FACTORS INFLUENCING MATHEMATICS PERFORMANCE IN KCSE AMONG LEARNERS IN PUBLIC SECONDARY SCHOOLS IN KILIFI SUB-COUNTY

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DECLARATION AND RECOMMENDATION

Declaration

I declare that this thesis is my original work and has not been presented to another university.

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Recommendation

This thesis has been submitted for examination with our approval as the university supervisors.

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DEDICATION

I dedicate this thesis to my husband John our children Maureen, Ken Moses, Evans Steve, and Eve Serah.

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I give glory to the Almighty God for the gift of life and good health. I thank Kenya Methodist University for giving me chance to further my studies. I am grateful to Dr. David Mutahi, Dr. Paul Gichohi and Mr. Paul Mwenda my supervisors for their guidance in conducting this study. I also thank my family and friends for their encouragement. Finally, I cannot forget to recognize the mathematics Departments Heads, Mathematics teachers and students who were the respondents in this study. May God bless you all.

ABSTRACT

Mathematics plays a critical role in development of thinking skills, creative problem solving, precise communication as well as teamwork skills for 21st century socio-economic development. Despite mathematics playing an important societal role, students continue to perform poorly in mathematics in national examinations. In Kilifi Sub-County of Kenya, very few students attained the required grade of C+ in mathematics. The study's main aim therefore was to assess factors influencing mathematics performance in KCSE among learners in public secondary schools in Kilifi sub-county. The study specifically assessed how: Student's attitude, family background, teaching and learning resources influence mathematics performance in KCSE among learners in public secondary schools in Kilifi sub-county. The study was founded on social cognitive theory, self- efficacy theory as well as Plato and Socrates' perspectives on teaching and learning. It targeted mathematics heads of department, mathematics teachers and Form Three students from all the public secondary schools in Kilifi Sub-county. Slovins formula was used to come up with a sample of 12 secondary schools. From each of the schools, purposive sampling was used to recruit, mathematics HODs, teachers and students. The study therefore had a sample of 156 respondents comprising 12 mathematics heads of department, 24 mathematics teachers and 120 students. Students were selected among the worst performing students in the previous end-of-term examinations. Questionnaires were used to collect data. SPSS were used to aid in data analysis. Descriptive statistics comprising frequencies, percentages, mean and standard deviation were used to organize findings. Chi-square tests were used to establish relationships. Tables were used to present the study findings. The study found that students generally had negative attitudes towards mathematic subject terming it as a complex subject. Majority of students were from poor backgrounds and therefore lacked necessary resources for learning mathematics. Teaching resources were also found to be inadequate. The findings showed that poor preparedness of teachers in mathematics was brought about by heavy workload. Chi-square analysis showed that students attitude ($p=0.000$) and teaching resources ($p=0.021$) were significant at 95% confidence level. Cramer's V values showed that student's attitude ($v=0.680$) had a greater influence than teaching resources ($v=0.305$). The study therefore concluded that poor mathematics performance in KCSE among learners in secondary schools in Kilifi sub-county could have been caused by students' negative attitudes and inadequate teaching resources. It was recommended that secondary schools in Kilifi sub-county to hire motivational speakers in order to change their poor perception of mathematics. In addition, the ministry of education should commit more mathematics teaching resources to secondary schools. Benchmarking with schools performing well in mathematics should also be done where students can visit and learn. The study also recommended that teachers use audio-visual equipment and internet based programs to teach mathematics.

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ABBREVIATIONS AND ACRONYMS

K.C.S.E	:	Kenya Certificate of Secondary Education
KICD	:	Kenya Institute of Curriculum Development
K.N.E.C	:	Kenya National Examination Council
OECD	:	Organization for Economic Co-operation and Development
PISA	:	Programme for International Student Assessment
SMASSE	:	Strengthening Mathematics and Sciences in Secondary Education
SPSS	:	Statistical Package for Social Sciences
STI	:	Science, Technology and Innovation
TLR	:	Teaching and Learning Resources
WASCE	:	West Africa School Certificate Examinations

CHAPTER ONE
INTRODUCTION

1.1 Background to the Study

The definition of mathematics is the overall group of sciences that study numbers, shapes and their relationships. According to Mohammadpour (2012), it is a science which is concern with argumentation of arrangement, quantity and shapes. Mathematics is defined by the National Council for Curriculum and Assessment (2005) as expression of cognition, expertise and processes which can be used in a number of ways like; to outline, demonstrate and explain, forecast, describe patterns and associations in figures so as to disseminate and elucidate meanings of certain matters in life. When studied, it is found that the mind benefits in various ways through mathematics. According to Mata, Monteiro and Peixoto (2012), mathematics enhances reasoning to develop, assists in analytical thinking, helps the mind to quicken, enables one to be pragmatic and assists in the day to day activities.

The subject of mathematics is the backbone for contemporary science such as computer science, information technology and computer engineering and other fields related to it (Adeyinka, Asabi & Adedotun, 2013). The developed nations have appreciated this fact and have established very strong Mathematics policies which have propelled them to greater heights of development. As such, it can be said that no nation can advance economically without at least having a minimum mathematics foundation. The challenge faced by schools however is of advancing and of improving performance in mathematics as a subject. Mathematics also aids in economic and technological development of any country (Carroll, 2011).

The crucial variable determining achievement in mathematics is the mindset concerning mathematics. It is argued by Ernest (2004) that more often than not, mathematics has been branded as tough, cold, conceptual and complicated. The findings of some studies (Tezer & Karasel, 2010; Yilmaz, Altun & Olkun, 2010; Fan, Quek, Yan, Mei, Lionel & Yee, 2005) have however shown that the mindset of students in relation to mathematics is welcoming. Ernest (2004) points out that at times a sense of masculinity and importance is attributed to mathematics. A scrutiny of literature relating to the uptake of the subject of mathematics by students as influenced their attitude has revealed that there exist a number of factors that are important in shaping the attitude of a student towards a subject. The identified factors can be placed into two categories: personal factors of the student; score in mathematics (Kogce, 2009), apprehension towards mathematics, the student's ability and mastery, exterior motivator (Tahar, 2010). Secondary factors within the school, concerning the teacher and teaching approach; the teacher's instruments of teaching, the organization and coordination of the class by the teacher, the personality of the teacher and how knowledgeable they are at the content, relation of the topic being taught with real world instances, sentiment of some students concerning mathematics (Yilmaz *et al*., 2010), the approach of teaching (Papanastasiou, 2000), student personal tuition and teachers attitude toward mathematics (Kogce, 2009).

Mathematic students are influenced according to how they perform by the background of their family. The characteristics of the family are crucial in terms of how many members they are and how the family is constituted. Members of a family can be a source of providing the extra needed resources or be the ones grappling for those resources (Chiru & Xihua, 2008). Students can therefore benefit by utilizing and attaining more of these educational resources provided by the members of the family.

Survey have recorded a strong interaction between the performance of students and their home background. According to Oginni (2018), the performance of students has been predicted strongly by characteristics of their homes which form part of their socio-economic status. Others are parents' education attainment and involvement in child's education activities.

Shortage of resources has been blamed for hindering teaching instructions and poor performance by students at mathematics. This is according to the organization for economic cooperation & development (OECD) and program for international student's assessment (PISA) (OECD, 2007). According to the report by OECD (2008), the unequal distribution of resources in schools is clearly shown in the way the performance of the students in academics is also unequal. According to Akungu (2014), there is a close link between how a school performs in education and how differently they adequately utilize the resources in teaching and learning; poor usage, under usage, and utilization of unqualified teacher leading to poor achievement in education. Student's learning outcomes in school is strongly influenced by lack of both physical and material resources. It is unlikely that schools with inadequate facilities will post good results. These resources include materials that aid teaching and learning, classrooms, laboratories and workshops (Keitany, Daniel & Salome, 2014)

According to Adeyinka *et al*., (2013), students performance have been negative towards the aim and objective of education due to the teachers low motivation levels particularly in regards to mathematics. According to Blazar and Kraft (2017), teachers who are of high standards are sought and judged to be capable of elevating exam results but also to deliver a surrounding that is emotionally encouraging to the development of the students emotions and social welfare, handling the behavior of the classroom, convey

content that is accurate and encourage them to think critically. The development of the profession of a teacher highly determines the motivation of students, the strategies of teaching, skills of communication, content arrangement and lesson planning and affects the participation of students in lessons, the confidence of the teacher and mastery of the subject matter (Claudia, 2015). According to Akpo and Jita (2012), the different facets of teachers inputs (academic qualification of teachers, subject knowledge), procedures (development of professional based standards, activities in the classroom that are based on standards and belief in the management of classrooms) are connected to academic attainment of students in mathematics.

The government of Kenya through the vision 2030 has widely recognized the significance of mathematics in science, technology and innovation (STI). According to Njoroge (2014), every time the results of Kenya Certificate of Secondary Education (KCSE) are released, the mathematics mean score always attract public complaints. The government of Kenya has therefore embarked on path to strengthen mathematics as an objective of achieving its objective of science, technology and innovation by 2030. At the moment, this was a pilot study project in secondary schools dubbed "Strengthening Mathematics and Sciences in Secondary Education" (SMASSE). The government therefore embarked on empowering secondary school teachers in public schools with necessary skills and instructional approaches that will strengthen the learning and tutoring of mathematics and sciences. The strategy is an approach by secondary schools to implement the mathematics curriculum. Akwiri (2014) opines that the results of the Kenya Certificate of Secondary Education in 2013 is evidence of general poor accomplishment by students within secondary school in Kenya in the field of mathematics. This is despite mathematics being a core subject and structures being put

in place to teach it. Kenya might not realize its goal in the science, technology and innovation vision 2030 pillar for which mathematics is prioritized.

In the TIMMS report, Ker (2013) opines that an effective education system is vital in establishing a competitive advantage for a country within the global economy. In an era of technological orientation, a nation aspiring to be a leader in science and technological hub must put great emphases on mathematics education. This is premised on the fact that having strong abilities in mathematics is essential high technological advancement (Ker, 2013). There has been global concern over the poor performance in mathematics even within developed countries. Studies in the USA by the American Institute for research (AIR) and National Assessment of Education Progress (NAEP) concerning the performance in mathematics by students in grades 4 - 8 as compared to other peers globally. The results of the study showed a consistent below average performance of grade 4 students from 1996 – 2007. The study identified the dominant cause of the mathematics results in the USA to be teachers. Similar results were also found in developing countries and middle income nations (Gnagey & Lavertu, 2016).

In developing countries many scholars, educators and trainers have for centuries been concerned in establishing factors influencing to effective and quality education. A study was conducted in Pakistan by (Farooq, Chandhy, Shafiq & Berhanu, 2011). This was to establish factors that contributed to the students levels of performance in academics. The characteristics of the family such as their socio-economic conditions were established to be substantial characteristics in students' performance determination. Other factors related to the students and their peers. In Jamaica, the Ministry of Education, Youth and Culture established that students saw very little or no use of mathematics outside the school environment (Crossfield & Bourne, 2017). This

resulted in the poor attitude and accomplishment of the subject. In South Africa, a lack of motivation was pointed out by Mji and Makgato (2006) as the key reason for poor accomplishment. Negative attitude by learners, teachers and parents was a determining element to the accomplishments in teaching and learning mathematics. While concurring to these findings, Farooq et al., (2011) recommended educators teaching mathematics and students learning it be given incentives to motivate them to achieve better grades.

A study was conducted in Nigeria Sa'ad, Adamu and Sadiq (2014) to establish elements that ascribed to students accomplishments in mathematics. The findings attributed the low accomplishment in mathematics to a negative perspective by students concerning the discipline, lack of qualified subject teachers and teaching instruments. Michael (2015) recommended that for schools to experience improved or better performance in mathematics, the attitude of both students and staff was to shift to a positive one, both students and staff were to be motivated and relevant teaching instruments provided. Tshabalala and Ncube (2013) observed that 66% of students failed. This outcome was a general reflection of the low quality of schooling. The blame was purely put on a curriculum that is overloaded, weak qualifications of the tutors and inadequate capabilities of some teachers who were teaching mathematics.

Literacy in mathematics has been underscored by the government of Kenya in institutions of education. The Kenyan government has recognized the responsibility substantially played by mathematics in the growth and advancement of the country. The government through the education system has made it compulsory to undertake mathematics subject in both secondary and primary schools. By so doing, stakeholders in the education sector have become greatly concern with the accomplishment of learners in mathematics (Yara & Otieno, 2010). Despite the crucial role played by

mathematics in the society, its performance has often been a challenge in KCSE as noted by (Ramani, 2004). An urgent cry has been put out to address the challenge in schools. Various studies and reports have identified some of the causes that influence the tutoring and knowledge in mathematics such as but not limited to student and teacher perception of the subject, culture, facilities and equipment (O'Connor, 2000).

As a measure to improve the performance of mathematics and science, collaborations have been forged between the government of Kenya and donors to regularly apply teacher based educational approaches in primary schools. These interventions include; Strengthening Primary Education (SPRED) program, School-based Teacher Development (SbTD) program and Strengthening of Mathematics and Science Education (SMASE) program (SMASE, 2010). Despites measures that have been instituted to correct the accomplishments of Kenyan learners in mathematics in examination at the national level, the results have continued to be lower than anticipated (KNEC, 2010).

Accomplishments in Mathematics and sciences in the Kenya Certificate of Secondary Education (KCSE) examination has been declining for the last three years. A report by Otieno (2017), on Nation Newsplex review of national examination analysis indicate that an overwhelming majority of the KCSE candidates nationally failed in Mathematics and the sciences from 2014 to 2016. Nearly 90 per cent, or 493,184 of the 569,733 candidates who sat the Mathematics Alternative A paper in 2016 scored between C- and E. This was about a 10 percentage increase from each of the two previous years. In contrast, four per cent (20,682) of the 2016 candidates scored either an A or A-. Half the candidates scored an E, the lowest grade, while the average mean grade was D, a drop from D+ in 2014 and 2015.

Performance in the Mathematics Alternative B paper was even worse, with 99 per cent of the 1,442 candidates who sat the paper scoring less than grade C. Less than one per cent, or three candidates, scored either grade A or A- (Otieno, 2017). This is a worrying trend that needs urgent and stringent measures to reverse before the situation gets out of hands and derail the country's progress towards industrialization and vision 2030. A baseline study by the Centre for Mathematics, Science and Technology Education in Africa (CEMASTEA) a government agency, indicates that students who are considered by teachers to weak are advised against picking courses that are science related, instead of being encouraged to do so. Deficient infrastructure of schools was identified as another challenge. According to Otieno (2017) science subjects were not being proactively entrenched by many schools.

The county of Kilifi is among the 6 counties within the Coast region. The seven sub-counties that make up Kilifi County are: Kaloleni, Rabai, Magarini, Malindi, Ganze, Kilifi South and Kilifi North. It comprises one hundred and sixty five sub-location, fifty four locations and seventeen divisions. As per the 2010 constitution of Kenya, it constitutes 35 county wards, and 7 constituencies. It was in 2012 estimated to have a population of 1,217,892. In 2009, Kenya Population and Housing Census projected a composition of 587,719 males and 630,172 females. In 1999, the age for the population for going secondary school, which was between 14 to 17 years was 102,868 constituting 9.27 percent of the population size. In 2012, only 35,670 students were enrolled which fell short of the 112,893 estimated as the population age for secondary school enrollment. In 2015, it was projected to rise to 123,896 while in 2017 it was projected at 135971. The county is currently challenged in terms of the few number of secondary school which stands at 120 and handled by 710 teachers. The county has a low secondary school gross enrolment rate of 42.5 percent while the net enrolment rate is

34 percent with differentials being reflected with boys having a higher enrolment rate than girls. Performance in secondary schools has also been poor compared to neighboring counties and national average. Table 1.1 shows the mathematics performance in Kilifi Sub-County.

