research points to a variety of factors leading to student's attitude towards the subject. Through school experiences in mathematics, learning and knowledge and skills acquisition, provide an environment where students learn attitudes. Classroom experiences convey messages about the subject which influences learner's attitudes. Mathematics is perceived by most students as a series of calculations that require the application of some set values and formulae that needs to be memorized. They start to think that Mathematics is complex and not understandable except for those who are talented or those with good luck. This results in psychological switch- off and students make no effort to understand and carry out activities as assigned by the subject teachers. The students' gives up what he believes to be a vain effort and switches off completely to an extent that even the most carefully presented materials may prove unsuccessful (Macnab & Comminine, 1996).

Students from their own learning experiences in school where the subject performance in most cases is ranked the last, have come to associate the subject with failures .Mathematics is seen as threatening as success and failure seems clear cut. Failure can be glaringly obvious unlike in other subjects which may require ones observations and opinions or views. The black and white nature of mathematics causes panic and unnecessary anxiety. As a result, they ignore the subject and would prefer to engage in other activities that they anticipate will result in reward and that they feel doable (Zimmerman, 2000).

Student attitudes merit a lot of concern due to the fact that they may form roots of personal qualities which may persist to adult life and which may be considered as beneficial or undesirable. Favorable attitude should be created and fostered due to the fact that; there is a common belief that positive attitudes, the liking for, interest in the subject can lead to greater effort and to higher achievement. Positive attitudes in the subject are regarded as a valid objective of mathematics education in its own right that should be nurtured regardless of the learners' achievement level given that the affective domain interacts and influences the cognitive domain thereby affecting learning and achievement in the subject (Macnab & commine, 1996).

This study would help in understanding the importance and influence of the affective construct regarding teaching and learning which is hoped would appeal to stakeholders to take the necessary measures. This focused on the main students' beliefs and perceptions about mathematics which are considered significant factors underlying school experiences with the hope that this would add student voice to the factors known to influence learning.

The importance of the study was for exposition and also for reference purposes as would give impetus to the development of further research that seeks to understand the effect of student attitudes on learning. Attitude change therefore, requires determining factors driving the attitude and using that information to bring out the necessary change i.e. helping students to learn and bring out their best potentials. These efforts may define the obscure role of the teacher in molding the learners' attitudes and motivating them towards learning the subject. Continued attention should then be directed towards creating, developing and reinforcing positive attitudes towards the subject (Pintrich, 1999). Therefore student interaction and

instructional styles should be carefully determined and supported by the teachers concerned who should not only be concerned about performance or cognitive abilities but also emotional and behavioural aspects of learning.

### **1.1 Statement of the problem**

A negative attitude towards mathematics has been found to be a contributing factor towards under-achievement in the subject. The negative attitude in the subject has created a lot of fear and anxiety among students who continue to perform dismally as they lack the interest, curiosity and patience needed for learning and performing related tasks concerning to the subject. Studies on students achievements in mathematics have mostly pointed to the fact that student's attitude is a major contributor yet has received very little attention if any. There is therefore a need to study the effect of student attitudes and beliefs as is the integral part of socio-cognitive learning which affect the learning outcomes (Burstein, 1992). This study would concern itself with a variety of beliefs that students harbor and which have potential effects on their learning processes as would determine their ability and willingness to learn. Students' opinions and beliefs regarding mathematics, how much they like it, how important they think it is, how difficult they perceive it is and the future expectations can be understood as facets of student's attitudes towards mathematics and which determine their success in the subject (Aiken, 2002).

The various reform efforts which have been launched to guide the teaching and learning of mathematics in schools e.g. the SMASSE project, has not realized any significant improvement in the general performance of the subject. These reforms point to the structural factors which leaves little attention given to student's factors as a contributor towards teaching and learning of the subject. This is a clear

indication that structural changes alone are a necessary, but not sufficient condition in realizing an improved performance (Trends in international mathematics and science study, 1999). There is a need therefore to understand the learners themselves, their attitudes and perceptions towards the subject with the aim of suggesting strategies for improvement in the teaching and learning of the subject through attitude change. As a result, some balance should be struck between curriculum goals and the student performance (Mullins et al, 2001).

### **1.3 Purpose of the study**

The purpose of this study was to determine the effects of the student's attitude towards learning and achievement in mathematics education.

### **1.4 Objectives of the study**

- i. To determine the perceptions of students about mathematics in public secondary schools in Kiambu county.
- ii. To examine the factors influencing student attitudes towards Mathematics
- iii. To investigate how the students' attitudes affect their learning and achievement in mathematics
- iv. To seek recommendations on how to improve students attitudes towards learning and achievement of mathematics.

### **1.5 Research questions**

- i. What was the perception of students towards mathematics?
- ii. What factors influenced students' attitudes towards Mathematics?
- iii. How did the students' attitudes impact on their learning and achievement in mathematics?

- iv. In which ways could the student attitudes be improved towards better learning and achievement in Mathematics?

### **1.6 Significance of the study**

Mathematics education has been in the middle of reform efforts towards an improved performance yet this has never been realized. The findings of this study would help all the interested parties in understanding the factors within the learners themselves and how the learners ultimately can contribute to their own learning processes and performance in the subject. The study was to help in exposing some of the perceptions and beliefs which learners acquire and carry into the classroom environment and which are of paramount importance to all stakeholders in education in attempting to improve teaching and learning of the subject in all schools. The study therefore would provide crucial information to curriculum planners that will guide in the designing policies and strategies towards improving performance in the subject.

The teacher would understand the learners better so as to capture their attention and change their perceptions and attitude towards the subject. Motivation, reinforcement and relevant instructional strategies by the teachers, might help the learners get directions on what is expected. Through this study, the learners would understand themselves and that their performance in the subject is a consequence of their actions, attitudes and effort which they can control for their successful learning and improvement in the subject.

The school administration (B.O.M, S.M.C, S.A) would understand what is ailing the subject and would help in putting up policies towards an enabling learning

environment and providing necessary support and be able to put up mechanisms towards improved teaching and learning of the subject e.g providing time, space, materials and moral support. The study would also be useful to other researchers in supplementing the existing literature on the same study area and would also provide a rich ground for further research based on the gaps left out by this study.

### **1.7 Limitations of the study**

The study was carried out in Kiambu County and specifically in Kikuyu sub-County. The region has quite a number of both public and private secondary schools. The study would focus only on public secondary schools due to the fact that the schools enjoy the same fee funding and subsidies from the government. The respondents may not have been willing to give the genuine information as expected. The questionnaires used or distributed were not all collected while others were collected with some sections not answered. The sample size may not have been representative of the entire school population in the area. The findings might have been ambiguous as may not show the real cause of failure in the subject is due to attitudes. Learners gave varied views which were difficult to harmonize as were not consistent in some sections.

### **1.8 Delimitations of the study**

The proposed study was based on public secondary schools in Kiambu County where the subject ranking always is the last. The study would confine itself to form four students who were just about to sit for their final exams as they already have established predispositions towards the subject and where majority of them coming from the same social and economic background. The schools selected had adequate

subject teachers, facilities and conducive environment which could allow for investigation of other factors affecting performance in the subject.

Several Researchers reveals a variety of factors known to influence learning and achievement in the subject ranging from economic, cultural, social, but this study focused on student factors and specifically on student attitudes concerning the subject as this has never attracted enough attention from all stakeholders in education sector.

### **1.9 Assumptions of the study**

This study assumed that

- i. There was no gender difference in attitudes towards the subject
- ii. Negative attitudes prevented the learners from realizing their success in the subject
- iii. All schools sampled had the adequate facilities, infrastructure and staff
- iv. Learners targeted, knew where they range in terms of performance in the subject
- v. The respondents would co-operate and provide genuine information during data collection
- vi. Findings of the study would be used to generalize all schools in the county.

### **1.10 Theoretical framework**

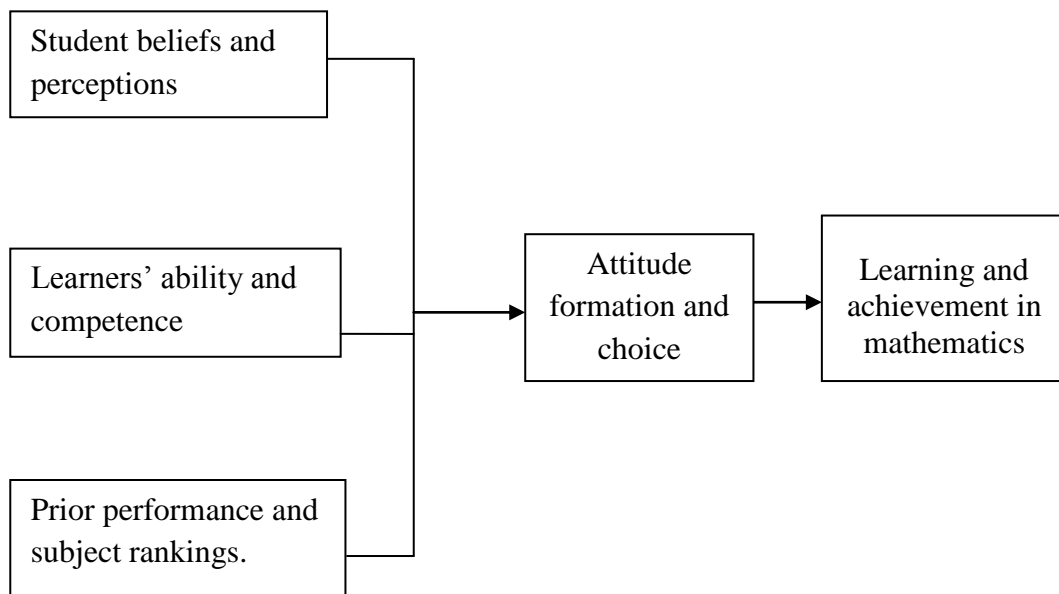
The theoretical framework was based on Albert Bandura's social learning theory of 1977 which asserts that all learning is acquired as a result of direct experience with the object, subject, thing, issue or an idea. According to Bandura, people interact with their environment which shapes the behavior of individual and vice versa. It emphasizes the immediate social context where an individual observes and interprets

the behavior of other people which in turn would determine their behaviors. Individuals select models and will only adopt the behavior of the models they deem similar to themselves and whom they esteem.

In this light, the learner determine the behaviors to adopt and which others to reject without necessary engaging in the others behavior i.e. through observation. Individual behavior decisions and perceptions determine also the extent to which one will persist in any task which results in either success or a failure of the tasks to be accomplished. Attitudes are therefore learnt experiences through observing, modeling and imitating the subjects in our environment or the behavior of others. According to Bandura some behavior changes may be mediated through modification of the model itself, through role modeling, use of reinforcement and rewards and sometimes through persuasion. In order for an individual to attempt a modeled behavior, he must value the observed outcome and perceive it as successful (schunk & Zimmerman, 2007).