Table1.1.

Performance in Mathematics in Kilifi Sub-County

Academic year	Mean Score	Grade
2012	2.3028	D-
2013	2.5749	D-
2014	2.4849	D-
2015	2.4907	D-
2016	2.5103	D-

Source: Kilifi County Education Office (2017)

1.2 Statement of the Problem

Mathematics is valued in the society for its development ability and potential to advance technology and science because of its abstract nature. Acquiring apprehension in mathematics is a key responsibility of schooling (Chaman, Beswick & Callingham, 2014). According to Andaya (2014), sciences and arts consider mathematics to be the foundation of learning. In almost all fields, it's considered as requisite: economics and technology, sports angles and fashion measurements. The crucial nature of acquiring perquisite skills in mathematics has been stressed by studies as well as the performance of mathematics in secondary schools. Our daily lives are defined by mathematics; to achieve the Kenya's vision 2030, it was inevitable to provide quality education that could ultimately lead to student's high performance (Onderi, 2015). Students have however continued to perform dismally in mathematics despite its critical role. This has

been observed in national examination. Ranani (2014), indicate that, mathematics achievement generally has been poor in many parts of the Country. According to Njoroge (2014), Kenya is experiencing poor achievements in mathematics despite the subject being considered as fundamental in turning around its industrialization by 2030. The same trend of poor mathematics performance has been noted in Kilifi Sub County over the years as depicted in Table 1.1. This trend indicates that very few students attain the required grade of C+ in the subject which is the minimum grade required to pursue a degree course in local universities. The implication of the poor mathematics performance in the sub county (D-) means that majority of students dream for tertiary education has been jeopardized by poor accomplishments in mathematics.

There exists a host of studies examining teaching of mathematics and mathematics performance such as (Lindberg, Hyde, Petersen & Linn, 2010; Mbugua, 2012; Munuve, 2013; Kiwanuka et al., 2015; Karigi, 2015 & Idowu, 2016). However, from a general perspective, majority of these studies have not considered social economic disparities in a particular region and tend to ignore adequacy and standards of learning and teaching facilities in public schools and public schools teachers workload. This survey is dedicated to fill these gaps in knowledge by assessing how a combination of factors that influence mathematics performance in KCSE among learners in public secondary schools in Kilifi sub-county.

1.3 Purpose of the Study

The study focused on assessing how Psycho-Social Factors influence mathematics performance in KCSE among learners in public secondary schools in Kilifi Sub-County.

1.4 Research Objectives

The study was guided by the following objectives:

i. To assess the influence of student's attitude on mathematics performance in KCSE among learners in public secondary schools in Kilifi sub-county.
ii. To find out the influence of family background on mathematics performance in KCSE among learners in public secondary schools in Kilifi sub-county.
iii. To determine how teaching and learning resources influence mathematics performance in KCSE among learners in public secondary schools in Kilifi sub-county.
iv. To evaluate the influence of teachers preparedness and workload on mathematics performance in KCSE among learners in public secondary schools in Kilifi sub- county.

1.5 Research Questions

The research questions for the study were:

i. To what extent do student's attitude factors influence Mathematics performance in KCSE among learners in public secondary schools in Kilifi sub-county?
ii. What is the influence of family background on mathematics performance in KCSE among learners in public secondary schools in Kilifi sub-county?

iii. To what extent does teaching and learning resources influence mathematics performance in KCSE among learners in public secondary schools in Kilifi sub-county?

iv. What are the influences of teachers' preparedness and workload on mathematics performance in KCSE among learners in public secondary schools in Kilifi sub-county?

1.6 Justification of the Study

It has been recognized that mathematics is an area that is critical to learning focused towards changing technology and the economy in a society and therefore promoting it as a key subject is of great consequence for human kind development (Adino, 2015). There is therefore a need to study the performance of mathematics and identify the determinants of poor performance in order to address issues surrounding poor student's accomplishment in mathematics. This survey consequently sought to assess how a combination of determinants that affect accomplishment in mathematics at KCSE among learners in public secondary schools in Kilifi sub-county.

1.7 Limitations of the Study

The study encountered the challenge of acquiring needed data from respondents. The respondents feared spillage of information that was confidential to the public domain especially the private secondary schools.

1.8 Delimitations of the Study

A sample size was used to enhance generalizability of findings. This was guided by four variables, which were Influence of student's attitude, Influence of family

background, influence the resource used in learning and teaching resources as including teacher preparedness and workload on mathematics performance in KCSE among learners in public secondary schools in Kilifi Sub-county.

1.9 Significance of the Study

The survey findings shall help tutors reaching mathematics and administrators of schools and the boards of management in developing strategies for addressing unique challenges affecting performance in mathematics in their respective institutions. The findings of the survey will be crucial to professional bodies and institutions such as Kenya Institute of Curriculum Development (KICD) and other stakeholders to relook the approaches in the methodologies applied in mathematics teaching and embark on strategies to improve on implementation of the curriculum in an effective manner.

1.10 Assumptions of the Study

In conducting this study, the researcher presupposed that school management and mathematics teachers' efforts were aimed at improving students' performance. It was assumed that teaching of mathematics in public secondary schools in Kilifi-Sub County was done in accordance with the Ministry of Education guidelines. The researcher also assumed that there were no irregularities in the KCSE exams.

1.11 Operational Definition of Terms

Anxiety	A tense emotion, fear or feeling that interrupts the performance of mathematics.
Factors	An incident, occasion of effect that leads to an outcome.
Family background	Socio economic status of household from where the student hails.
Perception	A belief or opinion held by students regarding mathematics
Performance	KCSE results in Mathematics
Preparedness	Readiness of mathematics teachers
Self-efficacy	A students belief in their innate ability to perform in mathematics
Student's attitude	The feeling a student has toward mathematics. It can either be favorable, neutral or unfavorable towards the object, subject or situation.
Teaching and learning resources	Requirements needed to assist in delivery of knowledge to student.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

In chapter two, related literature reviewed was to address the knowledge gap. Theoretical literature and empirical literature was premised on factors influencing mathematics performance in KCSE among learners guided by the study. The purpose of literature review was to discover inconstancy, areas to explore in research, incompatible in preceding surveys and previously not answered or left open questions. The first section reviewed literature related to students' attitude, family background, teaching resources and teacher preparedness.

2.2 Influence of Student's attitude on Performance in Mathematics

Positive attitude towards a subject was related positively to performance. In Kenya, research done by Nui and Wahome, (2006) in secondary education, has showed that consistent failure in sciences might be attributed to both the teachers and students attitudes towards the subjects. In agreement to this Manoah, Indoshi and Othuon (2011) observed that attitudes played an essential role in the performance of students'. Students with positive attitude tended to perform well in an exam. Considering these studies, the role of attitude could be a key factor in determining how well a curriculum is implemented in learning institutions and in particular Mathematics subject.

The different but interrelated variables were also used to find an insight on the characteristics that define attitude in the environment of the school. In general the student's attitude was found to be positive in relation to mathematics. The study also focused on the relationship between final academic results and the score in mathematics

in relation to attitude. Gender was not a factor identified by the study though a continuous negative trend was observed in girls in relation to their attitude as they progressed in school. Variables related to motivation when subjected to hierarchy analysis using structural equation modeling were shown to be the principal attitude predictor in mathematics. In Opolot-Okurut (2005) study, the attitude of students in secondary schools in relation to mathematics is interrogated. The results indicated substantial variation in the variables measuring attitude investigated on both female and male students. The attitude of students in schools performing highly showed an attitude that was positive compared to that of students in schools performing lowly.

Peppin (2011) compared the attitude of students in England and Norway. The study found their attitude to be influenced by their social and cultural design. This molded the environment and framework in which mathematics was learned. The study noted both similarities and differences that emanated from the influence of the environment. Though the statistical survey was premised on compact sample, attitude on mathematics was observed to be positive in year 7/8. The students in both countries showed similar results. The positive attitude among the students declined in year 9 then it increased in year 10/11. The analysis of the qualitative data from the student's comments concerning their attitude pointed out seven factors that seemed influential. The factors were slightly common but the understanding different based and a link was drawn to the learning surrounding mathematics in the classroom.

Another key factor likely to affect student attitude towards mathematics is self-efficacy. This refers the student's personal ability and confidence in grasping new abilities and assignments usually within the academic territory (Nasiriyan, Azar, Noruzy & Dalvand, 2011). Self-efficacy by students is a vital factor of motivation that assists in anticipating

the student's preferred actions, attempts and academic achievements (Pintrich & Schunk, 2002). Multon, Brown and Lent (2011) subjected academic self-efficacy to meta-analysis. A variance of 14% was reported on the beliefs of self-efficacy on the pedagogical accomplishments of leaners while a variance of 12% was reported on the persistence of the leaners pedagogy. Britney and Pajares (2006) conducted a survey targeting learners in middle school and their performance in the subject of science in connection to effectiveness. The study sampled grade 5 – 8 students and established that the student's grades in the science subjects were constantly influenced by self-efficacy.

A multi-purpose research was conducted by Khan (2011) on a small scale. The study's initial purpose was to ascertain the difference between the perspective of leaners towards mathematics within government and privately sponsored secondary schools in Quetta, Pakistan. The survey also aimed at establishing if student's perspective regarding mathematics was affected by differences in gender. The findings of the study did not yield any significant distinctness between the students attitude in both the public and private secondary school in relation to mathematics. Scrutiny of the subscale level results shows no difference that can be significantly considered other than the value of mathematics. This was evident in both the private and public schools. In addition, the study revealed significant attitude differences between the genders. A significantly high degree of positive attitude was observed among male students in contrast to the attitude towards mathematics on the counterparts who are female.

A quantitative study was conducted by Vella (2011) on how the gender difference and age influenced the perspective of learners regarding mathematics. The study design was conducted at state Junior Lyceum secondary schools. Questionnaires were issued to

form 1 and 3 students totaling 160. Questions were based on the Likert scale with 32 statement divided into 4 options. A section at the bottom end of the questionnaire enabled the learners give their opinions on their attitude towards mathematics. The study took note of the student's annual marks in the questionnaire. Attitude was found to be a significant factor influencing performance. Form 3 males and Form 1 females in the secondary schools were found to have significant statistical scores in attitude. An increase in the age of the students had significance in their pessimistic perspective regarding mathematics. It was noted in the annual examination that girl's achievement seemed to outperform boy's achievement. Notable statistical variations favoring female learners were recorded within Form 1 in secondary schools and within those in Form 3 learners. The study findings, based on the student's comments, showed that teachers very much influenced the advancement of the student's attitude.

A similar study investigating gender difference and their attitude towards mathematics was conducted by (Asante 2012). The survey was administered Accra, Ghana. The survey used democratic data questionnaire and attitude towards mathematics inventory (ATMI) to collect anonymous data from the respondents. SPSS version 16 was used to analyze the data collected and convert them to mean. The study revealed that there existed sufficient attitude difference displayed between the two genders towards mathematics. The environment of the school, attitudes of the educators and their beliefs, styles of teaching and attitudes of their parents were identified as determinants of the student's attitude in relation to mathematics.

An investigation was conducted by (Ajisuksmo & Saputri (2017). It centered on establishing the effects of perspectives of learners in high school in relation to mathematics and awareness on metacognitive in relation to their achievement in

mathematics. To measure the student's attitude in relation to mathematics, the Attitudes towards Mathematics Inventory (ATMI) was applied while metacognitive ability was measured using Metacognitive Awareness Inventory (MAI). When conducting the study, the report cards of the school throughout the semester were reviewed so as to measure the achievement in mathematics.

Aqajani, Khormayi, Rajabi, Rostam and Khiavi (2015) conducted a study in Kazerron city on primary school students. The survey was set to establish if a link existed between self-efficacy and self-confidence in relation to anxiety in mathematics. The survey established that parameters of self-efficacy and self-confidence positively influenced anxiety in mathematics. The variable, emotional self-efficacy, learning self-efficacy and self-confidence when analyzed using multivariate regression indicated that student's anxiety in mathematics was strongly being predicted by these variables. Anxiety in mathematics is therefore high in female students compared to male students according to this study. According to the findings, anxiety in mathematics is significantly different from anxiety in other fields of science in humanities. A study was conducted by Nikmanesh and Yari (2014) in Sabzevar on mixed high school students. The study sought to establish the link between anxiety in exams with self-perception and self-efficacy. The survey established that there was a substantial connection between anxiety in exams and self-efficacy. It also established a positive relationship between the 3 parameter (aggressive perception, acting perception & passive perception) of self-perception with anxiety in exams.

2.3 Influence of Student Family Background on Performance in Mathematics

Mohammed, Yinusa and Akanle (2008) conducted a study on socio-economic determinants and its role on achievement of students. The survey locale was Nigeria.

The findings indicated that a chain of social-economic factors to be predictors in academic performance. The study included parents, family and networks. In Kenya, similar findings were also made though they were more conspicuous at the primary school level. The study revealed a preference of boarding by parent with a high income while children coming from a low income background were taken to public primary schools. Generally in Kenya, the academic achievement of private primary schools was better than a most categories of public primary schools. According to the Kenya National Examination Council, majority of candidates from private schools qualify to progress to secondary school as comparison to those from public schools. A similar study was conducted by (Adeyemo & Kuyoro, 2013). It analyzed how the academic performance of students was being influenced by the social and economic experiences. The study revealed that the performance of students at tertiary schools was being influenced by conditions of their parents. These conditions included their parent's marital status, academic and job status.

A systematic review was conducted by Banerjee (2016) on determinants of poor academic performance on underprivileged students in the subjects of science and mathematics in school. Large scale assessment was conducted by the study considering a well define population for comparison and a research design that is robust. A measure of disadvantage was used in all the studies including an SES that is lower, linguistic hindrance, tribal minority, interim refugee rank, and a measure of end result such as achievement in standardized national tests. Research studies which applied correlational analysis were reviewed to answer relevant questions in the study. Reports published between 2005 and 2014 totaling to 771 studies were reviewed. The studies synthesized totaled thirty-four. The findings indicate a significant correlation between

underachievement and deprivation which can be categorized to portray a lack of support and surrounding that is positive.

Ugwuja (2010) conducted a study in Nsukka educational zone in Enugu state targeting students of senior secondary schools. The study design set to find out how the student's academic achievement was being influenced by factors in their family background. The study revealed the following: educated parents had students with better academic achievement compared to parents who were not educated; noticeable benefit was achieved by students from parents with a high income as compared to students with parents having a low income. High income parents could cater for their children's academic needs such as learning materials and equipment; the student's academic achievements were impacted by their parent's level of motivation. This was because children's learning was being influenced by their motivation and reward system. An investigation was conducted on how the performance of children in mathematics was being influenced by their parents SES (Das & Sinha, 2017). The study concluded that the children's performance in mathematics was being affected by their parent's socio-economic status. The student's independent mathematics performance was observed to be influenced by their parents' social and economic determinants such as education of the father, his profession and monthly earnings of the family.

A survey was conducted in Kenya particularly within the sub-county of Kitui west by (Kamuti 2015). It looked at the student's academic achievement in public school and how the home surrounding influenced it. The variables considered by the study were: how the student's academic achievements were being affected by the financial standing of their parents; ways in which the academic achievement of the students were being

affected by the involvement of their parents/family; how the academic performance of the students was being influenced by their parent style of parenting.

The study found that the student's academic achievements were being swayed by the economic status of their parents, the student's academic achievements were being influenced by the involvement of their parents/ family, and that in public secondary schools, the student's academic achievement were being influenced by their parents' style of parenting. The study consequently deduced that academic accomplishment was affected positively by authoritative parenting while good performance was negatively associated by authoritarian and permissive parenting. The results analyzed by ANOVA showed the academic performance of the students had been considerably influenced by the economic status of parent as shown by mean responses of academic performance of students as influenced by parent/ family and students' academic performance as influenced by style of parenting.

Kamau (2013) conducted a study in District of North Mbeere, Division of Siakago. The study set to establish if the student's academic achievement was being affected by their family's background. The focus of the study was: marital status of the parents, financial capabilities of the family, the level of education of the parents and the size of the family in relation to the student's academic performance. The study findings exhibited that the student's academic performance was positively influenced by the marital status of the parents, the size of the family, the level of education of the parents and the financial capabilities of the family. The study however found that the student's academic performance could not be significantly explained by the parent's marital status. The academic performance was being affected by a cohesive or conflictive type of family.

The level of education of the parents could only affect 7% of the student's academic performance.

A study was conducted in Abuja, Nigeria by Dzever (2015) to find out how the learners accomplishment in academics in public secondary schools were being impacted by factors in the home environment. The study yielded a relationship that was positive and significant in relation to the student's academic performance and permissive style of parenting. No relationship was however noted concerning the student's academic performance and authoritarian and demanding styles of parenting. The academic performance of students was however being influenced by the parents earnings, background of education, profession level and permissive style of parenting. These were the major predictive variables.

A study was conducted in Malaysia by Zahyah (2008) to investigate the influence between socio-economic factors. The study established that the academic achievement of the children was related to the level of education of both parents and availability of reading materials in the home. Ndaruhutse (2008) attribute the increasing rates of school drop out in Sub-Saharan African to the low academic performance of students occasioned by financially needy students who are made to repeat grades. He argued that there were few benefits of repeating grades and it was inefficiently in terms of finances. According to Ndaruhutse (2008), the problem of poor performance could effectively be tackled through addressing the issue of poor academic performance by reforms. Reforms need to tackle the issue of poor attendance in school, teaching quality and relevant content, inadequacy of support from parents and teachers. Olaitan (2017) factored family structures in relation to the accomplishment of learners in academics in secondary schools. The study narrowed down its target to families with single parents

and families with both parents. The different family structures studied yielded significant differences in relation to the student's accomplishments in academics. The survey established that children with both parents academically accomplished more as opposed to families with single parents.

Durojaiye (2006), on a study on social determinants influencing poor mathematics achievers, the survey stipulated factors that affected academic performance as; beliefs and attitude, early marriage and family income. The student's level of achievement was found to have negatively been affected by cultural constraints. Rustling of animals, underage unions and mutilation of the female genital (FGM) were some of the social and cultural practices that provided an insecure environment for children. These conditions exposed children to problems of emotional nature. It therefore led them to lack concentration in class and have low confidence in the assignments given to them.

Mbugua (2012) conducted a study in Koibatek District, Baringo County on the student's performance. The study revealed a better performance from the boys in the sciences and mathematics than from the girls. Studies conducted by Chege and Sifuna (2006) and Wambua (2007) revealed similar results from other counties in Kenya. In Kenya, multiple studies that a poor engagement and achievement of women in SMT subjects as compared to men. This is exhibited at the entire stage of education. The Gender Policy in Education blames it on a framework that is insensitive to the needs of girls and inadequate resource allocation in many girl schools. This has resulted in girls performing poorly compared to boys Sinnes (2004) also argues that girls have been portrayed in books and curriculum as inactive and having traditional roles. Kagume (2010) see this as a discouraging factor among girls thus leading them to ineffectively learn and restricting their choice of careers.

2.4 Influence of Teaching Resources on Performance in Mathematics

A report by the World Education Forum in Dakar blamed educators for ineffective utilization of resources. The report pointed out that there were no new skills in schools and that they lacked technology that could assist them acquire knowledge (Visser, Andrea & Feza, 2015). This was observed in about one-third of the secondary schools in the world. Additionally, the report argues that in cases of limited resources, there was reduction of the workload making science and mathematics become less stimulating. Githua, (2011), posits that the poor mathematics performance was as a result of the teachers not having enough experience in teaching mathematics, inadequacy of materials and equipment's in teaching mathematics. Students lack the required knowledge on basic mathematics techniques and that the simple processes and algorithms were not known by the students (Lashley, 2017). This was a common weakness that was observed from students and led to attaining low mathematics marks in KCSE. This failure to understand these concepts is a manifestation that other elements such as lack of proper methods of teaching, inadequate resources among others that hinder effective apprehension of the subject of mathematics in public secondary schools.

In Kenya within Igoji division, Kaume (2006) desired to discern the trends of allocation of resources and the effects on the achievement of learners in sciences and mathematics. The survey was conducted between 2002 and 2005. The survey included within the division of Igoji, fifty science and mathematics teachers and 7 head teachers. The study established that schools in which physical resources were highly available performed better that those whose levels of physical resource availability was low. Students who came from well of families better performed in science and mathematics. Also, science

and mathematics performance of the students was negatively correlated by the experience of teachers. The study established that schools with a teacher ratio that was low compared to students performed better than those with less teachers per students. Schools that were found to have sufficient resources for learning and teaching performed well compared to schools without sufficient resources.

In 2011, a compound regression investigation was performed on Trends in International Mathematics and Science Study (TIMSS). The data was collected from learners in South Africa to assist find out what influenced their performance in mathematics. The mathematics achievement of pupils was found to be influenced by the environment of their home and school (Viser, Juan & Feza, 2015).

A study in Bondo district in Kenya was performed by Yara and Otieno (2010) to determine the predictors of academic accomplishment of mathematics learners within secondary schools in relations to tutoring and apprehension using the available resources. The study used stratified sampling and divided them into the following strata: co-educational day, co-educational boarding, boys boarding and girls boarding. The questionnaire for the student's was validated on performance (SPQ). Multiple regression analysis was used to analyze the collected data. The study found eight independent variables to have a positive correlation on performance of mathematics which was the dependent variable. In total the eight variables amounted to 23.6% of the overall variance in the measure of independence. Financial support from the government, trained teachers, labs/classes and the ratio of books for studies to students could be utilized to anticipate academic accomplishment in mathematics.

A study was conducted in Tanzania by Yusta, Karugu, Muthee and Tekle (2016) to scrutinize the connection between the performance in mathematics and instructional

materials. The study considered integrated primary schools and targeted learners with dyscalculia within Arusha. The study had two objectives. The first was to find out what instructional resources mathematics teachers use in integrated schools. The second objective was to examine if mathematics teachers in integrated schools adequately used instructional materials. Graphic and regalia resources were identified by the study to be frequently used by the teachers. The study observed a lack or inadequacy of the identified types of instructional materials. The five common ones are audio, visual, audio-visual and regalia. A separate study was conducted in South-West Nigeria in relation to how mathematics performance of pre-university students was being affected by the equipment's utilized in tutoring and knowledge infusion. The study made used of standardized questionnaires that were administered on students to measure their performance. The questions were structured to answer three questions on the learner's mathematics accomplishment. The acquired data was scrutinized using correlation analysis, multiple regression analysis and coefficient of determination. The independent variable having been subjected to the three methods of analysis established that they had no notable impact in the learner's mathematics performance.

A comparative study was conducted by Afana and Lietz (2007) on the relationship between the resources provided by the school and the student's achievement. The study targeted PA educated Arab students. The data was subjected to descriptive analysis, simple regression, cross tabulation and hierarchical linear model analyses. The study's objective was to identify the schools different resources in particular the ICT's, other instructional equipment including the schools physical infrastructure. All these were examined in relation to the Grade 8 student's mathematics achievement. The study targeted Israeli Hebrew schools, Israeli Arab schools and Palestinian schools. The three group of schools clearly exhibited differences in the resources available in the school.

Despite the findings, the study clearly showed that inadequacy of support, software and hardware for computers were the only one that significantly affected the student's achievement in mathematics having considered the schools social and financial stability and the background of learners. The findings were however not consistent with Hebrew speaking schools in Israel. The consistency was observed for Arab speaking schools in Israel and PA.

Lyons (2012) argues that factors such as the resources used in teaching, the demands of the curriculum, motivation of the students, teaching skills and the schools physical facilities are what makes learning complex. Students can therefore achieve good performance if basic resources such as TLR are effectively made available to the school. The school needs to equip itself with sufficient teaching and learning apparatus, adequate tutors and auxiliary employees and make available tangible resources. Such facilities include conducive classroom, laboratories for experiments and libraries for enhancing research. A study examined the West African School Certificate Examination and how students performed in relation to instructional resources. The available teaching resources were related to the student's academic achievements. The achievements of the students were found to have been significantly affected by the material resources. This was because the material resources assisted the students to learn basics and the ideas surrounding them therefore discouraging rote-learning. The findings were observed in cases of inadequate TLR and compromised education levels which points to poor achievements in academics, high dropout rates. Bad behaviors, poor motivations by teachers and education goals that were unmet.

2.5 Teacher Preparedness and Workload on Performance in Mathematics

Studies (Nye, Konstantopoulos, & Hedges, 2004; Chetty, Friedman, & Rockoff, 2014) have confirmed that the academic and lifelong success of students is influenced by their teachers. This has gone against continuous effort by researchers to compare teacher's performance with certain characters like their experience, educational background and the attained certification (Wayne & Youngs, 2003). Studies conducted recently by Kane, McCaffrey, Miller and Staiger (2013) and Grosmman, Loeb, Cohen and Wyckoff (2013) have found established some attributes of constructive classroom surrounding, such as organizational skills of teachers and association with students.

The issue of poor implementation of mathematics curriculum in Africa was reviewed by UNESCO (2009). The report blamed the poor implementation to an insufficient number of teachers who are well trained, lack of and underutilization of teaching methods, a lack of adequate teaching equipment's that are relevant, and a dwindling culture of developing mathematics. The performance in mathematics has for years now been a subject of outcry in Uganda's national examinations. A study was conducted at the Makerere University to establish elements that affect primary school pupils from learning mathematics. The factors considered identified teachers (83%) as the hindering factor in learning mathematics. The study considered the following factors: weak techniques of imparting knowledge, scarcity of sustained teacher training and advancement, inadequate preparations due to lack of a strong academic background, inadequate inspiration and ability of teachers in mathematics (Opolot-Okurut, 2008). The analysis of data revealed the effect the experience from service learning had on this category of teachers and the significant effect it had on the teaching instructions. A

wealth of knowledge was added to an already existing literature on the preparation of teacher programs in shaping future teachers who are experience, prepared and qualified.

Naibei, Nakhanu and Aurah (2017) conducted a study targeting primary schools and how pupils were grasping basic concepts and skills as influenced by the preparedness of the mathematics teachers. The preparedness of the mathematics teacher was found to be strongly related to the ability of the learner to acquire basic concepts and skills. The perception of the findings was that through the study, the teacher's lack of preparedness will be highlighted as a factor leading to poor grasping of elementary mathematics concepts and expertise consequently poor mathematics achievement. Boyd, Lankford, Loeb and Wyckoff (2008) estimated the consequences as a result of the preparations of teachers based on the value they impart on students in the exam results in disciplines including mathematics and English. The study targeting schools in the New York City, revealed a variation in the preparation programs that were being supplied by teachers and their effectiveness. Teachers in their first year benefited from preparation practices. A qualitative research study was conducted by Hine (2015) to explore how teachers completing graduate diploma perceived themselves. The study targeted trainee secondary school mathematics tutors graduating with a diploma of secondary education. The study specifically examined the teacher's readiness perception as the start teaching mathematics in secondary schools. The teachers exhibited a difference in the readiness to teach mathematics in secondary schools.

An investigation by Arends, Winnaar and Mosimege (2017) aimed at the association between the achievements of the students and the exercises chosen by their tutors in the classroom. Data was acquired through the deployment of questionnaires distributed to teachers. This was part of the Trends in International Mathematics and Science Study

(TIMSS). The questionnaire contained questions on the practices employed by tutors to be clear in their enlightenment, discussion in the teaching room, response, developmental evaluation, problem solving and meta-knowledge approaches and cooperation. The findings showed that the performance of the learners was positively related to classroom practices selected by the tutors. The survey's other objective was to establish how the performance of the learner was being affected by how mathematics teachers collaborated. The study observed that collaboration among teachers was not keenly practiced though it was observed that the performance of the students was positively affected when teachers observed lessons of their peers. It was the discovery of the survey that accomplishments of the students in mathematics were affected by the various practices teachers used in the classroom. The study recommends that these practices needed to be sought and mechanisms for their implementation instituted to support the teachers.

Gimbert, Bol and Wallace (2007) conducted a study to establish how the achievement of students and the instructions they received was being influenced by preparation programs of the teachers, both traditional and alternative. The study targeted urban secondary schools in high need and chose a mixed method comparative design approach. The study set to answer three questions: 1) is the academic accomplishment of mathematics students affected by the training of the teacher? 2) Are the teachers adhering to set standards by the National Council of Teachers of mathematics in their teacher preparation? 3) Is the achievement of the students influenced by how frequently their teachers utilizes the standards guiding process and content? The study targeted the district level quarterly assessment and the standardized state test. The findings show a difference that is significantly inclines towards teachers' alternative preparation on the achievement of students and the utilization of instructional approaches that are standard

driven. The study recommended that tutors at the level of high school and middle school are needed to viably explore alternative programs for preparing teachers in order to meet the needs of students of public schools. This strategy can be used in the classroom by qualified mathematics teachers.

Roba (2015) examined the association between the mathematics accomplishments of students and the preparedness of their teachers in Marsabit County. The survey determined the various elements of preparing teachers such as: perspective, organizing and encounters which increases the learner's achievements in mathematics. A statistical difference was found by Chesimet, Githua and Ng'eno (2016) concerning the perceived preparedness by teachers as they sought to implement content in mathematics at the secondary school based on their experience. No statistical difference was however noted by the qualification of teachers and gender. Areas deemed socially advantaged were more likely to implement a mathematics curriculum of their own and the teachers were better prepared in teaching mathematics content that was advanced. Students with a better mathematics achievement were mostly found in schools that implemented a mathematics curriculum of their own. Their teachers also covered advanced mathematics content.

A survey was conducted the sub-county of Likoni by Njenga (2016) who investigated the factors relating to the teachers' influence on mathematics accomplishments of pupils targeting public school undertaking the Kenya certificate of Primary Education. The preparations of the teachers were determined by the survey to be lacking hence hindering the manner in which content in mathematics was being delivered. The tutors relied on the teacher focused delivery strategy. The survey found the mode of training that is in-service, not to be sufficient yet also there lacked sufficient inspiration for the

learners and tutors alike. Mwingirwa (2015) set to examine how teachers were using technology in teacher preparedness in teaching mathematics. The study measure teacher preparedness by examining the use of the available ICT resources and their relevance in terms of levels of training. The study took part in secondary schools in Tigania East district. The findings were that the secondary schools had a variety of ICT resources. Support structures were also found to be available, according to 66.9% of the schools. Lack of mastery by tutors was discovered to be a contributing factor for the available ICT resources not being utilized. The major limitation identified by the study was lack of training, either in-service or pre-service. The study concluded that a lack of ICT adoption and its utilization by mathematics teachers hindered its application in learning mathematics at Tigania East district.