## 1.11 Conceptual framework

**Figure 1.1: Influence of attitude factors on achievement**



Attitudes are learnt or acquired predisposition as a result of personal experiences and direct interactions with models or subject within our environment which can be at school or home and which yields certain beliefs and perceptions about the subject. Attitudes influence own social thought and helps us in organizing and evaluating stimuli into pleasant or unpleasant, useful or not useful favourable or unfavourable, or negative or positive. This would have a strong effect on the learners behavior which though not directly observable may be inferred from observable responses arising from the beliefs, emotional response and behaviour that determines whether they like the subject or not and whether they would be engaged or not. The learning outcome and achievement would be determined by the level of engagement and the amount of effort exerted by the learners which also is contingent upon the kind of attitude and behaviour adopted and exhibited by the learners themselves.

Through school experiences in mathematics, learning and knowledge and skills acquisition, provide an environment where students learn attitudes and are shaped by them. Classroom experiences convey messages about the subject which influences learner's attitude and inform individual behaviour decisions e.g the extent to which one is committed or persist in a given task. Favourable attitude should therefore be nurtured and enhanced to the benefit of the learner. i.e. helping students to learn and bring out their best potentials.

## **CHAPTER TWO**

### **REVIEW OF RELATED LITERATURE**

#### **2.0 Introduction**

The purpose of this section is to review related literature on the effects of attitudes of students learning and achievement. The review explored varied research findings and views relating to students attitudes in the subject. This revealed a complexity of interrelated factors that have been found to influence learners' attitudes and achievements in mathematics. Several researchers have regarded attitudes as a key factor to be taken into account when attempting to understand and explain variability in student achievement (Dika, 2002).

This study focuses on the review of literature on the effect of student attitudes among other factors known to influence learning and achievement in mathematics. This section contains; attitudes & attitude formation, factors influencing attitude, effects of attitudes , attitude change and the chapter summery.

#### **2.1 Attitudes and their formation**

Attitudes are psychological orientations developed as a result of one's experiences which influences a person's view of situations, objects people and how to respond to them either positively or negatively or favourably or unfavourably (Mensah et al, 2013). Attitude is an organization of beliefs feelings and behavioural tendencies towards an object (Vaughan& Hogg, 2005).Attitudes are positive or negative views about a person, object, idea or situation which influences individual choice of action and responses to challenges (Marianne & Elaine, 2005). Attitudes have three interrelated qualities or components which vary in direction and degree or strength.

This include the; Emotional components – how we feel; A cognitive component – thoughts and beliefs; A behavioural components – action, experiences (Maio & Haddock, 2010).

The social learning theories by Bandura postulate that individuals acquire attitudes through observing imitating and modeling the behaviors of others. They therefore form through direct experience with models, object or issues or ideas we interact with. They are learnt attributes which affect our behavior. Research has it that people behave in accordance with their attitudes under the conditions that; the attitudes are as a result of personal experience; that one is expecting a favorable outcome or where the model is attractive, popular or successful (Zimmerman, 2007). A student can develop positive attitude towards Mathematics because he or she learns to associate positive experiences or events with it. Also, positive reinforcement creates room for the formation of positive attitude for Mathematics (Mensah et al, 2013).

## **2.2 Students' attitudes towards mathematics**

Attitude towards mathematics presents 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 (Eshun, 2004). Some authorities regard attitude towards Mathematics as just a like or dislike for Mathematics, while others extend the meaning to embrace beliefs, ability, and usefulness of Mathematics. For Zan and Martino (2007), attitude towards Mathematics is just a positive or negative emotional disposition towards Mathematics. Considering attitude towards Mathematics from multidimensional perspectives, it interprets students attitude towards Mathematics as a more complex scenario characterized by the emotions that

one associates with Mathematics, ones beliefs about Mathematics and how one behaves towards Mathematics (Hart, 1989). This attitudes if negative is reflected by the fact that students may shy away and would always try to avoid mathematics tasks. A positive attitude towards the subject is an important educational outcome that should be nurtured regardless of the achievement level of the learners who should be helped in order to bring out their best abilities. They influence our social thought and help us to organize and evaluate stimuli into pleasant or unpleasant or negative or positive or useful or not useful. Attitudes have a strong effect on behaviour which helps in understanding and predicting peoples' behaviour in a wide range of contexts. Attitudes though not directly observable are inferred from observable responses and behaviours. They are elicited by certain stimuli and gradually get established into a consistency or a tendency (Wikipedia, the free encyclopaedia).

### **2.3. Students Attitudes towards Mathematics and achievement**

Most research on attitudes points to the fact that attitude plays a crucial role in learning and achievement in mathematics (Zan and Martino, 2007) hence determines the student's success in the subject. It determines their ability and willingness to learn the subject, work on a variety of assigned tasks and their persistence in the tasks available. In general, the conceptions students hold about Mathematics determines how they approach mathematics tasks leading them into either productive or non productive orientations. In many cases, students have been found to approach Mathematics as procedural and rule-oriented. This prevents them from experiencing the richness of Mathematics and the many approaches that could be used to develop competence in the subject (Mensah et al, 2013).

Most of the researches done tried to establish of the relationship between student attitudes towards mathematics and academic achievement. Some of these studies accept the fact that there exists a positive correlation between student attitudes towards mathematics and student academic achievement. “Nicolaidou and Philippou (2003), asserts that when students have positive attitudes towards mathematics they would achieve better which reflect a significant relationship between attitudes and performance. A study with secondary school students also showed that those with better academic performance exhibited more positive attitudes towards math than those with low performance (Mato and De La Torre, 2010). “These results were confirmed in wider research, concerning math study attitudes among the secondary school students of nine countries, developed by Sanchez et al., (2004). Lipnevich et al. (2011), in a study developed with USA and Bielo -Russian middle school students highlighted the importance of attitudes in predicting academic achievement, when it showed that mathematics attitudes explained a variance of 25% to 32% in mathematics achievement, with much of the explained variance independent of ability in math. Georgiou et al. (2007), showed that high achievement could serve to predict a positive attitude towards math, but such an attitude could not predict stronger achievement. However, these authors emphasize the role of teachers and schools in changing attitudes stating that, math achievement could be improved by, for example, better teaching methods, more motivated teachers or better course books, which were hoped would lead to the improvement of attitudes towards math. Cheung (1998), in his study of 11-13 year olds, also discovered positive correlation between attitude and Mathematics achievement. The correlation showed that the more positive the attitude, the higher the level of achievement in the student”. (Maria de laurdes Mata et al, 2012).

Some researchers have, however, demonstrated that the correlation between attitude towards Mathematics and achievement in Mathematics was rather weak and could not be considered to be of practical significance. In a meta-analysis of 113 primary studies involving elementary and secondary school children, Ma and Kishor (1997), found that attitude towards Mathematics and achievement in Mathematics was positively and reliably correlated but not strong. The correlation was not statistically significant” (Maria de laurdes Mata et al, 2012).

#### **2.4. Factors influencing students’ attitudes towards mathematics**

Research on learner’s attitudes as a predictor to learning and achievement in the subject emphasizes the importance of individual experiences, contexts where students interact with others and with mathematics hence becoming an important focal point. Fraser and Kahle (2007), in their research show that learning environments at home, at school and with peer group accounted for a significant amount of variance in student attitudes.

“In addition, Mohammed & Waheed (2011), when reviewing literature aimed at understanding attitudes and influences on their development identified three groups of factors that play vital role in influencing student attitudes. These include:-Factors associated with students themselves including; Mathematics achievement, anxiety , self- efficacy , self -concept, motivation and school experiences ;Factors associated with the school including the teacher and teaching – teaching materials, classroom management, teachers’ knowledge, attitude towards math, beliefs and motivation.; Factors from home environment and society including educational background, parental expectations and occupation of the parent” (Maria de Lourdes Mata et al, 2012).

Zimmermann (2000), asserts that factors influencing attitudes include; mathematical experiences, perceptions of Mathematics, self-regulation beliefs, anxiety, self-efficacy and self-concept. Wilkins and Ma (2003), found that student's attitudes towards Mathematics result from such factors as parental influence, teacher influence and peer influence which are generally categorized as social constructs. They came to a conclusion that positive encouragement from teacher, parents and peers guidance could help in initiating positive beliefs about the general importance of Mathematics which could help in diminishing the development of negative beliefs and attitudes affecting learning.

Most researches on attitudes have focused on a wide range of variables influencing attitudes. This research therefore would consider a few of these variables (student individual factors) with a view of providing in-depth understanding of those factors. These include mathematical achievement, mathematical ability and general beliefs and perceptions about mathematics.

#### **2.4.1. Prior performance and rankings in mathematics**

Students from their own learning experiences in school where the subject performance in most cases is ranked the last, have come to associate the subject with failure. Mathematics is seen as threatening as success and failure seems clear cut. Failure can be glaringly obvious unlike in other subjects which may require one's observation and opinion or views. The black and white nature of mathematics causes panic and anxiety. As a result they ignore the subject and would prefer to engage in other activities that they anticipate will result in reward and those they feel they can tackle (Schunk, 1997).

“Nicolaidou and Philippou (2003), showed that negative attitudes are brought about by frequent repeated failures or difficulty in dealing with mathematical tasks which may persists if not remedied. Attitudes towards Mathematics become more negative with the rise school level due to pressures or too demanding tasks and increase in workloads etc. Mato and De La Torre (2010), in a study with secondary school students showed that those who are better academically have more positive attitudes towards Mathematics than those with low academic performance hence repeated failures in mathematics leads to unfavourable attitudes. Student’s attitude towards of learning mathematics may be considered as both input and outcome variable as attitude towards the subject can be related to educational achievement in ways that reinforce higher or lower performance. Those learners who are positive about the subject tend to do well and vice versa (Gibbons, Kimmel and Oshea, 1997).”as cited by (Maria de Lourdes Mata et al, 2012).

#### **2.4.2 Students’ perceptions and beliefs**

Considering students opinions and beliefs regarding mathematics; How much they value and like it and what they forecast for their own future education (Kifer, 2002), reflect the strongest predictor variables affecting student achievement. Students with higher self- concepts *i.e.* those who thought that doing well in mathematics was not so difficult and who valued the importance of Mathematics were more likely than their peers with low self- concepts to attain a higher Mathematics achievement (Howie, 2002). It is therefore important to know what students think concerning the subject as this is likely to influence their performance.

Studies on the relationship between mathematics achievement and some learner related variables including self- efficacy, beliefs regarding knowledge and attitudes

towards mathematics, showed that the student's beliefs regarding their academic performance capabilities in mathematics were the strongest predictor of achievement in mathematics (Nasser and Birenbaum, 2004). The better the students evaluated themselves in doing Mathematics, the higher their academic performance.

The conceptions, attitudes, and expectations of students regarding Mathematics and Mathematics teaching have been considered to be very significant factors underlying their school experiences and achievements. The general conceptions determine the way students approach mathematics tasks, in many cases leading them into non-productive paths (Borasi, 1990 and Shoenfeld, 1985). "Students have been found to hold a strong procedural and rule-oriented view of mathematics and to assume that mathematical questions should be quickly solvable in just a few steps, the goal just being to get "right answers" and within the shortest time possible. For them, the role of the student is to receive mathematical knowledge and to be able to demonstrate so; the role of the teacher is to transmit this knowledge and to ascertain that students acquired it. Such conceptions may prevent the students of understanding that there are alternative strategies and approaches to many mathematical problems, different ways of defining concepts, and even different constructions due to different starting points." (Mensah et al, 2013).

"In consequence, they may miss significant aspects of mathematical experience, including making connections between concepts and their applications. They may approach the tasks in the mathematical class with a very narrow frame of mind that keeps them from developing personal methods and build confidence in dealing with mathematical ideas. Associated with these conceptions are students' expectations of what is a mathematics classroom. If the teacher tries some innovative activities an

overt or covert reaction of the students may quickly develop further inhibiting the learning process.” (Ponte et al, 1999).

Mathematics is viewed by most students as a series of calculations that require the application of some set values and formulate that needs to be memorized. They start to think that Mathematics is complex and not understandable except for those who are talented. This results in psychological switch- off and students make no effort to understand and carry out activities as assigned by the subject teachers. The students’ gives up what he believes to be a vain effort and switches off completely to an extent that even the most carefully presented materials may prove unsuccessful (Macnab & cummine, 1996).

Benham (1995), reviewed studies relating to students self–perceptions and academic achievement. His findings were that when students believed that their academic performance was a consequence of their own actions rather than the consequences of factors out of their control, they had better academic achievement. Stemler (2001), who supported the importance of students developing on internal locus of control and he concluded that “effective schools tend to have a student body who is able to see a connection between hard work , ability and achievement and are less likely to attribute achievement to external factors or those beyond their control e.g Good luck.

#### **2.4.3 Learners’ ability and competence**

Some research also points to the fact that confidence results from mathematical ability (self- efficacy) which is a predictor for achievement in Mathematics (Flores, 2007 & House, 2000). It makes students surer of themselves when handling

Mathematics tasks. Bandura et al (1996), asserts that high level of self- efficacy promote positive school attitudes. “Students who are convinced that they lack the ability to succeed or control the outcome of their learning experiences will not make an effort to engage or excel in school related –work. Student beliefs about their competence and their expectation for success in school have been directly linked to their levels of engagement as well as their emotional states that promote or interfere with their ability to be academically successful (Schenkel’s, 2009). Those who feel incompetent in the subject tend to be more anxious and fearful in revealing their ignorance in class (Abu-hilal, 2000). They fear that learning will result in embarrassment and humiliation which in turn inhibits them from behaving in ways that might help them e.g. avoiding classes and failing to do assignment”. (Theresa m, 2006).

## **2.5. Attitude change towards mathematics**

Samson and Maushak (2001) have drawn on findings from a number of studies to create a series of guidelines for effective design of attitude instruction including; Making instruction realistic relevant and technically stimulating; Presenting a new information; Presenting persuasive messages in a credible manner, Eliciting purposeful emotional involvement; Involving the learner in planning production and delivery of message; Providing post instruction discussion or critique opportunities. Therefore student interaction and instructional styles should be carefully determined and supported by the teachers concerned so as to ensure successful transfer of knowledge. Smith and Regan (1999), made such similar recommendations for designing instruction for attitude change including; providing persuasive message,

modelling and reinforcing appropriate behaviour, inducing dissonance between cognitive, affective and behavioural components of attitude.

While attitudes can have a powerful effect on behaviour, they are not set in isolation. The same influences that bring about attitude formation can also be used to bring about attitude change. Certain theories give an insight on how attitudes may be changed; “*Learning Theory of Attitude Change*: Classical conditioning, operant conditioning and observational learning can be used to bring about attitude change. Classical conditioning can be used to create positive emotional reactions to an object, person or event by associating positive feelings with the target object. Operant conditioning can be used to strengthen desirable attitudes and weaken undesirable ones. People can also change their attitudes after observing the behaviour of others. *Elaboration Likelihood Theory of Attitude Change*: This theory of persuasion suggests that people can alter their attitudes in two ways. First, they can be motivated to listen and think about the message, thus leading to an attitude shift. Or, they might be influenced by characteristics of the speaker, leading to a temporary or surface shift in attitude. Messages that are thought-provoking and that appeal to logic are more likely to lead to permanent changes in attitudes. *Dissonance Theory of Attitude Change*: people can also change their attitudes when they have conflicting beliefs about a topic, subject or issue. In order to reduce the tension created by these incompatible beliefs, people often shift their attitudes” (Kendura, 2013).

## **2.6. Summary of Literature Review**

Most Research on attitudes have pointed to the fact that attitude played a crucial role in learning mathematics hence determines the student’s success in the subject. Research also supported the fact that a positive attitude towards the subject is an

important educational outcome that should be constantly nurtured regardless of the achievement level of the learners who should be guided in order to bring out their best abilities and potentials.

However, there has not been a consistent findings as to the relationships between attitudes and achievement and on a proper recommendation on how to positively change the attitudes for the benefit of the learners. Literature confirms that it should start from determining the root cause of attitudes and using that information to bring out the expected change which in most cases has remained elusive or not practicable in the school contexts. Bearing in mind various variables that play a role in determining the learner's attitude, the literature stresses the need for more understanding on the effect of these variables in the learning of the subject which has always received very little attention from the stakeholders.

This study sought to create more awareness and understanding on the common beliefs and perceptions among the students which affects the learning of the subject and suggest more recommendations for improvement in performance through attitude change. The low performance and little engagement in an academic work by the learners may imply that the attitude change has not succeeded or different variables are given priority since attitude is implicit, but should continue as an area of concern among all the stakeholders in education. This calls for a more concerted effort in order to change some of the student's beliefs regarding the nature of learning and the factors that affect it. It also necessitates the development of strategies in education contexts to improve student attitudes and engagement as well as improving on the teacher's supports system.

## **CHAPTER THREE**

### **RESEARCH DESIGN AND METHODOLOGY**

#### **3.0 Introduction**

This section highlights or discusses how the study was conducted. It outlines the procedure and strategies which were used to collect and analyze data. It consists of the description of the research design, variables considered, location of the study, target population, sample size and techniques, research instruments and their validity and reliability, data collection procedures and data analysis.

#### **3.1 Research design**

This is the arrangement of conditions for collection and analysis of data. This study adopted a descriptive survey design as it dealt with people's views and hence was relevant to the study area. According to Grazino and Raulin (2000), descriptive survey method is often used to study people's feelings, thinking and attitudes about specific aspects hence was relevant for this study as attitudes could not be directly measured or observed but were inferred from certain cues which depicted the implicit nature of students characteristics. The research aimed at capturing some of the student beliefs and perceptions which signified attitudes towards mathematics. The data was obtained through the use of student questionnaires representing various attitude variables or themes. The students response was organized and analyzed both in qualitative and quantitative approaches then summed up in a descriptive manner according to the themes.

### **3.2 Variables**

Dependant variables included learning and achievement which were determined and influenced by the magnitude and direction of attitudes and its causes. They represent the total influence from the effects of independent variables. It was measured by the performance level of the learners in an examination, their confidence and knowledge level. Independent variables included those aspects which have an effect on dependant variables though indirectly. They included the learner's perception and beliefs, learners' ability and performance in Mathematics variables which influenced attitudes. These factors represented the part of the research which has no manipulative control; but could be measured through use of predictor variables including liking of mathematics, the difficulty, its value, the interest, its usefulness, self-confidence, competencies, previous performance and future expectations.

### **3.3 Location of the study**

This study was be carried out in Kiambu County which had several sub-counties including Kikuyu, Limuru and Gatundu among others and due to the vastness of the area; this study would only cover kikuyu sub-county. There were about 44 secondary schools in the area, with 23 public and 21 private secondary schools. The place was particularly selected due continued dismal performance in mathematics compared to other subjects.

### **3.4 Target population**

This study targeted public secondary schools in Kiambu County and particularly kikuyu sub county among other sub-counties which had 23 public secondary schools. Seven schools were selected in the sub-county for the research study due to the fact that most schools shared a lot in common. In the seven sampled schools,

there were about 700 form four students population where only 140 students were selected as participants. The form four students were particularly targeted due to the fact that at that level, they had been exposed to the greater extent of the mathematics curriculum which could have developed and stabilized their attitudes towards the subject with time. At such level also they could almost predict where they would range as far as performance in the subject was concerned.

### **3.5 Sampling techniques and sample size**

These include the different ways of selecting the sample and how the sample size would be arrived at.

#### **3.5.1 Sampling technique**

The sampled schools were selected using purposive sampling, convenient and stratified sampling techniques so as to bring out the expected variability, make the sample more representative. The methods were used as follows;

1. Purposive sampling was used to select Kiambu County and kikuyu sub county from other counties and sub- counties respectively. There were 23 public secondary schools in Kikuyu sub- County which were be categorized into stratus as; Boarding or Day schools; Boys or Girls boarding; mixed day or either Boys/Girls day schools.
2. Stratified random sampling was used to ensure that all the school categories were fairly selected. Convenient sampling was used to enhance accessibility given that most schools were performing the same.
3. In the final analysis, only seven schools were selected out of a total of 23 public schools. The final 7 sampled schools contain; a **Girls (A)** and a **Boys(B)** boarding schools; a Boy's day (C) and four mixed day secondary schools (D,E,

F,G), given that majority of the schools in the area were mixed day schools with very few boarding schools.

4. Stratified sampling was used in selecting the streams depending on how the streams were created so as to gather for ability groupings and gender. Also random sampling was used to select students from one stream.

### **3.5.2 Sample size**

The preferred sample size according to Ary et al (1972) is 10%-20% of the total population in a descriptive research. A sample size of preferably 20% of the total was appropriate given that most schools had several streams. Mugenda & Mugenda (2003), postulated that appropriate sample size should be at least 10% of the total population. The total population of form four students from the seven schools selected; School A=120students, school B=67, school C=75 and school D=118 students E=100, F=100 and G=120 giving a total of 700 students and the sample size calculated at 20% of 700= 140 participants in total who would be engaged .The same figure was arrived at by calculating the 20% of the number of students in each school. Majority of the schools in the area had the same facilities and also performed almost the same way as far as the mathematics was concerned.