Gichuru and Ongus (2016) established that mathematics performance of pupils in relation to the quality of the teacher. It targeted primary 6 pupils in private schools in Gasabo district in their national examination. The study noted that students performed highly when taught by teachers with effective teaching practices compared to those who applied teaching practices that were ineffective. The pupil's performance was also impacted more by more experienced teachers compared to teachers who have just graduated. Pupils also performed highly from teacher who had good communication skills. Enhanced accomplishment in mathematics was observed institutions where tutors showed commitment to assigned responsibilities, mathematics teachers exhibited a positive attitude, better preparations were done ahead of teaching, relevant teaching resources were used and pupils were engaged through assessments and evaluation.

Makewa, Role, Too and Kiplagat (2016) conducted a study in primary schools to discern the association between the accomplishment of mathematics and the

commitment of teachers. The western region of Kenya was the area of the study targeting 74 mathematics teachers and 280 class 8 pupils. The study found trained teachers within the area under study to have teaching experience ranging between 11 – 20 years. This was observed in public day primary schools. An average rating was observed on these variables: preparedness of teachers, utilization of learning resources by teachers, approaches of teaching and methods of assessment. A high rating was given by teachers in schools that performed highly on mathematics assessment, preparedness by teachers, use of academic equipment's and approaches used in imparting knowledge.

Miheso (2012) argues that there is no one ultimate method of teaching that can be used in all occasions. On the other hand, Benson (2011) opines that scholars have identified predictors to poor performance. They include: ignoring use of learner-centered teaching approach, inadequate experiment sessions, and activities that practically model and inexperience in teaching mathematics in schools. The mathematic accomplishment of pupils is significantly affected by the method of teaching/ giving instructions (Eshiwani, 2001). According to Agezo (2010) and Dolton and Marcenaro-Gutierez (2011), the learning outcomes of the students are greatly influenced by the teachers motivation. It is argued by Dolton and Marcenaro-Guierrez (2011) nations where the motivation of teachers is poor record low performance from teachers which has resulted in poor outcomes in education.

Ochieng, Kiplagat and Nyongesa (2016) administered a survey in Nyatike Sub-county, Kenya. The survey examined accomplishments of learners in mathematics in relation to the competence of the teachers. The study reviewed the Kenya Certificate of Secondary Examination results within public secondary schools within the area. The

concepts considered by the study included the academic qualification of the teacher, training of the teacher, the experience of the teacher and performance of mathematics as the dependent variable. A positive correlation was observed on: the academic qualification of the teacher in regards to accomplishment in mathematics, training of the teacher in regards to accomplishment of mathematics, experience of the teacher in relation to performance in mathematics.

2.6 Theoretical Literature Review

The formulation of these theories is meant to offer an explanation, anticipate and comprehend the occurrence and in various instances to provoke and expand current knowledge (Abend, 2008). The study was founded on the social cognitive theory, self-efficacy theory, Plato, and Socrates' Perspectives on teaching and learning.

2.6.1 Social Cognitive Theory

It is emphasized by Bandura's social cognitive theory how factors such as environmental, personal, behavioral and cognitive interact to establish motivation, behavior and performance of an individual (Crothers, Hughes, & Morine, 2008). Four goal realization processes constitute the Social Cognitive Theory: self-observation, self-evaluation, self-reaction and self-efficacy. The named elements are interconnected, with each reacting to the attainment of goals and motivation (Redmond, 2010). According to Pajares and Achunk (2001), students who assumed the ability of accomplishing duties utilized more mental and meta-cognitive approaches and persevered longer. Below is an explanation of components of social cognitive process

Self-observation: Observing oneself evaluating one's advancement based on attainment of goals and also on inspiring change in behavior (Zimmerman & Schunk, 2001). Self-

observation allows a student to compare his present achievement in relation to anticipated achievements or grade. It is argued by Van der Bijl and Shortridge-Baggett (2002) that particular goals or grade identify how much endeavor is needed for the accomplishment and to help improve effectiveness due to advancement is not complicated to measure. Self-evaluation: There is a sense of satisfaction by students when they attain their valued and set goals. An individual will more likely continue to put more effort if they have attained the goals they set out to achieve. If they only partially achieve this like in mathematics performance, they will not be motivated to increase their effort (Bandura, 2001).

Self-reaction: if the advancement is regarded as suitable, then self-efficacy will be a feeling one will experience pertaining to continuing, and will be inspired towards the attainment of that goal or grades in future. When a learner has achieved a set mathematics score, the standards will be raised most likely due to the re-assessment (grades); when a goal has not been attained by a person, most like re-assess themselves will occur and to reduce the expected (goal) to one that is attainable. Self-efficacy: a person's self-belief in the probability of accomplishing a goal can in itself inspire (Van der Bijl & Shortridge-Baggett, 2002). Self-efficacy is about judging a person on their ability to execute specific activities. Activities connected to self-efficacy enhance the attempts and tenacity towards tasks that are demanding; the likelihood of accomplishing these tasks is therefore increased (Axtell & Parker, 2003). Students understanding of their ability to execute tasks that are academic, predict their capability to accomplish such tasks (Bandura, 2001).

The concept of this theory will allow the study to examine the influence of a student attitude towards performance in mathematics as well as the consequences of teacher

related factors on student performance. Pajares (2009) argues that social cognitive perspective is the comprehension that a person understands that individuals are permeated with unique abilities. The key one is the ability to forecast and master over time. Students are able to use cognitive means due to these abilities to influence their academic excellence.

2.6.2 Self-Efficacy Theory

Self-efficacy is the personal ability of the students to understand new ideas or acquire new knowledge in a specific area (Nasiriyan, Azar, Noruzy & Dalvand, 2011). Bandura defines self-efficacy as personal sense of accomplishing currently introduced tasks and roles under new environment (Snyder & Lopez, 2007). The personal abilities are a significant concept that stimulates the person and their acts as well as. Lunenburg (2011) opines that the belief of self-efficacy is an essential element in the motivation of humans and the behavior including how their actions are influenced. This has the ability to influence a person's self-efficacy over time therefore relating it to self-esteem. According to Van der Bijk and Shortridgr-Baggett (2002), the theory of self-efficacy is based on the basic principle that individuals will probably take part in tasks that their self-efficacy is high and probably less take part in tasks which they don't.

Information is obtained by students to assess their effectiveness from real achievements in a particular subject, their secondary encounters or through others convincing them which propels their attempts, tenacity**,** resilience, and attainment (Bandura, 2007). This theory is suitable for the study because findings indicate that the capabilities of a person to learn determined by their effectiveness and also their achievement and motivation. It is the belief that they will succeed that will propel a person on certain tasks and responsibilities (Lunenburg, 2011). Hence student who believe they are good in

mathematics subject, will probably better perform in the subject unlike those who believe otherwise.

Redmond (2010) argues that the theory of self-efficacy is based on the basic idea of self-belief and accomplishment is relatively established by the ability of people to believe they can be effective. A person whose self-efficacy level is high is most likely to tackle hard tasks as challenging instead of viewing it as an avoidable threat. If students perceive themselves weak in mathematics, eventually they are likely to perform poorly and put little efforts on the subject.

2.6.3 Plato and Socrates' Perspectives on Teaching and Learning

Maganga (2013) while analyzing Plato and Socrates work, pointed out that, thoughts or basic notions behind the existing entities are usually felt by perception, through questions that evoke knowledge or comprehension of thoughts behind solid circumstances. The implications of this are that teachers need to provide students with more mathematics assignments, which will help in stimulating their minds to comprehend the concepts of mathematics. This means that students can be transformed into good mathematicians when their teachers grant them additional questions to stimulate their minds to appreciate and understand concepts of mathematics for improved performance.

Lynda (2014) asserts that, a lot of time and resources are utilized by public schools in curriculum development and approval yet little is utilized on facets of pedagogy including actual teaching to instill knowledge and understanding. Teachers offer guidance to students on what to learn while books exist so that learners can explore their content and answer end of chapter questions or questions in an examination. A lot

of time is utilized on mechanical learning with little time utilized on comprehension emanating from making relationships, coherence, understanding and critical thinking.

Many schools lack specialists modalities in teaching and learning yet they have acquired the services of many specialists in curriculum. The schools know what needs to be done and what content can be supported but lacks the knowledge in how to well coordinate, train and develop, and inspire a liking and desire to learn since this is absent in the learning experience (George, 2015). This could partly explain the reasons behind poor achievement in mathematics as a field. This theory will enable the study in understanding how availability and effective utilize equipment's for learning and teaching, teacher's preparedness, experience, teaching methods and motivation influence students' performance in mathematics subject.

2.7 Summary of Literature Review

Evaluated information highlighted issues on accomplishment of mathematics in secondary schools. The factors affecting performance of mathematics in secondary schools were identified and discussed. Specifically, the study reviewed extensive literature on student attitude, family background, adequacy of teaching and learning resources and teachers' preparedness, workload affected mathematics achievement in KCSE among learners in public secondary schools. Reviewed literature proposed that learners generally had a pessimistic perspective towards mathematics and saw it as a complex subject. Student family background affected performance of mathematics through aspects such as culture, gender and socio-economic status.

2.8 Conceptual Framework

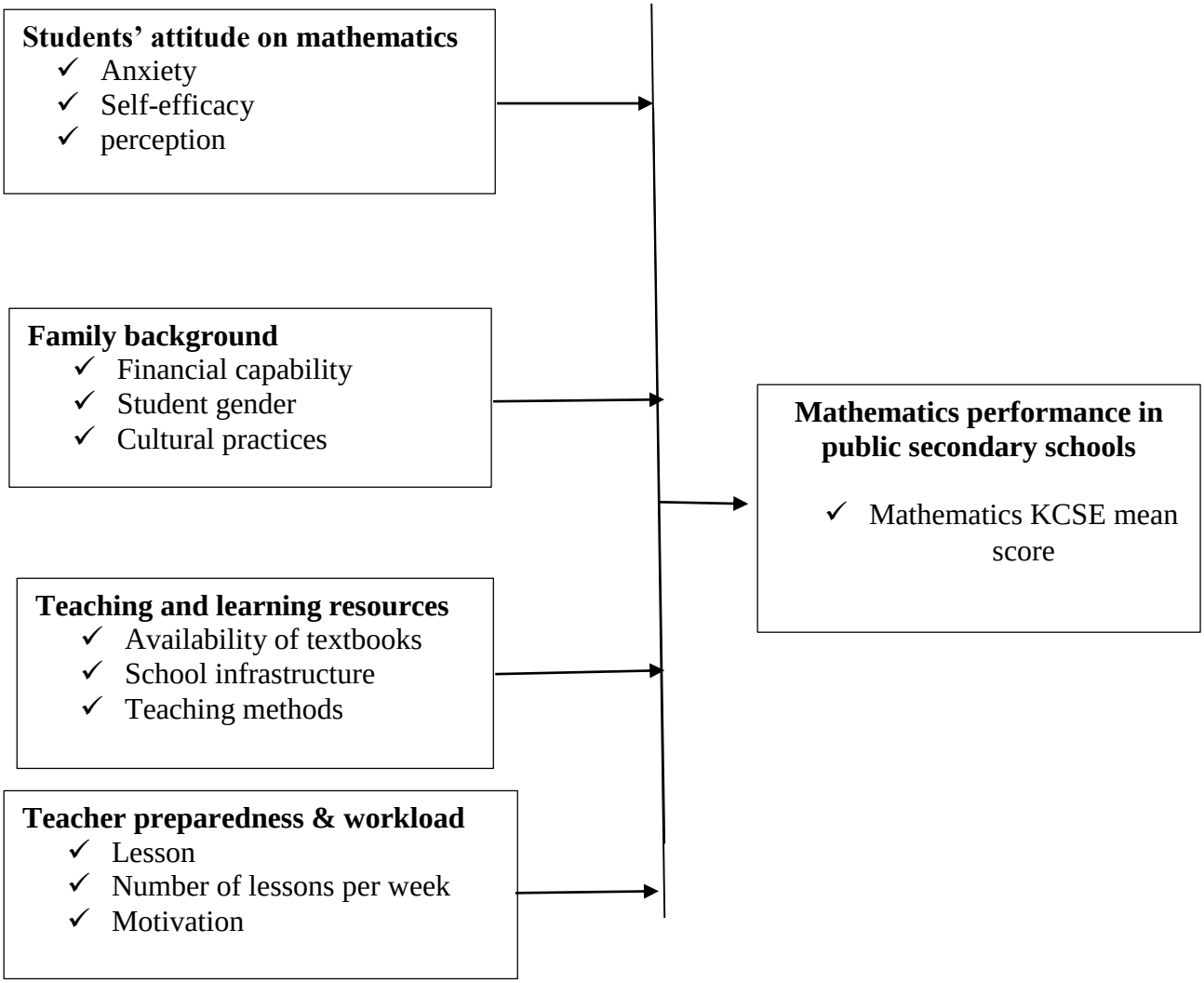

Figure 2.1 **Conceptual Framework**

The study sought to establish factors that influence mathematics performance in KCSE among learners in public secondary schools in Kilifi sub-county. The survey focused on assessing how student attitude, family background, adequacy of teaching and learning resources and teachers' preparedness, and workload influence mathematics performance in KCSE among learners in public secondary schools in Kilifi Sub-County.

One of the most pronounced personal factor that influenced teaching and imparting of mathematics was perspective, which as a notion was focused on the manner in which students think, behaving or conduct towards something (Olatunde, 2009). Moreover, attitude has serious consequences for the students, the educator, the group that directly interact with the students and the entire system of education. Smith (2004) argues that the performance of students is affected by their family background. He opines that students come from different cultural backgrounds which influence in their mathematics studies. The difference in cultural backgrounds also differently affects students. This is premised on the experiences of their parents, their interest in the subject, views that shape their culture and perception towards learning mathematics.

According to Akungu (2014), how effective an institution is depends the tutoring and the impacting of knowledge using resources (TLR) available. It is these resources that transmit into good academic performance by the students. An organization is constituted by both human and non-human resources (Maicibi, 2003). An institution is only capable of achieving its goals and objectives if there is a balance between the quality and quantity of the human resources. Armstrong, Henson and Savage (2009) argue that when lessons are properly organized and effectively managed, the students end up experiencing quality learning. The 21st century teacher has a responsibility and characteristics that are par with the instructions and programs that shape the characteristics of the learner. They include conducting an assessment to know when and where to start, ability to reason logically in giving direction and highlighting the intentions of the learner. The learning process should involve prior preparation to allow learners to be interested and be able to understand. A lesson of mathematics must arouse the interest of the learners to make them want to grasp the new ideas. The preparation of the teacher in the teaching process is very important. This is because it requires the

teacher to put in order the schemes of work, plan in advance for the lesson, prepare notes for the lesson and note down what has been covered.

CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

This section comprises study methodology adopted for the study. It covers study design, target population, sampling method, data collection procedures, pilot study, data analysis methods, and ethical issues observed.

3.2 Research Design

A cross-sectional descriptive study design was adopted by the study. Descriptive research design was used because it was a realistic description of the existing phenomena and therefore made it capable of generalizing the facts. Kombo and Tromp (2006) opine that a descriptive study is not a mere fact finding mission but also may result in unraveling the problem premised on the conception of valuable insights. Descriptive research design has the capability of providing quantitative and qualitative data analysis that was utilized in problem solving.