### **3.6 Research Instrument**

The research instrument basically used the questionnaires which were designed specifically for the form four students. The questionnaires include both open –ended and closed ended. The closed ended was meant to give uniform responses as in the attitude scales, the questions were grouped according to the themes(1A,2A,3A and 4i) to help in validation process. The students were supposed to tick the right responses in relation to the statements given which included the liking, usefulness,

difficulty, interest, abilities and performance in the subject. The questions were geared towards capturing opinions, beliefs and views of students as relates to the subject as had been adopted from the modified Fennema- Sherman attitudes scales of (1976). The open ended section (4ii), contained other additional questions meant for the respondents to substantiate their statements or give their personal opinions and clarification as per the objectives stated. Kothari (2003) asserts that questionnaires are useful in that it serves a large population giving the respondents adequate time to give well thought out answers. Questionnaires were the most preferred compared to other methods since it was the most appropriate method for dealing with large population or sample size. The instrument was validated by an expert who is the supervisor.

### **3.7 Pilot study**

This includes pre-test and test-retest techniques used to determine validity and reliability of the instrument respectively which were done before the actual data collection.

#### **3.7.1 Validity**

Validity was determined to ensure that the instrument measures what it purported to measure. A check was done by revising the questions to get rid of ambiguity, wrong phrasing of questions by exposing the instrument to an expert or the supervisor. The questions should convey the same meaning to all respondents.

Validity was also determined through piloting or pre- testing. The instrument was administered in a school with the same status as the sampled schools but which was excluded in the final study. The questions and responses were compared both from

the same school and from different schools. Extremely different responses implied different interpretation which meant the question could be rephrased or adjusted so as to convey the same meaning to all respondents (Dahlberg & Mc caig, 2010). Validity was done by checking and comparing the responses with the objectives stated. The questions also reflected the objectives for the study. This was confirmed by revising the questions against the stated objectives.

### **3.7.2 Reliability**

Reliability concerns the degree to which a measuring instrument gives similar results over a number of repeated trials. Piloting was done in different schools apart from the sampled ones. The schools were of the same level or status in terms of facilities or performance etc. By comparing the responses for the various items presented may reflect consistency though they may not be valid.

Alternatively, a Test - Retest was also used to estimate the degree to which the same results could be obtained in a repeated trial. One school was used to obtain responses in the same subjects but at different times e.g. difference of two weeks. It was expected that the response in the 1<sup>st</sup> and 2<sup>nd</sup> administration would be nearly the same if the instrument was reliable (Orodho, 1999). Alternatively, the two sets of results could best be compared by calculating a correlation coefficient which was not adopted by this study.

### **3.8 Data collection**

The researcher first sought permission from the schools authorities with the letter of introduction from the dean, post graduate school and a permit from the ministry of

education as evidence of the research requisition. He then booked for an appointment date with the schools for the administration of questionnaires.

During the actual field day, the questionnaires were distributed in all the sampled schools with the permission from the schools authorities and the teachers concerned or assistant. Co-ordination was done so as to establish the appropriate time to administer the questionnaires to students' i.e when the students were free. The teacher concerned would break the tension that the respondent anonymity was assured and that the work was only meant for research, then distribute the questionnaire to the right group, supervise and collect all of them when they were through. The form four students were randomly selected depending on the number required. The completed questionnaires were then kept safely for the researcher to pick.

### **3.9 Data analysis**

The collected data was checked, read, revised and marked. Grouping or coding was done according to the themes or variables considered for research which reflected the objectives. The data was first captured in statistical package for social sciences (SPSS) from where analysis was done jointly for all schools considered and for ease of comparison of factors. The method of analysis involved both qualitative and quantitative methods. In qualitative methods similar information was grouped into similar themes for ease of analysis and in making conclusions. In quantitative method, simple frequency tables and percentages were calculated and inferences are drawn by comparing these figures. Likewise hierarchical analysis of attitudes was performed by calculating the percentage strength of each variable to determine the significant factor. Descriptive narrative was used on open-ended items or

questionnaire. Summary, conclusions and recommendations was drawn depending on the findings and the analysis done.

### **3.10 Logistical and ethical considerations**

After the approval of the proposal by the supervisor and the Board, the researcher sought for a letter of introduction from the Dean, Graduate School of Kenyatta University. He then sought for a permit from the Ministry of Education. Appointment date for data collection was arranged with the school authorities before the actual day to ensure that convenient and appropriate time was set aside for the exercise. The researcher also requested for assistance from the school teachers in administering questionnaires so that students could not have unnecessary stress and tension given that the item was not an exam but was only meant for the research. The assistants helped in selecting the right sample and in explaining or reading the instructions to the students so that they could know how to answer the questions.

## **CHAPTER FOUR**

### **PRESENTATION OF FINDINGS, INTERPRETATION AND DISCUSSION**

#### **4.0 Introduction**

This chapter presents the findings of the study based on the data collected from the students in relation to the objectives of the study. The data was checked and arranged with the use of the statistical packages for social sciences (SPSS). The data was analysed using frequency tables and percentages in line with the themes and the objectives of the study. The objectives of the study were; to determine the attitudes of students towards mathematics as a subject; to investigate the factors influencing the attitudes; to examine the effects of attitudes on achievements and to suggest corrective measures that can help learners to improve in mathematics performance.

#### **4.1 Profile of Respondents**

A total of 140 questionnaires were successfully filled and collected for this study. The 140 respondents formed 20% of the Form Four class populations in the schools considered. All the respondents were form four students aged between 16-20 years. Majority of the respondents were males forming 63% while the female respondents were 37%.

#### **4.2 Perception of Students towards Mathematics**

The study sought to determine the perception of students towards mathematics as a subject whether favourable or not favourable. The items from the questionnaires were summarized with learner responses as Yes, No or Not sure. Percentage figures

obtained were used in making comparisons and conclusions. The attitude test results obtained from the study are summarized in Table 4.1.

**Table 4.1 Attitudes of Students towards Mathematics**

Attitudes	Yes		No		Not Sure	
	No	%	No	%	No	%
Do you like mathematics	118	84	13	9	9	6
Do you enjoy learning mathematics	116	83	16	11	8	6
Do you look forward to a Mathematics lessons	105	77	22	16	10	7
Is mathematics a boring subject to you	22	16	100	75	12	9

Table 4.1 indicates that 84% of the respondents said that they liked mathematics, while only 9% did not like the subject. Those who enjoyed learning mathematics were 83% compared to 11% who did not enjoy the subject. A proportion of 77% of the respondents reported that they looked forward to mathematics lessons. In addition, 75% of the students felt that the subject was not boring compared to 16% who felt otherwise. It can be noted from the analysis in Table 4.1 above that students had a positive attitude towards mathematics and therefore they are expected to perform better in the subject.

Generally, a student who likes mathematics, will enjoy learning the subject, will always look forward to maths lessons and will never find the subject as boring. This positive attitude is a recipe for high achievement in mathematics. This is in line with Schreiber (2000) & Hannula (2002) who asserted that positive attitudes are

conducive to good performance and would serve to predict better achievement in mathematics. In addition research show that children learn more effectively when they are interested in what they learn and would achieve better if they like what they learn (Ma & Kishor,1997). Learning becomes very difficult when the students do not like mathematics as they will find the subject boring and not enjoyable and would consequently fail to concentrate or feel like skiving the lessons and would never anticipate for the lesson. Therefore continuous attention should be directed towards creating, developing and reinforcing positive attitude towards the subject as it is the key to performance in mathematics.

### **4.3 Factors influencing attitudes of students towards mathematics**

The study also sought to investigate factors influencing the attitudes of students towards mathematics as a subject. The factors identified were perceptions and beliefs of students, learning abilities and competence and also previous performance and ranking of the subject in schools.

#### **4.3.1 Perceptions and beliefs of students towards mathematics**

The study investigated the perceptions and beliefs of the students towards the subject by assessing the level of agreement of the students on various statements on perceptions and beliefs. The students' perceptions and beliefs towards mathematics are summarized in Table 4.2 below.

**Table 4.2 Perceptions and beliefs of students towards mathematics**

Perceptions and beliefs	Yes		No		Not Sure	
	No	%	No	%	No	%
Maths is applicable in other subjects	127	92	5	4	5	4
Maths is useful for career growth	113	81	23	17	4	2
It is Important to do well in mathematics	133	95	3	2	4	3
Do you belief that mathematics is difficult	18	13	105	75	16	12
Would you avoid mathematics if it were optional	41	30	79	59	15	11

The information in Table 4.2 shows that 95% of the respondents agreed that it was important to do well in mathematics while 92% of the respondents agreed to the fact that mathematics was applicable in other subjects. Those who thought they needed mathematics for their career were 81%, while 75% of the students did not believe that mathematics was a difficult subject. Fifty nine percent of the students would not avoid mathematics if it was an optional subject while 30% would. These findings confirm the positive beliefs and the right perceptions exhibited by the learners which are hoped would enhance achievement in the subject.

If students think that mathematics is important, useful and contributes towards success in other subjects due to its applicability, they will not avoid the subject, but instead will work hard and put a lot of efforts as they build on their related future careers which may lead to improved performance. The students understand that they need to improve in maths as it is tied to other subjects whose performance depends on maths. They also know that careers are build from the good performances in

mathematics and related areas which would require their efforts in order to perform and qualify for the various fields. Where the effort does not yield any success, the student may give up or feel that subject should be optional as they believe the subject is difficult for them or may be involving in terms of the practice required. This may lead to dismal performance in the subject and consequently in maths related areas like sciences which will curtail them of their future careers.

This is in line with the findings that considering students' opinions and beliefs regarding mathematics; how much they value and like it and what they forecast for their own future education (Kifer, 2002), reflect the strongest predictor variables affecting student achievement. Students with higher self-concepts *i.e.* those who thought that doing well in mathematics was not so difficult and who valued the importance of Mathematics are more likely than their peers with low self-concepts to attain higher Mathematics achievement (Howie, 2002). The learners should be guided to realise the importance of the subject through all aspects of lives so as to embrace the subject and acquire the necessary skills which would enhance their performance in the subject and the related areas.

#### **4.3.2 Learning ability and competence in mathematics**

The students were asked to indicate their level of agreement with the given statements. The responses were rated as strongly agreed (SA), agreed (A), disagreed (D), strongly disagreed (SD) and not sure (NS). The responses obtained from the study are summarized in Table 4.3.

**Table 4.3 Level of agreement on learning abilities and competences in Mathematics**

<b>Learning abilities and competences</b>	<b>SA</b>	<b>A</b>	<b>D</b>	<b>SD</b>	<b>NS</b>
Maths involves memorisation of facts and formulae difficult to grasp	<b>35</b> (25%)	<b>44</b> (22%)	<b>36</b> (26%)	<b>19</b> (14%)	<b>4</b> (3%)
I have no ability or talent to succeed in mathematics	<b>3</b> (2%)	<b>3</b> (2%)	<b>35</b> (25%)	<b>88</b> (63%)	<b>10</b> (7%)
Not everyone can be good in all the subjects	<b>60</b> (43%)	<b>48</b> (34%)	<b>8</b> (6%)	<b>13</b> (9%)	<b>11</b> (8%)
I can get a good grade if i work hard	<b>108</b> (78%)	<b>22</b> (16%)	<b>1</b> (0.7%)	<b>5</b> (4%)	<b>3</b> (2%)

The findings in Table 4.3 indicate that 94% of the students agreed that they could get good grades if they worked hard while 88% disagreed that they had no ability to do well or were not talented in mathematics. Seventy seven percent of the students agreed that not everyone could be good in all subjects while 57% agreed that learning mathematics involved a lot of memorization of facts and formulae difficult to grasp. Students seem to understand that hard work can yield success and that they have the capacity to improve as performance is about effort and not about talents or special abilities hence they know the gateway to success.

Students develop attitudes depending on their abilities and competencies. Learners with high confidence in mathematics do not attribute their performance to talents or ability but rather to their hard work and effort which always would be the only source of success (internal locus of control). They view mathematics as something learnable and doable and not so difficult to grasp hence they feel they can perform in the subject because they can work hard hence the students seem to be in control of their learning. Where the students find it difficult to grasp facts, they will think that

they can do well in other subjects other than mathematics where they can understand statements of facts and not memorisation of formulas as it is in mathematics. The students fail to connect between concepts as they think the only way to master the subject is through cramming of the required formulas which they feel would be difficult for them. They fail to know that through regular and repeated practice they can internalise concepts and facts and not necessarily having to cram them directly. This is also in line with the findings that student beliefs about their competence and their expectation for success in school have been directly linked to their levels of engagement as well as their emotional states that promote or interfere with their ability to be academically successful (Schenkel, 2009).

Mathematics is viewed by most students as a series of calculations that require the application of some set values and formulae that needs to be memorized. They start to think that mathematics is complex and not understandable except for those who are talented. This results in psychological switch- off and the students' gives up what he believes to be a vain effort and switches off completely to an extent that even the most carefully presented materials may prove unsuccessful (Macnab & cummine, 1996).The students should be helped to always focus on the interrelationships between the subjects and that each subject is significant by its own merit.

#### **4.3.3 Previous pperformance and ranking in mathematics**

The previous performance and ranking as a factor affecting attitudes of students towards the subject was also analyzed. The respondents were asked to indicate their level of agreement with statements depicting previous performance and ranking. The results obtained from the study are shown in Table 4.4.

**Table 4.4 Previous performances and Ranking in mathematics**

<b>Previous performance and Ranking</b>	<b>SA</b>	<b>A</b>	<b>D</b>	<b>SD</b>	<b>NS</b>
Mathematics is least performed in our school	<b>38(28%)</b>	<b>50(36%)</b>	<b>27(20%)</b>	<b>8(6%)</b>	<b>15(11%)</b>
Previous failures in exams implies that it is difficult to pass the subject	<b>6 (4%)</b>	<b>17(12%)</b>	<b>41(30%)</b>	<b>61(44%)</b>	<b>14(10%)</b>
It is normal to fail in mathematics	<b>20(14%)</b>	<b>40(28%)</b>	<b>30(22%)</b>	<b>29(21%)</b>	<b>20(14%)</b>

**Key:** SA-strongly agreed; A-agreed; D-disagreed; SD- Strongly disagreed;

NS- Not sure

The information in Table 4.4 shows that 74% of the students disagreed that previous failures in the subject affected their attitudes towards the subject as they know they can exert some effort that would see them improve. Some 64% of them agreed that mathematics being among the least performed subjects in the school affected their attitudes, while another 42% of the students agreed that it was normal to fail in the subject.

Students from their own learning experiences in school where the subject performance in most cases is ranked the last, have come to associate the subject with failures. They have believed that it is normal to perform dismally in the subject in the school level as they think that it is the norm and they will therefore make no effort to improve but tilt to those other subjects they think they can score better. The

students will put no effort to change this situation and improve as they believe it cannot be changed and is part of the school culture. On the contrary, the students also seem to agree that despite low ranking and least performance at school level they still believe it may not be that difficult to pass in the subject. Majority of the students feel that their failures in the subject may not actually imply that the subject is difficult as they know that they can work hard to improve in the subject individually and not as a school hence to them failing in maths is not normal as they attribute success to factors within their control e.g. putting in more effort and working hard so as to improve and not as a result of talents or special abilities.

This affirms the research by Nicolaidou and Philippou (2003), which showed that negative attitudes are as a result of frequent repeated failures or problems when dealing with mathematical tasks and may become relatively permanent. Attitudes towards mathematics become more negative with the school grade or at high school due to pressures or too demanding tasks and increase in workloads etc. Mato and De La Torre (2010), in a study with secondary school students showed that those with better academic performance have more positive attitudes regarding mathematics than those with poor academic performance hence repeated failures in a subject leads to unfavourable attitudes hence, the school performance level should be controlled or else it would stabilize into a school culture that would necessitate a paradigm shift.

#### **4.4 Effects of attitudes on achievement in mathematics**

The effect of attitudes on achievements in mathematics was discussed in terms of students' effort and behaviour towards learning and performance in the mathematics.

#### 4.4.1 Effort and Behavior towards mathematics

The study sought to examine effect of attitudes on effort and behaviour of the students towards mathematics. The findings obtained from the study are as shown in Table 4.5.

**Table 4.5 Effort and behavior of students towards mathematics**

<b>Effort and Behaviour of students towards mathematics</b>	<b>Always</b>		<b>Sometimes</b>		<b>Never</b>	
	<b>No</b>	<b>%</b>	<b>No</b>	<b>%</b>	<b>No</b>	<b>%</b>
I ensure that I Complete my mathematics assignments	52	37	85	61	2	1
I must find time for practice and extra work	70	50	65	47	4	3
I am attentive in class during the lesson	92	66	46	33	2	1
I feel like missing the lesson if it is maths	11	8	41	29	88	63
I work hard to get a good grade	115	83	21	15	3	2
Mathematics assignments are boring/ time wasting	4	3	31	23	103	75
I read for other subjects when the teacher delays	35	25	77	55	28	20

The findings in Table 4.5 indicate that 83% of the students said that they always worked hard to get good grades in mathematics while 75% of the students never perceived mathematics assignments as boring or time wasting. The students seem to understand the importance of hard work in maths. There were 66% of the students who were always attentive in class, 63% never missed mathematics lessons, and 61% sometimes completed their mathematics assignments. A proportion of 55% sometimes read for other subjects when the mathematics teacher failed or delayed to

come to class. Fifty percent of the students reported that they always practiced and did extra work in mathematics.

A student who likes and enjoys mathematics is motivated to perform in the subject hence would engage fully in activities or tasks that bring about success. The student will complete all the assignments, will do extra work, is attentive in class, will not miss a lesson and will always be prepared for the lessons even when the teachers are away or not available.

The findings of this study imply that most students believe in hard work in order to improve. They also believe the assignments given are neither boring nor time wasting as they are meant for their good and therefore they must find time for practising maths and doing extra work as practice enables one to internalise concepts and be able to apply them in exams. The students do not like to miss a lesson and are attentive in class leading to concentration and better understanding hence continuously building on knowledge and skills that would ensure success an achievement in the subject in the subject. This requires a lot of commitment on the side of student to be able to work on the assigned tasks and doing practice which helps the student to better integrate and master the learnt concepts and facts. Where a student is attentive and does not miss a lesson would ensure successful transfer and consistency in the acquisition of knowledge which also enhances mastery and application of such knowledge in examinations.

However, it is also clear that students are not fully engaged nor self-motivated to work hard and to realize their potentials despite their knowledge of the same. This is reflected generally on the low percentage response for those in agreement with the

items above. It is a clear that though assignments are not boring nor time wasting, most students could neither complete them nor spend enough time doing practice yet they know maths requires such a commitment for any success to be realised. The students, reading for other subjects when the teacher delays, is an indication that one has preferences for other subjects or other activities which is an indication of lack of interest and commitment in the mathematics which contributes to underachievement in the subject. The students have not given enough attention to the subject as they feel it requires alot from them in terms timing and concentration and consequently have not performed their best.

Some research studies support the fact that students' success in mathematics depends upon the learners' attitude towards the subject as this determines their ability, willingness to learn, choice of action and response to challenges. It determines the level of engagement, interest, personal effort without which one can hardly perform (Garden & Smith, 2001).

Negative dispositions induces tendencies of fear, anxiety and stress where one resorts to other non -productive practices which finally prevents them from experiencing the richness of Mathematics and many approaches that could be used to develop competencies in the subject. Consequently, the student exhibit low motivation, decreased level of participation, boredom and behavioural problems including class or lesson avoidance (Furinghetti & Perkhonen, 2002).The findings above represent the most significant influence of attitude factors on achievement as they are mediated by the effort and the behaviour of the learners towards the subject.

#### 4.4.2 Learning and achievement in mathematics

The level of confidence of the students in mathematics determines the level of learning and achievement. The results on this item are presented in Table 4.6