3.3 Location of the Study

The survey was administered in 12 public secondary schools in Kilifi Sub-County. Kilifi Sub-County is located in coast region of Kenya in Kilifi county about 420km south-east of Nairobi and 60km north of Mombasa. Economically it depends on fishing and tourism. This area was selected due to the poor mathematics performance in the public secondary schools as compared to neighboring areas in the region (Kilifi County Education Office, 2018).

3.4 Target Population

The target population according to Orodha (2005) is an augmentation of entities that hold the information being sought. The targeted population comprised of mathematics department heads, students in Form 3 and tutors teaching mathematics within the public secondary school in Kilifi Sub-County since they could easily relate to the trends in mathematics performance in their schools and have easy access to the required data. There were 35 public secondary schools in Kilifi Sub-County with 35 heads of mathematics department, 220 mathematics teachers and a population of 28,567 students as shown in Table 3.1.

Table 3.1.

Target Population

Category	**Population**
Heads of Departments, Mathematics	35
Mathematics teachers	220
Students	28,567
Total	**28,822**

Source: Kilifi County Education Office 2018

3.5 Sampling Procedure

The sampling technique adopted by the study was the multistage approach. It assisted in deriving the study sample. Multistage sampling approach is a technique where the sample becomes smaller as it moves from stage to stage. According to Burns (2010), two-stage sampling technique involves first selecting a primary sample unit then deriving a secondary sample unit from the individual primary units. In this study, Slovins formula was used to come up with representative sample.

$n=N / (1 + N e2)$

Where: n= sample size, N= population and e=margin of error

Therefore in a population of 244,

12=35/ (1+35*0.05)

The study therefore involved 12 secondary schools. Purposive sampling was deployed in each school to recruit, mathematics HODs, teachers and students. Purposive technique of sampling is a non-probability sample methodology where a sample is arrived at depending on the features of the population and the study objectives. This method was preferred to enable the sample include teachers and students from all sampled schools. Using this method, the researcher purposively sampled the mathematics departmental heads and 2 teachers from each of the participating schools. In addition, the researcher purposely selected 10 form three learners within each of the 12 public secondary schools. These were selected from the 10 worst performing students in the previous end-of-term examinations.

Table 3.2.

Sample Size

School	HOD	Teachers	Students
1	**1**	**2**	**10**
2	**1**	**2**	**10**
3	**1**	**2**	**10**
4	**1**	**2**	**10**
5	**1**	**2**	**10**
6	**1**	**2**	**10**
7	**1**	**2**	**10**
8	**1**	**2**	**10**
9	**1**	**2**	**10**
10	**1**	**2**	**10**
11	**1**	**2**	**10**
12	**1**	**2**	**10**
Total	**12**	**24**	**120**

The study therefore had respondents totaling a hundred and fifty six, derived from twelve departmental heads (Mathematics), twenty four tutors teaching mathematics and a hundred and twenty learners.

3.6 Instrumentation

The study used questionnaires, qualitative interview schedule and an observation checklist. Self-administered questionnaires were used for data collection from mathematics teachers and students. A Questionnaire is a tool for collection data where the respondents targeted are required to react to a similar cluster of inquiries in a sequence that is predetermined (Sekaran, 2006). Information obtained by use of questionnaires is exempt from prejudice and not influenced by the researcher (Kothari, 2008). A Likert five point scale was deployed within the questionnaire with a scale between 1-5 where, 5= Strongly Agree, 4=Agree, 3=Neutral, 2= Disagree, while 1=Strongly Disagree.

The study adopted interview schedules to acquire data from department heads. Interview schedules generally are a compilation of questions in a list format prepared to lead the interviewer in acquiring the required data from the interviewee on a particular issue or topic (Burns, 2010). An interview schedule is preferred as it is able to procure comprehensive information on an individual emotions, understanding and perspective. It also permits for additional probing on that topic or issue and often attains a response rate that is high.

An observation checklist utilized to acquire data on teaching resources. A template of the checklist used is attached in Appendix IV. With direct observation, the researcher

was able to obtain first-hand knowledge and information about teaching and learning resources.

A pilot study was a compact study done before hand to assess the viability, timeliness and financial implications, to predict appropriateness of the tool of research, the questions had to be clear and the design of the study predetermined prior to the actual study. Fendler (2016) proposed that in a pilot study, an adequate number of participants range from 10 to 30. Participants totaling thirty were utilized to provide an upper limit of the pilot study which was undertaken in 5 secondary schools in the neighboring Ganze Sub-County**.** A test of reliability was provided by the pilot study hence enhancing the acquisition of data by the research tool through offering clarity in the questions asked and by providing it with the capability to acquire relevant data.

3.6.1 Validity of Research Instruments

The data acquired was needed to not only pass the reliability test but also be precise, accurate and valid. Validity is a measure of the degree at which a research tool can measure what it's required to measure (Frankfort-Nachmias & Nachmias, 2008). According to Mugenda and Mugenda (2010), instrument validity can be enhanced by the input of experts. To improve on validity of research instrument the researcher's supervisors reviewed the instrument and made recommendations, which were adopted. This assisted in improving the content validity of data collected by ensuring the research tool was revised and modified hence meeting the standards. After pilot study, the questionnaires were revised with pointed out corrections to capture required feedback.

3.6.2 Reliability of Research Instruments

It is paramount for a researcher to subject the research tool to a test for its validity and reliability before subjecting it to acquisition of data in the field. The study subjected its research instrument to data reliability and data validity for purposes of maintaining data accuracy. Data reliability is the level at which a tool of research conveys consistent outcome when replicated. Reliability is concern with generating resemblance and accuracy. In research, reliability is concern with the capabilities to reproduce the same outcomes within a homogenous population given the circumstances is similar. This notion of research makes it replicable. The research tool used in the study was subjected to a pretest to ensure replicability. A Cronbach Coefficient score of 0.74 was achieved in the study indicating adequate reliability.

3.7 Procedure Data Collection

A letter introducing the researcher and purpose of the study was acquired from the researcher's institution, which is Kenya Methodist University. Another letter from the National Council for Science and Technology (NACOSTI) was also acquired that permitted this research in Kenya. Kilifi County was also informed about the research through its education department. The researcher reported to the head of schools in person and sought permission to conduct the study. Questionnaires were issued to HODs, mathematics teachers and form 3 students and retrieved within five official work days to enable them enough period of time to respond to the queries adequately. The technique of dropping and conveniently picking once done was applied in acquiring data using questionnaires. The researcher checked up on the respondents through telephone calls to encourage timely and higher response rate. The researcher personally visited the participating schools to fill the classroom observation checklist. Face-to-face

interviews were then conducted on the same day with the HODs, in a private setting to ensure comfort and confidentiality.

3.8 Operationalization of Research Variables

The survey attempted to determine factors that influence mathematics performance in KCSE among learners in public secondary schools in Kilifi sub-county. The independent variables in the study included student attitude, family background, adequacy of teaching and learning resources and teachers' preparedness, while accomplishment in mathematics was the dependent variable. Student's attitude towards mathematics was assessed by looking at anxiety, self-efficacy and perceptions. Financial capability, student's gender and cultural practices were the indicators for family background. Teaching and learning resources aspect included availability of textbooks, school infrastructure and teaching methods. Teacher preparedness and workload was measured using lesson plans, number of lessons of teachers. The schools mean score in mathematics in the 2017 academic year was used to measure performance in mathematics.

3.9 Methods of Data Analysis

Creswell (2004) argues that the analysis of data is the reorganization of raw data for purposes of making sense of it. The end product in this process is information that is relevant to the data provided. Data analysis involves a set of activities that begins with the collection of data and ends with a detailed presentation of the findings. The collected data is assessed and bits of information compiled in the entire process. Shamoo and Resnik (2013) opines that there exist several steps of analysis. The raw data acquired

from the study area is challenging to evaluate therefore it was cleaned, locked, key pinched into computer using SPSS version 24.

The researcher used descriptive statistics comprising frequencies, percentages, mean and standard deviation. Chi-square tests were used to establish relationships between student attitude, family background, adequacy of teaching and learning resources, teachers' preparedness, and workload on mathematics performance in KCSE among learners in public secondary schools in Kilifi Sub-County. The findings were presented in form of tables.

3.10 Ethical Consideration

In Kenya, the National Commission for Science and Innovation (NACOSTI) is the body mandated by the relevant Ministry to facilitate research. The researcher therefore contacted NACOSTI seeking authorization to conduct research and to collect data within Kilifi Sub-County which is in Kenya. The researcher maintained privacy by collecting information anonymously since respondents were not required to indicate their names in the questionnaire. Approval was sought from KeMU and the principals of participating schools in order to get permission to collect data from the teachers and students who were under 18 years. The purpose of the study was also disclosed to the respondents with an assurance that data provided would only be used for academic purpose. The researcher also obtained consent from the respondents and participation in the study was voluntary.

CHAPTER FOUR
RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents the findings and interpretation of findings. It includes the response rate, socio-demographic profile of respondents and findings on student's attitude, student family background, teaching resources and teacher preparedness and workload. Findings are analyzed using descriptive and inferential statistics and presented in form of tables.

4.2 Response Rate

A total of 132 questionnaires were returned out of a possible 156 representing a 85% response rate. This was a high response rate as it is greater than the 70% recommended for descriptive studies.

Table 4.1.

Response Rate

Population	Questionnaires distributed	Questionnaires returned	Response rate (%)
Mathematics heads of departments	12	9	75
Mathematics teachers	24	20	83
Students	120	103	86
Total	156	132	85

4.3 Socio-Demographic Characteristics of Respondents

Socio-demographic characteristics in the study included gender, age, level of education and experience of teaches. The findings are presented in Table 4.2. Majority 72% (15) of the respondents in the study were male. This shows that there was great gender disparity among teachers of mathematics of public secondary schools in Kilifi Sub-County. Slightly above half 52% (n=11) of the respondents were aged between 31 and 40 years while 28% (n=6) were aged between 21 and 30 years. This shows that mathematics teachers of public secondary schools in Kilifi Sub-County were relatively young.

The findings show that slightly above half 52% (n=11) of the respondents in the study had acquired a degree while 38% (n=8) had acquired a bachelor's degree. This shows that mathematics teachers of public secondary schools in Kilifi Sub-County were trained as all of them had acquired post-secondary education. Slightly less than half 47% (n=10) of the respondents had a working experience of between 11 and 15 years while 38% (n=8) had a working experience of between 6 and 10 years. This shows that the respondents were experienced enough to enable them respond resourcefully to the questions in the study.

Table 4.2.

Socio-Demographic Characteristics

Characteristic	Category	Frequency	Percentage
Gender	Male	15	72%
	Female	6	28%
	Total	21	100%
Age (years)	21-30	6	28%
	31-40	11	52%
	41-50	3	12%
	>50	2	8%
	Total	21	100%
Level of education	Diploma	11	52%
	Bachelor's degree	8	38%
	Post graduate degree	2	10%
	Total	21	100%
Teaching experience	<5	1	3%
	6-10	8	38%
	11-15	10	47%
	>16	3	12%
	Total	21	100%

4.4 Students Attitude towards Mathematics and Performance in Mathematics

The study sought to find out students attitude towards mathematics in order to assess the influence of student's attitude on mathematics performance in KCSE among learners in public secondary schools in Kilifi sub-county. The findings are presented in this section.

4.4.1 Teachers' Responses on Students Attitude towards Mathematics

(68%) of the teachers in the study disagreed that students generally like Mathematics and believe they will get good grades however 32% of the respondents disagreed. The vast (96%) agreed that mathematics usually makes students feel uncomfortable and nervous during mathematics lessons and test leading to poor performance however, 4% of the teachers disagreed. (62%) also agreed that mathematics teachers have built

confidence of their students on their ability to pass well in KCSE. However, 36% disagreed and 2% of the respondents were uncertain. In addition, the vast (93%) of teachers agree that many students feel they have no ability or talent to succeed in Mathematics however 6% of the respondents disagreed.

Slightly above half (55%) disagreed while 45% agreed that learning Mathematics involves a lot of memorization of formula which are difficult to grasp and Many times miss Mathematics lessons because the subject is difficult. Similarly, 84% disagreed, 12% agreed and 4% were uncertain that Mathematics is too complex and it is difficult to pass Mathematics it in KCSE especially in this school. It is normal that majority of students fail in the subject. The vast (98%) agreed that students attitude towards mathematics greatly influences their performance on the subject. However 2% of the respondents were uncertain.

The findings therefore show that students generally had negative attitudes towards mathematic subject and they found it as a complex subject. This is in agreement with Aqajani *et al*., (2015) finding that students anxiety in mathematics was strongly predicted by emotional self-efficacy, learning self-efficacy and self-confidence. These results also are also in tandem with the findings of Nikmanesh and Yari (2014) which showed an association between anxiety in exams and self-efficacy. Also, it found a significant association between the 3 elements (aggressive perception, acting perception, & passive perception) of self-perception with anxiety in exams.

Table 4.3.

Teachers' Responses on Students Attitude towards Mathematics

Statement	SA		A		U		D		SD	
	%	N	%	n	%	N	%	N	%	n
Students generally like Mathematics	22	4	10	2		0	20	4	48	
Mathematics usually makes students feel uncomfortable and nervous during mathematics lessons and test leading to poor performance	56	11	40	8		0	4	1		
Mathematics teachers have built confidence of their students on their ability to pass well in KCSE	44	9	18	4	2	0	18	4	18	
Many students feel they have no ability or talent to succeed in Mathematics.	56	11	38	8		0	4	1	2	
Learning Mathematics involves a lot of memorization of formula which are difficult to grasp and Many times miss Mathematics lessons because the subject is difficult	25	5	20	4		0	38	8	17	
Mathematics is too complex		0	12	2	4	1	28	6	56	
Students attitude towards mathematics greatly influences their performance on the subject	78	16	20	4	2	0		0		

Key: SA = strongly agree, A = Agree, U= Uncertain, D= disagree, SD = Strongly disagree

4.4.2 Students' Responses on Attitude towards Mathematics

(68%) of the students in the study agreed that mathematics is too complex and it is difficult for them to pass however, 32% disagreed to this. (60%) disagreed, 34% agreed while 6% were uncertain that mathematics doesn`t scare them at all and they believe that they would get good grades. The findings show that (80%) of the students agreed while 20% disagreed that mathematics usually makes them feel uncomfortable and they get nervous during mathematics lessons and tests. In addition, slightly above half (57%) of the students disagreed, 39% agreed and 4% were uncertain that they had no confidence in tackling Mathematics related problems.

The findings show that (63%) of the respondents agreed, 35% disagreed while 2% were uncertain that they had no ability or talent to succeed in Mathematics. (71%) of the students agreed while 29% disagreed that mathematics teachers had made them feel that they had the ability to pass well in mathematics. (75%) also agreed and 25% disagreed that mathematics is a worthwhile and necessary subject. However, slightly above half (58%) of the respondents disagreed, 39% agreed and 1% were uncertain that mathematics is of no relevance to them and they expected to have little use for it when they get out of high school.

The findings therefore show that students had not only a negative attitude but also fear of mathematics. This is consistent with Ernest (2004) finding that its very likely, the public image of mathematics is labeling it as a difficult, cold, abstract, theoretical and ultra-rational subject. It is also aligned with the findings of Manoah *et al*., (2011) in their study observed that attitudes played a critical role in students' performance. Students with positive attitude tended to perform well in an exam. It is however in contrast to findings of Fan, Quek, Yan, Mei, Lionel and Yee, (2005), Yilmaz *et al*., (2010) and Tezer and Karasel, (2010) which indicated the attitude of students towards mathematics to be relatively positive.

The negative attitudes and phobia towards mathematics among the students could be attributed to the culture of failing mathematics in the study area. Traditionally, mathematics has been a poorly performed subject and as such students hold the belief that they will eventually fail. Benchmarking with schools which pass in mathematics can be used to solve this problem. In addition, rewards for students who do well in mathematics should be introduced.

Table 4.4.

Students' Responses on Attitude towards Mathematics

Statement	SA		A		U		D		SD	
	%	n	%	N	%	n	%	N	%	N
Mathematics is too complex	43	44	25	26		0	16	16	16	16
Mathematics doesn`t scare me at all	24	25	10	10	6	6	38	39	22	23
Mathematics usually makes me feel uncomfortable	57	59	23	24		0	16	16	4	4
I have confidence in tackling Mathematics	22	23	17	18	4	4	19	20	38	39
I have no ability or talent to succeed in Mathematics	25	26	38	39	2	2	23	24	12	12
Mathematics teachers have made me feel I have the ability to pass well in math's	33	34	38	39		0	22	23	7	7
Mathematics is a worthwhile and necessary subject	48	49	27	28		0	23	24	2	2
Mathematics is of no relevance to me	1	1	38	39	3	3	31	32	27	28

Key: SA = strongly agree, A = Agree, U= Uncertain, D= disagree, SD = Strongly disagree

4.4.3 HODs Responses on Students Attitude towards Mathematics

(67%) of the heads of departments indicated that students have a negative attitude towards mathematics. Some of their responses are captured below:

"In my opinion, most students adopt a negative attitude towards mathematics due to the notion that mathematics is difficult."

"The attitude towards mathematics is not taken positively because mathematics is a hard subject"

"Students' attitude towards mathematics is positive they just lack the confidence to approach and tackle it"

The findings therefore show that there was a general negative attitude towards mathematics among the students. This is in tandem with findings of Ernest (2004); Nui and Wahome (2006); Manoah *et al*., (2011); Nikmanesh and Yari (2014) and Aqajani *et al*., (2015) which showed that students harbored negative attitudes towards mathematics. The finding is however different from findings of Fan, Quek, Yan, Mei,

Lionel and Yee, (2005), Yilmaz *et al*., (2010) and Tezer and Karasel, (2010) which indicated the attitude of students towards mathematics to be relatively positive.

Schools should therefore adopt new strategies of motivating students to learn mathematics thereby reducing the phobia that they have against mathematics. This can be done for example by using outdoor activities. Teachers should also be given refresher training to enhance their mastery of content and ability to use various learning styles to motivate students (Zahyah, 2008; Kamau, 2013).

Table 4.5.

HODs Responses on Students Attitude towards Mathematics

Response On Attitudes	Frequencies	Percentage
Positive	3	33
Negative	6	67
Total	9	100

4.5 Students' Family Background and Performance in Mathematics

The study assessed students' family background characteristics in order to assess the influence of family background on mathematics performance in KCSE among learners in public secondary schools in Kilifi sub-county. The results are presented in this section.

4.5.1 Teachers' Responses on Students' Family Background and Performance in Mathematics

(88%) of the teachers in the study agreed, 10% disagreed and 2% were uncertain that low parental socio-economic status which is associated with low income makes it difficult for parents to buy adequate learning resources. (84%) of teachers agreed while

16% disagreed that boys tend to perform better than Girls in mathematics subject. (60%) of teachers also agreed, 28% disagreed and 12% were uncertain that cultural constraints negatively impacts on achievement level among students.

The findings therefore suggest that students' family background has an influence on performance in mathematics due to socio-economic status, gender and cultural constraints. Ndaruhutse (2008) seemed to have agreed with these findings by arguing that the nations within sub-Saharan Africa end up compelling their students who are in most cases financially struggling to repeat classes because their academic performance is low. This has led to a great number of them dropping out of school.

It is consistent with the conclusion of (Robert & Taylor, 2005). They conducted their study in New Hampshire public high schools and concluded that factors that are both economic and social have strong relationship on the average achievement of the students.

Table 4.6.

Teachers' Responses on Students' Family Background and Performance in Mathematics

Statement	SA		A		U		D		SD	
	%	n	%	n	%	n	%	N	%	n
Low parental socio-economic status makes it difficult for parents to buy adequate learning resources for their children is one of the major factor contributing to lower academic achievement in the region	86	17	2	0	2	0	10	2		0
Boys tend to perform better than Girls	56	11	28	6		0	10	2	6	1
Cultural constraints negatively impacts on achievement level among students.	43	9	17	3	12	2	16	3	12	2

Key: SA = strongly agree, A = Agree, U= Uncertain, D= disagree, SD = Strongly disagree

4.5.2 Students' Responses on Family Background

Slightly above half (52%) of the students in the study agreed, 44% disagreed and 2% were uncertain that their parents were able to afford books and other equipment necessary for mathematics. (77%) of the students disagreed while 23% agreed that their parents and siblings helped them with mathematics homework. The vast majority (93%) of students also agreed while 7% disagreed that nobody in their family is good at mathematics. The findings therefore show students family background had an influence on the mathematics performance due to lack of money and role models in the family to help with mathematics. This is in agreement with Zahyah (2008) who while studying the link between facets of social-economic determinants in Malaysia stated that the academic achievement of students were related to available reading materials at their homes and the education level of the parents. Mohammed *et al*., (2008) that performance in academics can be determined by various socio-economic determinants found within the family, parents and network.

Table 4.7.

Students' Responses on Family Background

Statement	SA		A		U		D		SD	
	%	N	%	n	%	N	%	N	%	n
My parents are able to afford books and other equipment necessary for mathematics	38	39	14	14	4	4	22	23	22	23
My parents and siblings help me with mathematics homework	22	23	1	1	0	0	37	38	40	41
Nobody in our family is good at mathematics	54	56	39	40	0	0	7	7		0

Key: SA = strongly agree, A = Agree, U= Uncertain, D= disagree, SD = Strongly disagree

4.5.3 HODs Responses on Students' Family Background and Performance in Mathematics

Slightly above half (56%) of the mathematics heads of departments indicated that students' family background influences students' performance in mathematics. Some of the responses are captured below;

"*Students' family background influences their performance for example if the family is poor and is unable to meet the students' needs"*

"If a student's family encourages and have also been brilliant performers a student will be determined to work hard in order to"

"Family background cannot affect their performance since the willingness to study and understand the subject is what makes one pass or fail"

Findings show that family background can determine a students' attitude and performance in mathematics. This is consistent with findings of Kagume (2010) and Mbugua (2012) who also found that performance in mathematics is associated with students' family background.

Table 4.8.

HODs Responses on Students' Family Background and Performance in Mathematics

Response	Frequency	Percentage
Yes	5	56
No	4	44
Total	9	100

4.6 Teaching Resources and Performance in Mathematics

The study sought to establish the availability and adequacy of teaching resources in the participating schools in order to determine how teaching and learning resources

influence mathematics performance in KCSE among learners in public secondary schools in Kilifi sub-county.

4.6.1 Teachers' Responses on Teaching Resources

(71%) of the teachers in the study agreed while 29% disagreed that inadequacy of textbooks, revision materials and limited access to library materials hinders effective teaching and learning of mathematics. Slightly above half (58%) agreed, 38% disagreed and 4% were uncertain that there is a friendly and cooperative relationship between Mathematics teachers and the students which makes the subject enjoyable. However (84%) of the teachers disagreed while 16% agreed that the school has adequate infrastructure (Classes, desks, library) and mathematics teachers have adequate workspace for preparation, collaboration or meeting with students. The findings show that the vast (92%) of teachers agreed, 6% were uncertain and 2% disagreed that teaching methods in mathematics is student centered and participatory which have enhanced student understanding on complex mathematics concepts. The vast (92%) also agreed, 6% disagreed and 2% were uncertain that availability and effective utilization of teaching and instructional materials have a great potential of improving performance in mathematics in KCSE.

The findings therefore suggest that teaching resources were inadequate and this had an influence on performance of students in mathematics. This finding is in tandem with findings of Akungu (2014) who established that a lack of enough resource both material and physical is a vital component accountable for the students learning outcomes. Schools with inadequate structures including materials for supporting teaching and learning, classrooms, laboratories and workshops are not likely to produce results that are good. The finding is also in tandem with Lyons (2012) finding that schools become

enhanced and effective through the available TLR. This is because, these are essential resources that institute academic performance that is good for the students. Lack of conducting proper background preparation by a mathematics teacher, inadequate equipment's of teaching mathematics and material are some factors that have been cited to be promoting bad results in mathematics due to demotivation of students (Gathua, 2011).

Table 4.9.

Teachers' Responses on Teaching Resources

Statement	SA		A		U		D		SD	
	%	N	%	N	%	n	%	n	%	n
Inadequacy of textbooks, revision materials and Limited access to library	44	9	27	5		0	20	4	9	2
Friendly and cooperative relationship between teachers and the students	38	8	20	4	4	1	26	5	12	2
The school has adequate infrastructure	8	2	8	2		0	37	7	47	9
Teaching method in mathematics is student centered and participatory	62	12	30	6	6	1	2	0		0
Availability and effective utilization of teaching and Instructional materials	82	16	10	2	2	0		0	6	1

Key: SA = strongly agree, A = Agree, U= Uncertain, D= disagree, SD = Strongly disagree

4.6.2 HODs Responses on Teaching Resources

Slightly above half (56%) of the mathematics heads of departments in the study indicated that there was a fair availability of mathematics teaching resources. This suggests the inadequacy of mathematics teaching resources which may influence teaching and mathematics achievement of students. This is in agreement with The Organization for Economic Co-operation and Development (OECD) (2007) who show inadequate resources impede teaching and lowers performance of students. It is also in agreement with Githua (2011) who posited that lack of conducting proper background preparation by a mathematics teacher, inadequate equipment's of teaching mathematics and material are some factors that have been cited to be promoting bad results in

mathematics. Lyons (2012) posits that learning is a multiplex venture that includes interaction of teaching skills and demands of curriculum, physical structures, resources for teaching and motivation of students. Schools become enhanced and effective through the available TLR. This is because, these are essential resources that institute academic performance that is good for the students.

Table 4.20.

HODs Responses on Teaching Resources

Response	Frequency	Percentage
High	2	22
Fair	5	56
Low	2	22
Total	9	100

4.6.3 Researcher's observations of Teaching Resources

Using an observation checklist, the researcher checked the availability, condition and adequacy of mathematics teaching resources. The findings show that mathematics textbooks, reference books and geometric equipment were found in all participating schools. Majority of the teaching resources were in a good or fair condition. However, majority of resources such as computers with mathematics related programs, Geometric equipment, modern teaching aids and mathematics textbooks had a low adequacy.

The findings therefore show a high availability but low adequacy of teaching resources. This is consistent with World Education Forum in Dakar (2010) finding that resources are not effectively utilized by most teachers and where they are available they are very little used. This is because globally a third of secondary schools lack access to technologies and skills that could assist enhance the knowledge acquisition process.

The finding is also consistent with findings of Johan (2004), Momoh (2010) and Lyons (2012) who also found high inadequacy of teaching resources.

Table 4.31.

Researcher's observations of Teaching Resources

Item	Availability				Condition						Adequacy					
	Yes		No		Good		Fair		Bad		High		Fair		Low	
	%	N	%	N	%	N	%	N	%	N	%	n	%	n	%	N
Mathematics textbooks	100	12	0	0	73	9	18	2	9	1	9	1	18	2	63	8
Modern teaching aids	55	7	45	5	63	8	27	3	0	0	27	3	27	3	46	6
Calculators	91	11	9	1	82	10	18	2		0	37	4	63	8		0
Mathematics reference books	100	12	0	0	9	1	73	9	18	2	36	4	9	1	5	1
Mathematics posters and charts	100	12	0	0	73	9	18	2	9	1	82	10	9	1	9	1
Geometric equipment	100	12	0	0	55	7	27	3	18	2	18	2	9	1	73	9
Computers with mathematics related programs	36	4	64	8	55	7	45	5	0	0	9	1	0	0	82	10

4.7 Teacher Preparedness and Performance in Mathematics

The study assessed teacher preparedness and workload in order to evaluate the effects of teachers' preparedness and workload on mathematics performance in KCSE among learners in public secondary schools in Kilifi sub-county.

4.7.1 Teachers' Responses on Preparedness and Workload

(80%) of the respondents disagreed while 20% agreed that they do not have adequate time to prepare lesson plans. The vast (97%) agreed while 3% were uncertain that mathematics teachers-student ratio is high, making it impossible for the teacher to

interact with students at a personal level. However, 71% of the teachers disagreed while 29% agreed that mathematics teachers and students were rewarded whenever improvement in performance was noted to appreciate them and maintain morale. Slightly above half, (54%) agreed, 34% disagreed and 12% were uncertain that inadequate preparation lack of motivation to both teachers and students and high teacher workload have contributed to dismal performance in mathematics subject.

The findings therefore signify a poor preparedness of teachers in mathematics brought about by heavy workload. This is consistent with findings of UNESCO (2009) which found that the mathematics curriculum was ineffectively being implemented because of inadequacy of teachers who are properly trained, lack of proper techniques in teaching, insufficient supply of equipment's that are relevant and inadequate growth of the culture of mathematics. It is also consistent with Dolton and Marcenaro-Gutierrez (2011) observations that countries where the motivation of teachers was low also recorded low performance from teachers which translated to educational outcomes which are poor.

Table 4.42.

Teachers Responses on Preparedness and Workload

Statement	SA		A		U		D		SD		M	StD
	%	n	%	N	%	n	%	N	%	n		
Adequate time to Prepare lesson plans	16	3	4	1		0	23	5	57	11	4.4	0.809
Teachers-student ratio is high	82	16	15	3	3	1		0		0	1.64	0.702
Teachers and students are rewarded	23	5	16	3		0	27	5	44	9	3.92	1.009
Inadequate preparation lack of motivation to both teachers and students	27	5	27	5	12	2	23	5	11	2	2.3	1.211
Average											3.07	0.933

Key: SA = strongly agree, A = Agree, U= Uncertain, D= disagree, SD = Strongly disagree, M= Mean & Std = Standard Deviation

4.7.2 HODs responses on teacher Preparedness and Performance in Mathematics

(78%) of the heads of departments indicated that teachers were well prepared to teach mathematics. Some of the responses are captured below;

"Most mathematics teachers are prepared well enough to teach the subject. What lacks is the preparedness from the student together with interest"

"Some teachers come to teach being prepared ton which topic ad assignments they will take"

"Teachers are well prepared in teaching mathematics since the students depends on them for their performance"

These findings are in contrast to those of teachers, which indicated poor preparedness. The findings are therefore in contrast to those of Nye, Konstantopoulos and Hedges, 2004; and Jackson (2012) which found poor preparedness of mathematics teachers. Student performance that was high was registered by teachers whose teaching practices were effective as opposed to those whose teaching practices were considered

ineffective. Also, the performance of students was impacted more by teachers with more experience in teaching as compared to fresh graduates. Teacher preparedness enables effective teaching of mathematics which motivates students which translates to better performance in the subject (Gichuru & Ongus, 2016).

Table 4.53.