**Table 4.6 Students level of confidence in mathematics**

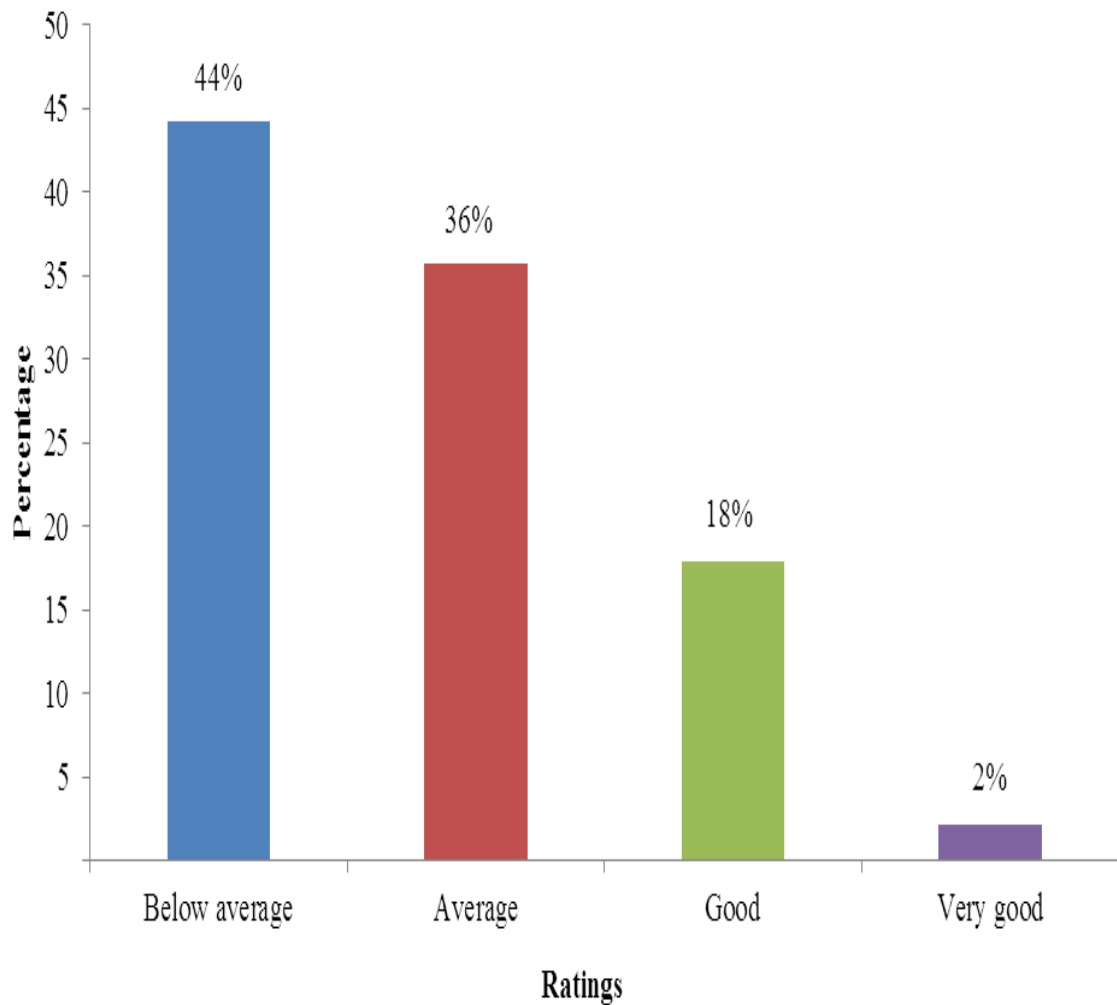
Level of Confidence	Yes		No		Not Sure	
	N0	%	N0	%	N0	%
I have Confidence in tackling mathematics	87	63	20	14	32	23
I am Sure of a good grade in KCSE exams	117	81	3	2	20	14
I will go for maths related courses in future	68	49	31	22	40	29

Table 4.6 shows that 81% of the respondents reported that they were sure of getting a good grade in the final KCSE exams, 63% said that they had confidence in tackling mathematics related problems, and 49% mentioned that they would surely go for a mathematics related course in their next level.

Positive attitude leads to high confidence level and is an indication of achievement in mathematics. Majority of the students are confident that they can tackle mathematics problems and almost half of them will go for mathematics related courses. the students feel they are capable of overcoming most of the difficulties experienced in the subject hence would perform better. This is in line with some research which points to the fact that confidence results from mathematical ability (self- efficacy) which is a predictor for achievement in mathematics (Flores, 2007 & House, 2000).

Confidence makes students surer of themselves when handling mathematics tasks. Students' belief that, through hard work they can be confident and can be able to obtain a good grade in KCSE exams though only half of them intend to go for a maths related courses. They know performance is a result of factors within their reach and which they can control like putting a lot of effort to improve. This can also be interpreted to mean that students are aware of the minimum requirements in mathematics for other courses of their interest and would strive to attain this minimum by pitting less effort to improve. Students understand what it takes to perform in mathematics but most of them lack the commitment as they believe they can go for other courses which are not related to maths and this may reduce their confidence level and performance in the subject.

The researcher further sought to understand the perceived level of performance of the students in mathematics as relates to achievement. The students were asked to rate themselves in terms of mathematics performance in the previous exam or test. The students rated their mathematics performance as either very good, good, average or below average. The results obtained from the study are presented in Figure 4.1.



**Figure 4.1 Students' ratings of their self-performance in mathematics**

Figure 4.1 indicates that almost half (44%) of the students performed below average in the in the last mathematics exams they sat for. These were the students who scored grade D and below. A proportion of 36% of the students performed averagely. They scored grade C in the last mathematics exams. Eighteen percent of the students rated their performance as good because they had managed to score grade B. Only 2% of the students rated their mathematics performance in the last examination as being very good since they had grade A. The general performance therefore is can be considered not favourable as the majority obtained dismal grades.

These performances in mathematics can be a reflection of effects of attitude factors where most students lack commitment and are not fully engaged as they have little future interest in maths related areas hence they make little effort to improve. To some, they believe that it is normal to fail in maths as it has formulae which are difficult to grasp and that one cannot be good in all the subjects. This could also be as a result of the previous low school performances in mathematics that could have affected them negatively and consequently would affect their future career choices.

The researcher also used the previous grades of students from the end of term results to gauge their performance in mathematics. The grades students attained in their last mathematics exams or tests were as shown in Table 4.7.

**Table 4.7 Grades attained in the last end term mathematics exam**

<b>Grade</b>	<b>Number of students</b>	<b>Percentage</b>
As	4	2.9
Bs	20	14.8
Cs	44	32.5
Ds	51	37.8
Es	16	11.9
<b>Total</b>	<b>135</b>	<b>100</b>

The results both from figure 4.2 and in table 4.7 signify a low performance in mathematics among the secondary schools sampled. This can be interpreted as almost half of the students were scoring D and below, 33% scoring only average of Cs while 18% scored Bs and above.

These results affirm the reality that performance in mathematics is still an area of concern. Such low performance of mathematics limits the students' choice of career opportunities and make learning and mastering of other subject across the curricular very difficult (Kiswili, 1995).

Though the students may seem to like and value mathematics, there are very few who can attain a qualification for the high stake courses like engineering, medical and I.C.T necessary for the attainment of the vision 2030 and beyond with only 18%. Those with average grades in mathematics are assured of attaining the minimum required to join other careers while the 50% below average may be required to undergo bridging courses before undertaking the other courses which increases the cost of learning. They can also qualify for low cadre courses.

Some of students were getting wastage grades of D- and E which may not be of any use to them in the academic and competitive world. The students liked mathematics but cannot make enough effort to improve as they think it may be too involving and require a considerable amount of time for one for practice compared to other subjects. They are lazy and are not serious with their assignments and doing practice which are the gateways to success in mathematics.

These findings are in contrary to the research findings which showed that high achievement could serve to predict a positive attitude, but such a positive attitude alone could not predict stronger achievement (Georgiou et al, 2007). Positive attitude alone without a commitment to work hard and improve may serve to predict low achievement as witnessed in the results above, but high achievement is a motivation on its own and would result in a positive attitude. These researchers

proposed that achievements could be improved through better teacher support and improving on learner motivation through positive attitude change.

#### 4.5 Attributions for achievement in mathematics

The students were asked to respond to other factors that they attribute to their achievements in mathematics as a subject. The results obtained from the study are summarized in Table 4.8.

**Table 4.8 Other factors influencing student attitudes towards mathematics**

Attributing factors for achievement	Yes		No		Not Sure	
	No	%	No	%	No	%
My teacher can make me pass	63	45	49	35	27	19
My parents were never good in maths	70	50	7	5	63	45
I make no personal effort to improve	103	74	27	19	8	6
I have no talent or ability in the subject	12	9	114	81	13	9
My friends hate maths	52	37	45	32	42	30
It is difficult to pass maths in my school	112	82	17	12	8	6
I have no future interest in maths related areas	107	78	13	12	12	9

Table 4.8 shows that 82% of the respondents said that the school environment did influence their attitude, 81% reported that passing mathematics was not a talent and hence did not affect their performance and 78% noted that lack of future interest in mathematics affected their attitude. Another 74% of the students observed that lack

of personal effort to improve in the subject influenced their attitude towards mathematics. Fifty percent indicated that the influence of parents did affect their attitudes while 45% said that their attitude was influenced by their teacher. Thirty seven percent of the students pointed out that peers influenced their attitude towards mathematics.

The above findings agree with the findings of Fraser and Kahle (2007), who found that learning environments at home, at school and peer group accounted for a significant amount of variance in student attitudes towards mathematics. This shows that the home environment, school environment, peer influence and personal interests affect the attitude of students towards mathematics.

The findings show that students develop attitudes depending on the performance of the mathematics at the school level. Persistent low performance in mathematics becomes part of the school culture and a normal occurrence that cannot easily be changed according to the students. The students therefore will make no personal effort to improve since to them the level of performance is already determined; hence failing in mathematics becomes a norm.

The findings also indicate that majority of the students will avoid careers related to mathematics even though they know they can do well in the subject if they make a personal effort to improve. They understand that performance is not about talents or innate abilities but that everyone has the capacity to tackle mathematics depending on the level of commitment to improve and interest in the subject.

The students also acknowledged the fact that mathematics is important for their future given that there is always the minimum requirement for mathematics in most courses. The student will only strive to attain this minimum requirement or enrol for other courses where the subject is not a requirement which has greatly influenced their attitudes as majority profess not making any personal effort to improve or not taking careers in related areas.

Parental beliefs, involvement and educational levels has a strong influence on their children's attitude towards the subject and consequently on their achievement. Parental involvement varies from providing encouragement, discussing issues, assisting in complex tasks, providing the necessities and participating in school activities. Research on parental involvement and student activities show that it increases achievement and student engagement in school. It develops in students an orientation towards internal locus of control and generally fosters positive self-efficacy, beliefs and positive self- concept which increases student engagement and achievement (Wilkins, 2004).

Parents encourage children to pursue high education goals and desire by establishing education resources at hand and holding particular attitudes and values towards their children learning. Consequently Maths ability perceptions affect student valuing of Maths and their expectation for achievement. Parents may also fail to understand the purpose of maths which the children are doing and so fail to give directions or sometimes make critical remarks which can also encourage the development of poor attitudes towards the subject e.g parents who never performed in the subject, nurse little expectations from their children and would always persuade them not to worry because the subject was also a problem to them while at school.

The teacher factors influencing attitudes includes the classroom management, teachers content knowledge and personality, teaching methods, teachers attitudes and beliefs towards the subject (Papanastasiou, 2000). Studies have shown that the teaching method explored by the teacher, his personality and style, greatly accounted for the students positive attitude towards mathematics and that without interest and personal effort in learning maths by students they can hardly perform well in the subject.

Teachers who provide a varied range of learning experiences who engage students on hands-on activities with real world applications and who make learners feel supported who demonstrate passion for the subject and who relate and interact constantly with the learners have a positive effect on attitudes towards the subject. The method of instruction by the teacher determines whether the students will be passive or actively involved which in turn would affect the level of achievements. Where students fail to make connection between concepts may finally fail to see value of learning the subject (Crespo, 2003) consequently the students become disinterested and disengaged.

An effective teacher has feelings of self- efficacy where a teacher has high expectations of his learners and would strive to control the learning environment, inspire student interest to learn and to take responsibility for their own learning which are the basic instructional methods for successful learning (Jaris, Holford and Criffin, 2003).

Peer influences and orientations determine the nature of beliefs about the school and learning in general which also determines the level of academic achievement.