HODs responses on teacher Preparedness and Performance in Mathematics

Response	Frequency	Percentage
Well prepared	7	78
Fairly well prepared	2	22
Total	9	100

4.8 Performance in Mathematics in KCSE

Performance in mathematics among participating schools was noted over a period of 5 years in order to assess how student attitude, family background, adequacy of teaching and learning resources and teachers' preparedness, and workload influence mathematics performance in KCSE among learners in public secondary schools in Kilifi Sub County. Findings in Table 4.14 show that the participating schools consistently performed poorly over the study period with a mean grade of D- each academic year.

Table 4.64.

Performance in Mathematics in KCSE

Academic	Mean average	Grade
2013	2.28	D-
2014	2.46	D-
2015	2.41	D-
2016	2.48	D-
2017	2.53	D-

4.9 Chi-Square Tests

Chi-square tests were performed to find out the influence of independent variables on mathematics performance in KCSE among learners in public secondary schools in Kilifi Sub County. Findings in Table 4.15 show that students attitude (p=0.000) and teaching resources (p=0.021) were significant. Cramer's V values showed that student's attitude (v=0.680) had a greater influence than teaching resources (v=0.305).

Table 4.75.

Chi-square Output

Variable	Significance (p-value)	Cramer's V
Students attitude	0.000***	0.680
Students' family background	0.068	
Teaching resources	0.021***	0.305
Teacher preparedness	0.104	

*** Significant at 95% confidence level

4.9.1 Student's Attitude and Performance in Mathematics

The attitude of students in public secondary schools in Kilifi sub-county was assessed together with how it influenced their mathematics performance. A significant attitude (p=0.000) was noted at as shown in table 4.16. The findings of the study targeting public secondary school learners in Kilifi Sub -county therefore show a slight association between the attitude and mathematics performance of students. The culture of failing in the subject of mathematics is a reflection of the student's negative attitude and phobia in relation to mathematics in the area under study. The perception of failure in mathematics exhibited by the students is attributed to a tradition of poor performance in the subject.

Ernest (2004) agrees by stating that mathematics is publicly perceived as difficult, complicated, and conceptual and involves a lot of thinking. Manoah *et al*., (2011) in support observed that the performance of students is often attributed to their attitude towards it. Those who perform well in the exam are often believed to have had a positive attitude. Some studies (Tezer & Karasel, 2010; Yilmaz *et al*., 2010; Fan, Quek, Yan, Mei, Lionel & Yee, 2005) have however dispelled this by showing that mathematics has been positively perceived by students.

4.9.2 Family Background and Performance in Mathematics

While targeting public secondary schools in Kilifi sub-county, the study looked at the student's mathematics performance and how it was being impacted by the background of their family. There was no significant ($p=0.068$) impact that was observed by the background of the family. This means that the students in public secondary schools were not being significantly influenced by the background of the family. Thus no significant relationship was recorded between the two variables. It was observed that lack of finances and role models formed the background of the family of the students. This however was not significant. The student's performance in mathematics was therefore believed to be strongly influenced by other variables such as their attitude.

These findings depart from views held by Kagume (2010) and Mbugua (2012) who linked the background of the students with their mathematics performance. Robert and Taylor (2005) however found in their study at the New Hampshire that in public high schools, the average performance of students was strongly related to social and economic factors. Zahyah (2008) also presented different findings in a study based in Malaysia. It stated that the academic performance of children was determined by the level of education of both parents and the availability of reading materials in their

homes. The aim of the study was to investigate the social and economic determinants of academic achievement of children. Further, Mohamed *et al*., (2008) differed in view by stating that his study found that several social and economic determinants that surround the students can predict his/ her academic performance.

4.9.3 Teaching and Learning Resources and Performance in Mathematics

While the target was Kilifi sub-county and the sample being students in public secondary schools. The study sought to establish how their mathematics performance was being influenced by the teacher and the resources used in learning. A statistical significant rate (p=0.021) was observed on the resources used in teaching and learning. The study was therefore able to find an association between student's mathematics performance in public secondary schools and the resources applied in teaching and learning in Kilifi Sub-county. The study attributed this finding to the mathematics teachers inadequate preparation in teaching, inadequacy of material and equipment's that can be used in teaching mathematics. The teaching resources are often used in motivating students when teaching mathematics and eradicating the fear and negative perception of mathematics in students.

It was also noted by Organization for Economic Co-operation and Development (OECD) (2007) that the performance of the student is lowered and affected by shortages in the teaching and learning resources. These findings are consistent with the findings by Akungu (2014) who found that school which experience lower learning outcomes from students are often lacking the basic resources both physical and material. The finding is also in tandem with Lyons (2012) finding that schools become enhanced and effective through the available TLR. This is because, these are essential resources that institute academic performance that is good for the students. The finding is also in

tandem with findings of Johan (2004), Momoh (2010) and Lyons (2012) who also found high inadequacy of teaching resources.

4.9.4 Teachers' Preparedness and Performance in Mathematics

To evaluate the effects of teachers preparedness and workload on mathematics performance in KCSE among learners in public secondary schools in Kilifi sub-county. The findings show that teachers preparedness and workload ($p=0.104$) was not significant. This means that there was no significant relationship between teacher's preparedness and workload and performance in mathematics among learners in public secondary schools in Kilifi sub-county. Although there was widespread poor preparedness of teachers in mathematics brought about by heavy workload, well prepared teachers would not have made a difference due to inadequacy of resources and students' negative attitudes towards mathematics. This is therefore in contrast to findings of Nye, Konstantopoulos and Hedges (2004); Jackson (2012); Chetty *et al*., (2014) and Gichuru and Ongus (2016) which stated that a high number of students with high performance was being produced by teachers who applied their teaching practices in an effective manner as opposed to those who ineffectively practiced.

CHAPTER FIVE
SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary of the findings of the study. The conclusions and recommendations are also presented. In Kilifi sub-county, very few students attained the required grade of C+ in the subject between 2012 and 2016 which is the minimum grade required to pursue a degree course in local universities. The implication of the poor performance in mathematics in the sub county (D-) means that majority of students dream for tertiary education has been jeopardized by poor performance in mathematics. This study focused on assessing how student attitude, family background, adequacy of teaching and learning resources and teachers' preparedness, and workload influence mathematics performance in KCSE among learners in public secondary schools in Kilifi Sub-County.

A descriptive study design was adopted. The focused of departmental heads (Mathematic), tutors teaching mathematics, and Form three learners within public secondary schools in the sub-county of Kilifi since they could easily relate to the trends in performance in mathematics in their schools and have easy access to the required data. Sampling was done at multiple stages to arrive at a representative sample of one hundred and fifty six respondents, which comprised twelve departmental heads (mathematics), twenty four tutors teaching mathematics and one hundred and twenty learners. Questionnaires were used for data collection from mathematics tutors and learners. Interview schedule was utilized to acquire data from mathematics heads of departments. An observation checklist was used to collect data on teaching resources. Descriptive statistics was utilized in the analysis of data with the support of Statistical

Package for Social Sciences. Chi-square tests were used to establish relationships. The findings were presented in form of tables.

5.2 Summary

Majority (68%) of the teachers in the study disagreed that students generally like Mathematics and believe they will get good grades however, 32% of the respondents disagreed. Majority (68%) of the students in the study agreed that mathematics is too complex and it is difficult for them to pass however, 32% disagreed to this. Majority (67%) of the heads of departments indicated that students have a negative attitude towards mathematics. The findings therefore show that there was a general negative attitude towards mathematics among the students.

Majority (88%) of the teachers in the study agreed, 10% disagreed and 2% were uncertain that low parental socio-economic status which is linked to low income makes it difficult for parents to buy adequate learning resources. Slightly above half (52%) of the students in the study agreed, 44% disagreed and 2% were uncertain that their parents were able were able to buy books and other apparatus necessary for mathematics. Majority (77%) of the students disagreed while 23% agreed that their parents and siblings helped them with mathematics homework. Slightly above half (56%) of the mathematics heads of departments indicated that students' family background influences learners achievement in mathematics. The findings therefore show that family background can determine a students' attitude and performance in mathematics.

Majority (71%) of the teachers in the study agreed while 29% disagreed that inadequacy of textbooks, revision materials and limited access to library materials hinders effective tutoring and mathematic learning. Nevertheless, majority (84%) of the teachers

disagreed while 16% agreed that the school has adequate infrastructure (Classes, desks, library) and mathematics tutors have sufficient workstations getting ready, partnership or consulting with learners. Slightly above half (56%) of the mathematics heads of departments in the study indicated that there was a fair availability of mathematics teaching resources. The researcher observed that that mathematics textbooks, reference books and geometric equipment were found in all participating schools. Majority of the teaching resources were in a good or fair condition. However, majority of resources such as computers with mathematics related programs, Geometric equipment, modern teaching aids and mathematics textbooks had a low adequacy.

Majority (80%) of the respondents disagreed while 20% agreed there wasn't enough time to prepare lesson plans. The vast majority (97%) agreed while 3% were uncertain that mathematics teachers-student ratio is high, making it impossible for the teacher to interact with students at a personal level. Majority (78%) of the heads of departments indicated that teachers were well prepared to teach mathematics. Chi-square analysis showed that students attitude ($p=0.000$) and teaching resources ($p=0.021$) were significant. Cramer's V values showed that student's attitude ($v=0.680$) had a greater influence than teaching resources ($v=0.305$).

5.3 Conclusion

It is the conclusion of this study that perception of the students affects mathematics performance in KCSE among students in public secondary schools within the sub-county of Kilifi. Particularly, the learners have poor attitude regarding the mathematics field hence it has negatively influenced their achievement in mathematics. The students see it as a hard complex subject that is hard to grasp and as such majority of students have lost interest and are resigned to the fact that they will fail in it.

The study concludes that students' family background has little or no influence on mathematics performance in KCSE among learners in public secondary schools in Kilifi sub-county. This is because although majority of students come from poor families and a culture of failing in the subject, there are overriding factors which have a stronger influence such as students' attitude.

The study concludes that teaching resources influence mathematics performance in KCSE among learners in public secondary schools in Kilifi sub-county. Specifically, the lack of adequate resources for teaching mathematics that negatively affects performance in the subject. Resources such as geometric equipment, modern teaching aids and mathematics textbooks had a low adequacy. Limited resources such as lack of adequate mathematics books brings difficulty in teaching and learning mathematics.

The study also concludes that teacher preparedness has little or no influence on mathematics performance in KCSE among learners in public secondary schools in Kilifi sub-county. Although teachers preparedness was not optimal, having good preparedness would not raise the mathematics performance due to underlying factors namely students' pessimistic perception and insufficient teaching and learning resources.

5.4 Recommendations

This section provides recommendations for policy, practice and research.

5.4.1 Recommendation on Research Findings

The survey proposes that in the sub-county of Kilifi, public secondary school procure the services of motivational speakers for purposes of swaying the learners towards

mathematics. The schools should also visit other schools in other counties in order to benchmark with them and their learners can visit and be enlightened.

There is need for parents to support their children in learning mathematics this should be emphasized in parents and teachers meetings. In accordance with the study, the education ministry should commit more resources to schools especially teaching resources for mathematics. More teachers should also be employed to ease the workload on the existing staff.

The study also recommends use of audio-visual equipment and internet based programs to teach mathematics. There should be indoor and outdoor mathematics laboratories, field trips, industrial visits and market research.

5.4.2 Recommendations for Further Research

In this study, only teaching resources and teacher preparedness were studied. Future studies should also investigate teachers' competence and teaching methods. In addition, the challenges and opportunities in the mathematics curriculum should be looked into keenly. A wider study comprising of more public secondary schools should be conducted to enhance our understanding on determinants that influence the achievement of mathematics in KCSE among learners in public secondary schools.

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APPENDICES

APPENDIX I: INTERVIEW SCHEDULE FOR HODS

The purpose of this interview is collect data on factors that influence performance in mathematics among learners in public secondary schools. Please respond to the questions to the best of your ability.

1. How would you describe students' attitude towards mathematics?

…….

…….

…….

2. Do you think the students' family background influences their performance?

- Yes
- No

Explain your answer

…….

…….

…….

3. How would you rate the availability and mathematics teaching resources?

- Very high
- High
- Fair
- Low
- Very low

4. How would you describe teacher preparedness in teaching mathematics?

…….

…….

…….

5. What strategies has the school adopted to enhance performance of mathematics?

…….

…….

…….

APPENDIX II: QUESTIONNAIRE FOR TEACHERS

Please respond to the following by ticking in the space provided on the question applicable to you. To maintain anonymity, do not indicate your name. Thank you.

SECTION A: GENERAL INFORMATION

1. What is your gender?
    - Male
    - Female
2. How old are you?
    - 21-30 years
    - 31-40 years
    - 41-50 years
    - Over 50 years
3. What is your highest level of education?
    - Diploma
    - Bachelor's degree
    - Post graduate degree
4. How long have you taught mathematics?
    - <5 years
    - 6- 10 years
    - 11-15 years
    - >16 years

Section B: Students Attitude towards Mathematics subject

5. The purpose of this question is to assess students attitude and confidence in mathematics which can have an influence on performance. Kindly respond to each statement using the answers ranging from "strongly agree" to "strongly disagree" using the scale below:

5= Strongly Agree, 4=Agree, 3=Neutral, 2= Disagree, while 1=Strongly Disagree.

Study methods	**5**	**4**	**3**	**2**	**1**
Students generally like Mathematics and believe they will get good grades					
Mathematics usually makes students feel uncomfortable and nervous during mathematics lessons and test leading to poor performance					
Mathematics teachers have built confidence of their students on their ability to pass well in KCSE					
Self- efficacy: Many students feel they have no ability or talent to succeed in Mathematics.					
Learning Mathematics involves a lot of memorization of formula which are difficult to grasp and Many times miss Mathematics lessons because the subject is difficult					
Mathematics is too complex and It is difficult to pass Mathematics it in KCSE especially in this school. It is normal that majority of students fail in the subject					
Students attitude towards mathematics greatly influences their performance on the subject					

SECTION C: STUDENT FAMILY BACKGROUND

6. Kindly respond to each statement using the answers ranging from "strongly agree" to "strongly disagree" using the scale below:

5= Strongly Agree, 4=Agree, 3=Neutral, 2= Disagree, while 1=Strongly Disagree.

Statement	**5**	**4**	**3**	**2**	**1**
Low parental socio-economic status which is associated with low income makes it difficult for parents to buy adequate learning resources for their children is one of the major factor contributing to lower academic achievement in the region					
Boys tend to perform better than Girls in mathematics subject					
Cultural constraints negatively impacts on achievement level among students.					

SECTION D: TEACHING AND LEARNING RESOURCES

7. Kindly respond to each statement using the answers ranging from "strongly agree" to "strongly disagree" using the scale below:

5= Strongly Agree, 4=Agree, 3=Neutral, 2= Disagree, while 1=Strongly Disagree.

Statement	**5**	**4**	**3**	**2**	**1**
Inadequacy of textbooks, revision materials and Limited access to library materials hinders effective teaching and learning of mathematics					
There is a friendly and cooperative relationship between Mathematics teachers and the students which makes the subject enjoyable					
The school has adequate infrastructure (Classes, desks, library) and Mathematics teachers have adequate workspace for preparation, collaboration or meeting with students					
Teaching method in mathematics is student centered and participatory which have enhanced student understanding on complex mathematics concepts					
Availability and effective utilization of teaching and Instructional materials have a great potential of improving performance in mathematics in KCSE					

SECTION E: TEACHER PREPAREDNESS AND WORKLOAD

8. Kindly respond to each statement using the answers ranging from "strongly agree" to "strongly disagree" using the scale below:

5= Strongly Agree, 4=Agree, 3=Neutral, 2= Disagree, while 1=Strongly Disagree.

Statement	**5**	**4**	**3**	**2**	**1**
Mathematics teachers have adequate time to Prepare lesson plans					
Math's Teachers-student ratio is high, making it impossible for the teacher to interact with students at a personal level					
Math's teachers and students are rewarded whenever improvement in performance is noted to appreciate them and maintain morale					
Inadequate preparation lack of motivation to both teachers and students and high teacher workload have contributed to dismal performance in mathematics subject					

SECTION F: PERFORMANCE IN MATHEMATICS IN KCSE

9. Kindly provide a summary of performance in mathematics for the last 5 years

Year	KCSE School mean score
2013	
2014	
2015	
2016	
2017	

~Thank you for your participation~

APPENDIX III: QUESTIONNAIRE FOR STUDENTS

Please respond to the following by ticking in the space provided on the question applicable to you. Do not indicate your name. Thank you.

SECTION A: ATTITUDE TOWARDS MATHEMATICS

1. Kindly respond to each statement using the answers ranging from "strongly agree" to "strongly disagree" using the scale below:

5= Strongly Agree, 4=Agree, 3=Neutral, 2= Disagree, while 1=Strongly Disagree.

STATEMENT	5	4	3	2	1
Mathematics is too complex and It is difficult to pass					
Mathematics doesn`t scare me at all and I believe I will get good grades					
Mathematics usually makes me feel uncomfortable and I am nervous during mathematics lessons and test					
I have confidence in tackling Mathematics related problems					
I have no ability or talent to succeed in Mathematics					
Mathematics teachers have made me feel I have the ability to pass well in math's					
Mathematics is a worthwhile and necessary subject					
Mathematics is of no relevance to me and I expect to have little use for it when I get out of high school					

SECTION B: STUDENTS FAMILY BACKGROUND

2. Kindly respond to each statement using the answers ranging from "strongly agree" to "strongly disagree" using the scale below:

5= Strongly Agree, 4=Agree, 3=Neutral, 2= Disagree, while 1=Strongly Disagree.

Statement	**5**	**4**	**3**	**2**	**1**
My parents are able to afford books and other equipment necessary for mathematics					
My parents and siblings help me with mathematics homework					
Nobody in our family is good at mathematics					

~Thank you for your participation~

APPENDIX IV: OBSERVATION CHEKLIST

Item	Availability (1 = Yes, 2-=No)	Condition (1= Good, 2- Fair, 3= Poor)	Adequacy (1=high, 2= fair, 3= low)
Mathematics textbooks			
Modern teaching aids			
Calculators			
Mathematics reference books			
Mathematics posters and charts			
Geometric equipment			
Computers with mathematics related programs			

APPENDIX V: RAW DATA

HODs' Interview

Attitude

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Positive	3	33.3	33.3	33.3
	Neagtive	6	66.7	66.7	100.0
	Total	9	100.0	100.0	

Family_Background

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	5	55.6	55.6	55.6
	No	4	44.4	44.4	100.0
	Total	9	100.0	100.0	

Availability

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very High	2	22.2	22.2	22.2
	Fair	5	55.6	55.6	77.8
	Low	2	22.2	22.2	100.0
	Total	9	100.0	100.0	

Teacher_Preparedness

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Well Prepared	7	77.8	77.8	77.8
	Fairly Well Prepared	2	22.2	22.2	100.0
	Total	9	100.0	100.0	

Teachers Questionnaire

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	15	71.4	71.4	71.4
	Female	6	28.6	28.6	100.0
	Total	21	100.0	100.0	

Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	21-30	6	28.6	28.6	28.6
	31-40	11	52.4	52.4	81.0
	41-50	2	9.5	9.5	90.5
	>50	2	9.5	9.5	100.0
	Total	21	100.0	100.0	

Education

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Diploma	11	52.4	52.4	52.4
	B.Degree	8	38.1	38.1	90.5
	P.Degree	2	9.5	9.5	100.0
	Total	21	100.0	100.0	

Experience

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	<5	1	4.8	4.8	4.8
	6-10	8	38.1	38.1	42.9
	11-15	10	47.6	47.6	90.5
	>16	2	9.5	9.5	100.0
	Total	21	100.0	100.0	

Students_Like_Maths

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	10	50.0	50.0	50.0
	Disagree	4	20.0	20.0	70.0
	Agree	2	10.0	10.0	80.0
	Strongly Agree	4	20.0	20.0	100.0
	Total	20	100.0	100.0	

Maths_Uncomfortable_Nervous

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	1	5.0	5.0	5.0
	Agree	8	40.0	40.0	45.0
	Strongly Agree	11	55.0	55.0	100.0
	Total	20	100.0	100.0	

Maths_Teachers_Confidence

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	3	15.0	15.0	15.0
	Disagree	4	20.0	20.0	35.0
	Agree	4	20.0	20.0	55.0
	Strongly Agree	9	45.0	45.0	100.0
	Total	20	100.0	100.0	

Self_Efficacy

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	1	5.0	5.0	5.0
	Agree	8	40.0	40.0	45.0
	Strongly Agree	11	55.0	55.0	100.0
	Total	20	100.0	100.0	

Memorization_Formula

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	3	15.0	15.0	15.0
	Disagree	8	40.0	40.0	55.0
	Agree	4	20.0	20.0	75.0
	Strongly Agree	5	25.0	25.0	100.0
	Total	20	100.0	100.0	

Mathematics_Complex

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	3	15.0	15.0	15.0
	Uncertain	1	5.0	5.0	20.0
	Agree	4	20.0	20.0	40.0
	Strongly Agree	12	60.0	60.0	100.0
	Total	20	100.0	100.0	

Students_Attitude

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	4	20.0	20.0	20.0
	Strongly Agree	16	80.0	80.0	100.0
	Total	20	100.0	100.0	

Parental_SES

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	3	14.3	15.0	15.0
	Strongly Agree	17	81.0	85.0	100.0
	Total	20	95.2	100.0	
Missing	System	1	4.8		
Total		21	100.0		

Boys_vs_Girls

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	4.8	5.0	5.0
	Disagree	2	9.5	10.0	15.0
	Agree	6	28.6	30.0	45.0
	Strongly Agree	11	52.4	55.0	100.0
	Total	20	95.2	100.0	
Missing	System	1	4.8		
Total		21	100.0		

Cultural_Constraints

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	3	14.3	15.0	15.0
	Disagree	3	14.3	15.0	30.0
	Uncertain	2	9.5	10.0	40.0
	Agree	3	14.3	15.0	55.0
	Strongly Agree	9	42.9	45.0	100.0
	Total	20	95.2	100.0	
Missing	System	1	4.8		
Total		21	100.0		

Inadequacy_of_resources

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	9.5	10.0	10.0
	Disagree	4	19.0	20.0	30.0
	Agree	5	23.8	25.0	55.0
	Strongly Agree	9	42.9	45.0	100.0
	Total	20	95.2	100.0	
Missing	System	1	4.8		
Total		21	100.0		

Cooperative_Relationship

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	9.5	10.0	10.0
	Disagree	5	23.8	25.0	35.0
	Uncertain	1	4.8	5.0	40.0
	Agree	4	19.0	20.0	60.0
	Strongly Agree	8	38.1	40.0	100.0
	Total	20	95.2	100.0	
Missing	System	1	4.8		
Total		21	100.0		

Infrastructure

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	9	42.9	45.0	45.0
	Disagree	7	33.3	35.0	80.0
	Agree	2	9.5	10.0	90.0
	Strongly Agree	2	9.5	10.0	100.0
	Total	20	95.2	100.0	
Missing	System	1	4.8		
Total		21	100.0		

Teaching_Methods

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Uncertain	2	9.5	10.0	10.0
	Agree	6	28.6	30.0	40.0
	Strongly Agree	12	57.1	60.0	100.0
	Total	20	95.2	100.0	
Missing	System	1	4.8		
Total		21	100.0		

Instruictional_Materials

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	9.5	10.0	10.0
	Agree	2	9.5	10.0	20.0
	Strongly Agree	16	76.2	80.0	100.0
	Total	20	95.2	100.0	
Missing	System	1	4.8		
Total		21	100.0		

Lesson_Plans

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	11	52.4	55.0	55.0
	Disagree	5	23.8	25.0	80.0
	Agree	1	4.8	5.0	85.0
	Strongly Agree	3	14.3	15.0	100.0
	Total	20	95.2	100.0	
Missing	System	1	4.8		
Total		21	100.0		

Teacher_Student_Ratio

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Uncertain	1	4.8	5.0	5.0
	Agree	3	14.3	15.0	20.0
	Strongly Agree	16	76.2	80.0	100.0
	Total	20	95.2	100.0	
Missing	System	1	4.8		
Total		21	100.0		

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	7	33.3	35.0	35.0
	Disagree	5	23.8	25.0	60.0
	Agree	3	14.3	15.0	75.0
	Strongly Agree	5	23.8	25.0	100.0
	Total	20	95.2	100.0	
Missing	System	1	4.8		
Total		21	100.0		

Preparation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	3	14.3	15.0	15.0
	Disagree	5	23.8	25.0	40.0
	Uncertain	2	9.5	10.0	50.0
	Agree	5	23.8	25.0	75.0
	Strongly Agree	5	23.8	25.0	100.0
	Total	20	95.2	100.0	
Missing	System	1	4.8		
Total		21	100.0		

Students Questionnaire

Mathematics_Too_Complex

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	21	20.4	20.6	20.6
	Disagree	13	12.6	12.7	33.3
	Agree	24	23.3	23.5	56.9
	Strongly Agree	44	42.7	43.1	100.0
	Total	102	99.0	100.0	
Missing	System	1	1.0		
Total		103	100.0		

Mathematics_Doesnt_Scare

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	23	22.3	22.3	22.3
	Disagree	39	37.9	37.9	60.2
	Uncertain	6	5.8	5.8	66.0
	Agree	10	9.7	9.7	75.7
	Strongly Agree	25	24.3	24.3	100.0
	Total	103	100.0	100.0	

Mathematics_Nervous

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	4	3.9	3.9	3.9
	Disagree	15	14.6	14.7	18.6
	Agree	24	23.3	23.5	42.2
	Strongly Agree	59	57.3	57.8	100.0
	Total	102	99.0	100.0	
Missing	System	1	1.0		
Total		103	100.0		

Confidence_Mathematics_Problems

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	38	36.9	36.9	36.9
	Disagree	20	19.4	19.4	56.3
	Uncertain	4	3.9	3.9	60.2
	Agree	18	17.5	17.5	77.7
	Strongly Agree	23	22.3	22.3	100.0
	Total	103	100.0	100.0	

Ability_Succeed_Mathematics

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	11	10.7	10.7	10.7
	Disagree	25	24.3	24.3	35.0
	Uncertain	2	1.9	1.9	36.9
	Agree	39	37.9	37.9	74.8
	Strongly Agree	26	25.2	25.2	100.0
	Total	103	100.0	100.0	

Mathematics_Teachers_Ability

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	8	7.8	7.8	7.8
	Disagree	22	21.4	21.4	29.1
	Agree	39	37.9	37.9	67.0
	Strongly Agree	34	33.0	33.0	100.0
	Total	103	100.0	100.0	

Mathematics_Worthwhile_Necessary

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	1.9	1.9	1.9
	Disagree	24	23.3	23.3	25.2
	Agree	28	27.2	27.2	52.4
	Strongly Agree	49	47.6	47.6	100.0
	Total	103	100.0	100.0	

Mathematics_No_Relevance

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	23	22.3	22.3	22.3
	Disagree	37	35.9	35.9	58.3
	Uncertain	3	2.9	2.9	61.2
	Agree	39	37.9	37.9	99.0
	Strongly Agree	1	1.0	1.0	100.0
	Total	103	100.0	100.0	

Parents_Afford_Books

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	23	22.3	22.3	22.3
	Disagree	23	22.3	22.3	44.7
	Uncertain	4	3.9	3.9	48.5
	Agree	14	13.6	13.6	62.1
	Strongly Agree	39	37.9	37.9	100.0
	Total	103	100.0	100.0	

Parents_Siblings_Help

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	41	39.8	39.8	39.8
	Disagree	38	36.9	36.9	76.7
	Agree	1	1.0	1.0	77.7
	Strongly Agree	23	22.3	22.3	100.0
	Total	103	100.0	100.0	

Nobody_Family_Mathematics

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	6	5.8	5.8	5.8
	Agree	41	39.8	39.8	45.6
	Strongly Agree	56	54.4	54.4	100.0
	Total	103	100.0	100.0	

APPENDIX VI: LETTERS OF APPROVAL

KENYA METHODIST UNIVERSITY
MOMBASA CAMPUS
P O Box 89983-80100 MOMBASA, Kenya
Tel: +254-715120282
Fax: 041-2495946
E-mail:mombasa@kemu.ac.ke

Date: 03-08-2018

TO WHOM IT MAY CONCERN

Reg. No: **EDU-3-7484-3/2011**
Name: GITHAIGA ESTHER WANJIRU
This is to confirm that the above named person is a bona fide student of this University pursuing a **Master of Education Leadership and Management** as part of the degree requirements the student is required to undertake research and write a thesis in the area of specialization.

The student is undertaking research on **"Factors Influencing Performance of Mathematic Subject among Learners in Public Secondary School in Kilifi Sub County"**and is currently proceeding to collect field data.
Any assistance given towards attaining this goal will be highly appreciated.

Yours faithfully

03 AUG 2018

Eric Mathuva
For Coordinator, Postgraduate Studies

APPENDIX VII: AUTHORIZATION LETTER

CONDITIONS

1. The License is valid for the proposed research, research site specified period.
2. Both the Licence and any rights thereunder are non-transferable.
3. Upon request of the Commission, the Licensee shall submit a progress report.
4. The Licensee shall report to the County Director of Education and County Governor in the area of research before commencement of the research.
5. Excavation, filming and collection of specimens are subject to further permissions from relevant Government agencies.
6. This Licence does not give authority to transfer research materials.
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8. The Commission reserves the right to modify the conditions of this Licence including its cancellation without prior notice.

REPUBLIC OF KENYA

National Commission for Science, Technology and Innovation

RESEARCH CLEARANCE PERMIT

Serial No.A 20188

CONDITIONS: see back page

THIS IS TO CERTIFY THAT:
MS. GITHAIGA ESTHER WANJIRU
of KENYA METHODIST UNIVERSITY,
204-10100 OTHAYA,has been permitted
to conduct research in *Kilifi County*

on the topic: *FACTORS INFLUENCING MATHEMATICS PERFORMANCE AMONG LEARNERS IN PUBLIC SECONDARY SCHOOLS IN KILIFI SUB-COUNTY*

for the period ending:
17th August,2019

.....
Applicant's Signature

Permit No : NACOSTI/P/18/37134/24677
Date Of Issue : 18th August,2018
Fee Recieved :Ksh 1000

.....
Director General
National Commission for Science, Technology & Innovation

APPENDIX VIII: CERTIFICATE OF PUBLICATION

Novelty Journals

INTERNATIONAL JOURNAL OF NOVEL RESEARCH IN HUMANITY AND SOCIAL SCIENCES

Certificate of Publication ISSN 2394 - 9694 (online)

Manuscript ID: 015092018C **Date:** 13/10/2018

This is to Certify that Esther Wanjiru Githaiga

has published his/her manuscript entitled "Influence of Student's Attitude in Mathematics Performance among Learners in Public Secondary Schools in Kilifi Sub-County, Kenya"

Year: 2018	Volume: 5 (Five)	Issue: 5 (Five)

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