Negative peer attitude will make the students view school as uninteresting or boring environment and so do the subjects they feel are more involving. Peer pressure result in negative habits and behaviours which interfere with the learning outcomes. The individual student may never realise his potentials as he constantly conform to the group demands which are usually counter- productive e.g being involved in other activities which they feel comfortable with other than being fully engaged in class activities and learning in general. Peer groupings should be chosen by the teachers concerned as this may help in cooperative teaching which improves on learning.

Generally, the conceptions, attitudes, and expectations of students regarding Mathematics and Mathematics teaching have been considered to be very significant factors underlying their school experiences and achievements. The general conceptions determine the way students approach mathematics tasks, in many cases leading them into productive and non-productive paths (Borasi, 1990 and Shoenfeld, 1985). The learner should be guided to be able to understand the importance of mathematics and should be exposed to all the experiences that lead to success in mathematics education. They should be able to see the connection between their attitudes, efforts and achievements in mathematics.

## **CHAPTER FIVE**

### **SUMMARY, CONCLUSIONS AND RECOMMENDATIONS**

#### **5.0 Introduction**

This chapter presents a summary of the findings, conclusions and recommendations of the study. The chapter also has some research gaps identified and recommendations for further research.

#### **5.1 Summary of the findings**

##### **5.1.1 Perception of the students about mathematics**

The findings of the study indicate that the students have a positive attitude towards mathematics. The findings show that the students like mathematics, enjoy and look forward for mathematics lessons. These positive attitudes are key to providing conducive environment for learning as the students learn better if they enjoy what they are learning however, this is not reflected in their performances in mathematics.

##### **5.1.2 Factors influencing students attitude towards mathematics**

The study established three factors which influence the attitude of students towards mathematics:

The students' perceptions and beliefs were found to influence their attitudes towards mathematics. The study found that students perceived mathematics positively. They agreed that mathematics was widely applicable and useful in their future careers. Majority did not perceive mathematics as a difficult subject and could not fail to pursue it even if it was optional. Hence perception is among the strongest predictor variables affecting students' achievement in mathematics.

The second factor influencing the students' attitude towards mathematics is the learning ability and competence in mathematics as a subject. Although the students agreed that learning mathematics involved a lot of memorization of facts and formulae which were difficult to grasp, they confessed they could get good grades after working hard. The learning abilities and positive minds of the students enabled them to view the subject as something learnable, achievable and were related to most of the environmental activities. The beliefs about their competencies affected their attitudes towards mathematics as the students felt that not everyone can be good in all subjects.

The third factor which affects mathematics is the previous performance and rankings in mathematics. The study found that mathematics was the least performed subject in schools and this had given students a dull perception that it was normal to fail in mathematics. This creates a myth that mathematics is a subject which is normally scored poorly. This shows that previous performance in mathematics negatively affected the students' attitude towards mathematics.

### **5.1.3 Effects of the attitudes on the student achievement in mathematics**

The other objective of the study was to establish the effect of attitudes on mathematics performance. It was established that;

Attitudes affected the effort and behaviour of students towards mathematics in various ways. students who liked and enjoyed mathematics are expected to be motivated, could complete all the assignments, do extra work, pay attention to the teachers in class, could not miss a lesson and were always prepared for mathematics lessons regardless of the presence or absence of the teacher. A good percentage of students were in contrary to this expectation which is reflected in their dismal

performances. They fail to complete the assignments and do practice which makes it difficult for them to perform.

Attitude determines students' ability, willingness to learn, choice of action and response to challenges. It determines the level of engagement, interest, personal effort without which one can hardly perform. Students are aware of what it takes to perform in maths yet they lack commitment. They know if they work hard they can improve but would constantly fail to do the necessary.

Attitude also influences the confidence level of students in mathematics. The study found that students were positive of getting good grades in their final KCSE exams, had confidence in tackling mathematical related problems and most would pursue mathematics related courses in future which reflect high level of confidence of students in mathematics. However, on the contrary the positive attitude of the students does not match their performance as most of them scored dismally in mathematics.

#### **5.1.4 Suggestions for improving students' attitudes towards mathematics**

The attitude of the students towards mathematics has been found to influence significantly the student efforts, behaviour and learning of mathematics. These are very influential aspects and motivators of students' performance in mathematics. The study suggests that more efforts be put to improve students' attitudes through designing of instruction for attitude change including; providing persuasive message, modelling and reinforcing appropriate behaviour, inducing dissonance between cognitive, affective and behavioural components of attitude. This should be

fully supported by all the stakeholders in education to ensure success as each entity has a role to play towards this goal achievement.

On the basis of analysis of the findings, it is clear that students hold positive attitudes about the subject yet they continue to perform dismally. This could be attributed to other intervening variables which are not considered by this study e.g the school culture, teaching methodology or lack of teaching and learning resources among others.

By the same token, students may not have given sincere responses some of which are conflicting, but were just trying to impress the researcher by answering positively. For instance if majority of students liked and enjoyed learning mathematics, they would have consequently performed well in the subject which is not reflected in these findings. Some of the suggestions that can be considered to improve learners' performance in mathematics include; Encouraging students to apply the taught knowledge and skills through feedback and assignments and extra work, the teacher to use variety of teaching methods, teaching aids and improvisation to promote discovery and elicit interest among the learners; and Sometimes the teachers should administer easy tests in order to arouse interests and counteract learners' helplessness especially to low performers.

## **5.2 Conclusions of the study**

The study concludes that:

Students generally have a favourable attitude towards mathematics. The student like, enjoy and look forward to the mathematics lessons. Thus, there is a positive and good attitude towards mathematics as a learning subject by the secondary school

students in Kiambu County. The students do not hate the subject as is widely thought but exhibit favourable attitudes towards mathematics. Though Positive attitudes alone may not significantly predict good performance as shown by the students' grades, there are other mediating factors including student effort and commitment that connect attitude and achievement without which attitude alone may not reflect achievement.

The attitude towards mathematics is influenced by the perception and beliefs about mathematics, learning abilities and competence in mathematics and the previous performance and rankings in mathematics in schools where the later poses a negative influence. The effect of attitude of students on learning and achievement is reflected in terms of the effort and behaviour of students towards mathematics through motivation, completion of assignments, and attention in class and lesson attendance hence low level of engagement which makes it difficult to perform in mathematics.

The attitudes of the students also influence their confidence level in mathematics mostly in terms of their feeling about getting good grades, tackling mathematical tasks and their desire to pursue mathematics related courses in the future.

Though the students are aware of the importance of mathematics and what it takes to achieve in the subject, they lack commitment which limits them of their future career opportunities due to dismal performance in the subject. This may also imply that the educational goals are not being achieved.

Students attribute their achievements in mathematics mostly to the school environments, abilities, future interest and personal effort and less on social constructs (parents, teachers and peers).

### **5.3 Recommendations of the study**

The study makes the following recommendations:

- The school administration should advantageously make use of the learners' positive attitude to create a strong inclination and culture of mathematics as a subject in secondary schools where the students can score favourably like in any other subject.
- The curriculum designers and the teachers should articulate well on the usefulness and applicability of mathematics in general so that students create positive minds towards the subject and subsequently strive to improve in the subject.
- The Ministry of education, teachers and parents should ensure that performance of mathematics among students is improved so as to dislodge the negative attitude and create a positive one on performance of mathematics in secondary schools. This will counteract the effect of previous failures and rankings in the subject which may degenerate into negative school culture and definitely low performance.
- The parents and the teachers should explore other avenues to change the behaviour of students towards mathematics and the interests of the students towards the subject. The student generally should be motivated through persuasion, use of reinforcements, provision of learning resources and

improving on teacher support which cuts across the home and the school environments.

- The learners should be able to understand the need for a commitment to be fully engaged and to be willing to embrace logic behind every success in mathematics so as to acquire the necessary knowledge and skills for examinations.
- Teachers can best motivate their learners to excel in mathematics as they are important tools in changing and shaping the learners attitude towards the subject. This can be done through;
  - the use of well designed learning strategies and feedback to fully engage the learners on how these strategies translates to improved performance;
  - mastering and adapting content to the learners understanding level by selecting the method of presentations that takes care of individual differences;
  - Guiding learners to monitor daily progress, through feedback that is normally generated from the work done.

#### **5.4 Suggestions for further research**

The study was limited to students in Kikuyu Sub-county of Kiambu County. However, the perception, understanding and performance of mathematics could be different in others sub-counties of the Kiambu County. The study suggests that an extensive similar study be done in all secondary schools within Kiambu County, so as to have a comprehensive report on influence of students' attitudes on mathematics performance of secondary schools students.

The study was only limited to students. However, the views of the teachers who play a very crucial role in the teaching of mathematics were left out. There is need to carry out a similar study involving the teachers in order to incorporate their views so as to have a comprehensive report.

The study made use of only one instrument for data collection. The use of more than one method could be appropriate so as to compare the data, verify the results and to generate a conclusive and a better report.

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## **APPENDICES**

### **Appendix 1 : Introductory letter**

Dear student,

I am a postgraduate student at Kenyatta University and currently, I am carrying out a research on the effect of students' attitudes towards mathematics on their learning and achievement.

The purpose of this study is to provide understanding of students' views and perceptions concerning the subject e.g. why they like or dislike the subject which would have a bearing on their learning outcomes. The findings of this study would hopefully help stakeholders in designing appropriate strategies for cultivating positive attitudes towards improved teaching and learning of the subject.

It is also worth noting that there will be no correct or wrong responses as it all depends on your personal opinion and experience about the subject. You are not required to identify yourself as this is NOT a test.

Your responses will be treated as confidential and will only serve the purpose for this research.

Thanks for your cooperation.

Yours faithfully,

ALPHINE C. LANGAT

## Appendix II : Questionnaire for students

### PART 1: Give the following details

Age : \_\_\_\_\_  
 Gender : \_\_\_\_\_  
 Class / Form : \_\_\_\_\_

### PART II

In this section, you are provided with a range of statements concerning your views about mathematics as a subject. You are supposed to answer by ticking the right response.

	Statements	Response		
		Yes	No	Not sure
1 A	Do you think you like mathematics			
B	Do you enjoy learning mathematics			
C	Do you look forward to a Mathematics lessons			
D	Is mathematics a boring subject to you			
2 A	Do you find Mathematics applicable in other subjects			
B	Do you think you need Mathematics for your career			
C	Do you think it is important to do well in Mathematics			
D	Do you belief that Mathematics is a very difficult subject			
E	Do you feel like you would avoid Mathematics if it were optional			

### Answer the following section using the responses provided

<u>Abbreviation</u>	<u>Response in full</u>
SA.....	Strongly agreed
A.....	Agreed
D.....	Disagreed
SD.....	Strongly disagreed
NS.....	Not sure

	Statements	Response				
		SA	A	D	SD	NS
F	Learning Mathematics involves a lot of memorization of facts and formula difficult to grasp					
G	Mathematics concepts are discrete and not related to activities in my environment					
H	I have no ability or talent to succeed in Mathematics					
I	Not everyone can be good in all the subjects					
J	I know I can get a good grade in Mathematics if I work hard					
K	Mathematics is always ranking among the least performed subjects in our school					
L	Previous failures in the subject exams implies that it is very difficult to pass Mathematics					
M	It is normal that majority of students fail in the subject					

	STATEMENT	RESPONSE		
		Always	Sometimes	Never
3 A	I ensure that I complete my Mathematics assignment			
B	I must find time for practice or do extra work			
C	I pay close attention when the teacher is teaching			
D	I feel like missing the lesson if it is Mathematics			
E	I work hard to get a good grade			
F	Mathematics assignments are boring and wastes a lot of my time			
G	I read for other subjects if the teacher fails to come for the lesson or delays.			

	STATEMENT	RESPONSE		
		Yes	No	Not sure
H	I have confidence in tackling Mathematics related problems			
I	I am sure that I will get a good grade in the final exams			
J	I will surely go for Mathematics related courses in my next level.			

Attitudes result from our learning experiences within our environments. You are required to respond to the following items as may have affected your attitude as well as performance in the subject.

	STATEMENT	RESPONSE		
		Yes	No	Not sure
<b>4 (i)</b>				
A	Mathematics teacher is the one who can make me pass Mathematics			
B	My Parents were never good in Mathematics			
C	I make no of personal effort to improve			
D	I have no ability or talent, the subject is difficult			
E	My friends hate mathematics			
F	It is difficult to pass Mathematics especially in this school			
G	I have no future interest in mathematics or in the areas related and can do without it.			

4.(ii) (a) If you were to rate yourself in terms of Mathematics performance, which category would you belong to?(tick one).

(i) V. Good    (ii) Good    (iii) Average    (iv)Below average

(b) What grade did you attain in the latest exams or tests that you sat for?

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

(d) If yes (in c above), suggest five ways that you think can make you like the subject and do well in it?

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

### Appendix III : The Timelines/Work Plan

	Activity and Time	Sept 2012 -may 2013	Apri 2013 april 2014	May 2014	May- June 2014	July 2014	August -Nov 2014	Dec- 2014- April 2015	June 2015
1.	Concept paper writing								
2.	Proposal writing and corrections by the supervisors								
3.	Proposal approval by the graduate school								
4.	Data collection entry and coding								
5.	Data analysis and presentation								
6.	Draft Report writing, revising and editing								
7	Project submission and review								
9	Graduation								

### Appendix IV: The Research Budget

No.	Expenditure	Unit	Quantity	Unit in Kshs.	Total cost in Kshs.
1.	Notebooks	Item	3	100	300
2.	Pencil and pens	Item	10	20	200
3.	Photocopying of proposals and questionnaires	volumes	10	500	5,000
4.	Fools caps	Ream	3	400	1200
5.	Transport to fieldwork	Day	10	300	3,000
6.	Lunch during fieldwork	Day	10	300	3,000
7.	Draft proposal printing and binding	volumes	12	400	4,800
8.	Draft project report and binding	Page	10	500	5,000
9.	Airtime	frequency	40	100	4,000
10.	Final project printing and binding	volumes	9	800	7,200
11.	Transport to K.U to report to school and supervisors	Days	50	200	10,000
	<b>Total</b>				<b>43,700</b>

### Appendix V : Sampled Schools and Sample Size

<b>Sampled Schools</b>	<b>Sample size</b>	<b>Percentage</b>
Moi Girls Kamangu	23	16.4
Karai Secondary School	20	14.3
Kirangari High School	23	16.4
Kikuyu Day Secondary School	28	20.0
Musa Gitau Secondary School	24	17.1
Gichuru Memorial sec school	12	8.6
Muhu Secondary sec school	10	7.1
<b>Total</b>	<b>140</b>	<b>100</b>

## Appendix VI : K.C.S.E Overall Performance

KCSE Overall performance in mathematics for kikuyu sub-county(2011-2013)																	
No.	CENTER	CANDI	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	E	M.S.S.	M.S.S.	M.S.S.
1	KAHUHO UHURU	198	30	20	18	20	14	17	15	14	7	21	15	7	7.37	6.92	5.87
2	SKYLINE-MUGUGA	31	5	1	4	1	1	7	2	2	2	3	3	0	7.16	9.41	9.7
3	UTHIRU	135	16	6	12	12	9		13	8	13	32	3	1	6.67	5.61	4.5
4	MARY LEAKEY	184	13	16	12	8	13	18	13	21	10	44	14	2	6.19	7.38	6.4
5	RUNGIRI	209	18	14	15	15	15	12	8	13	22	36	34	7	5.78	6.82	5.2
6	KIRANGARI	115	4	7	4	8	5	10	5	12	12	24	19	5	5.22	6.14	5.8
7	LAY CANON NUMA	14	1		1			1	3	0	0	2	4	2	4.74	2.29	2.08
8	THE GREEN GARDEN	19	0	0	1	0	1	2	0	1	0	3	9	2	4.58	4.13	6.1
9	MOI GIRLS	134	2	4	3	5	6	11	11	15	6	29	37	5	4.47	5.7	5.1
10	STONEBIC HIGH	2	0	0	0	0		0	0	0	1	1	0	0	3.5	1.67	2.5
11	THAMANDA GIRLS	8	0	0	0	0		1	1	1	0	1	3	1	3.5		
12	MUSA GITAU	119	1	2	2	3	3	2	2	5	9	21	31	38	2.9	3.23	2.8
13	KARAI MIXED	73	1	2			2	2	0	3	1	14	18	29	2.66	3.64	3.7
14	ACK NYATHUNA	43	1			1	1	3	0	2	1	6	13	9	2.6	1.97	1.5
15	KINDHEART	28				1		0	1	2	1	5	7	11	2.56		
16	MUGUGA	25	0	0	0	1	1	0	0	2	0	3	9	9	2.52	2.37	2.7
17	KIKUYU DAY	125	0	0	3	1		2	2	5	6	15	23	68	2.18	2.97	2.4
18	WAGATONYE	99		1			1	1	4	5	4	9	28	47	2.15	2.36	1.3
19	KABETE	71				2	0	0	4	2	2	5	11	44	2.11	2.23	1.9
20	KERWA	79	1		1		0	0	3	1	2	13	9	47	2.07	2.59	1.2
21	KANJERU GIRLS	66	1	0	1	0	1	0	0	0	2	8	20	33	1.95	2.27	1.5
22	GATHIGA	57		1	1	1	1	0	0	3	1	4	2	38	1.94	1.96	1.9
23	GICHURU MEM.	66				2	0	3	0	0	4	5	12	40	1.92	1.88	1.4
24	UFANISI	24				1	0	0	0	0		3	7	13	1.84		
25	KIKUYU YOUTH R.C.	50					0	0	0	0		2	3	45	1.77	1.27	1.1
26	ST. KEVIN KELLY	53					0	1	2	0		5	11	34	1.7	2.5	1.7
27	BRIGHT HOPE E.C.	48				1	1	0	0	0		2	2	39	1.65	1.61	
28	ACK GIKUNI	52		1						1		4	9	37	1.54	1.85	
29	PCEA MAI-A-IHII	24						1			1	2	8	12	1.54	2.92	1.2
30	RENGUTI	54						1	1		1	2	10	39	1.52	2.52	1.8
31	KIKUYU PRIVATE	211					1	0	1	7	3	10	24	140	1.49		
32	ST. TITO GIRLS	101	0	0	0	0	0	1	1	2	0	3	22	72	1.47	1.44	1.2
33	MUHU	43					1					2	31	9	1.42	1.71	1.6
34	KANYARIRI	66			1			1				3	10	51	1.39	1.58	1.1
35	FR. KEVINS	15										1	2	12	1.28	2.55	
36	STAR SHEIKH AC.	118								1	1	3	12	94	1.26	2.08	
37	KIBICIKU	77						1				3	14	59	1.17	1.29	3.7
38	KIKUYU TOWNSHIP	40										2	2	36	1.15	1.06	1.2
39	ST. SERAPHIM	15										1	1	13	1.15	1.06	1.4
40	ST. MICHAEL E.C.	56										2	5	49	1.12	1.38	1
41	ONDIRI GIRLS	5	0	0	0	0	0	0	0	0	0	0	0	5	1	1.64	1.8
42	SIGONA ST.LUKE	41												41	1	1.02	
	<b>TOTAL/M.S.S.</b>	<b>3529</b>	<b>388</b>	<b>123</b>	<b>125</b>	<b>125</b>	<b>106</b>	<b>136</b>	<b>106</b>	<b>137</b>	<b>122</b>	<b>359</b>	<b>497</b>	<b>1245</b>	<b>3.05</b>	<b>3.39</b>	<b>2.7</b>

### Appendix VII : Subject Analysis

	Subject Analyses for Kikuyu sub-county		
SUBJECTS	MSS 2010	MSS 2011	MSS 2012
ENGLISH	3.9	4.6	6.3
KIWAHILI	3.7	4.1	5
MATHEMATICS	2.1	2.7	3.4
BIOLOGY	2.9	3.6	5.1
PHYSICS	2.6	3.5	6.3
CHEMISTRY	2.3	2.8	4.7
HISTORY	3.3	4.3	5.7
GEOGRAPHY	3	4.3	6.3
C.R.E.	4.2	5.6	5.6
AGRICULTURE	3.4	4.4	5.3
BUSINESS	3.3	4.1	5.3
HOME SCIENCE	5.4	5.7	6.4

## Appendix VIII : Authorization letter



KENYATTA UNIVERSITY  
GRADUATE SCHOOL

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Our Ref: E55/24385/11

Date: 28<sup>th</sup> August, 2014

The Principal Secretary,  
Higher Education, Science & Technology,  
P.O. Box 30040,  
NAIROBI

Dear Sir/Madam,

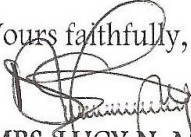
RE: RESEARCH AUTHORIZATION FOR MRS. ALPHINE C. LANGAT - REG. NO. E55/24385/11

I write to introduce Mrs. Langat who is a Postgraduate Student of this University. She is registered for a M.Ed. project degree programme in the Department of Educational Management, Policy & Curriculum Studies in the School of Education.

Mrs. Langat intends to conduct research for a thesis Proposal entitled, "Students' Attitudes and their Effects Towards Learning and Achievement in Mathematics: A Case of Public Secondary Schools in Kiambu, Kenya"

Any assistance given will be highly appreciated.

Yours faithfully,

  
for: MRS. LUCY N. MBAABU  
FOR: DEAN, GRADUATE SCHOOL

DNN/cao

