FACTORS INFLUENCING STUDENTS PERFORMANCE IN MATHEMATICS IN KENYA CERTIFICATE OF SECONDARY EDUCATION IN PUBLIC SECONDARY SCHOOLS IN BUTERE SUB COUNTY, KENYA

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A Research Project Submitted in Partial Fulfillment of the Requirements for the Award of Degree of Master of Education in Curriculum Studies

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DECLARATION

This research proposal is my original work and has not been presented for a degree in any other university.

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E55/83713/2012

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

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DEDICATION

I dedicate this work to my husband Caleb Otwoma Musa and our children Gerry, Ivy, Specious and Mike.

ACKNOWLEDGEMENT

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LIST OF ABBREVIATIONS AND ACRONYMS

CEMASTEA   Centre for Mathematics, Science and Technology Education in Africa

DEO   District Education Officer.

KCE   Kenya Certificate of Education.

KCSE   Kenya Certificate of Secondary Education.

KICD   Kenya Institute of Curriculum and Development

KIE   Kenya Institute of Education.

HoD   Head of Department

NCEOP   National Committee on Educational Objectives and Policies

QASO   Quality Assurance and Standards Officer

RoK   Republic of Kenya

SMASSE   Strengthening of Mathematics and Science in Secondary Education

TIMSS   Third International Mathematics and Science Study

USA   United State of America

ABSTRACT

The purpose of this study was to establish factors influencing students' performance in Mathematics in Kenya Certificate of Secondary Education in public secondary schools in Butere sub-county Kenya. The four research objectives were; to determine whether the teachers in servicetraining influences students' performance in Mathematics in KCSE, the teachers and students attitude towards Mathematics in KCSE and availability of Resources. The study adopted descriptive survey design and targeted 26 Principals, 45 Mathematics teachers and 192 students in Butere sub-county. Simple random sampling technique was used to select the study participants. Data was collected by use of questionnaire and analyzed by use of descriptive statistics. Findings revealed that non-availability and inadequacy of teaching and learning resources hampered performance in Mathematics. Research findings also showed that the teaching methodologies influence performance as well. Findings on the influence of learners attitude in Mathematics revealed that learners had positive attitude towards the subject based on the findings it was concluded that performance in KCSE. The study recommended that further study be undertaken in both public and private schools in other sub-counties in Kenya to establish the factors behind poor performance in Mathematics. The ministry of education should invest in providing Teaching/learning resources for Mathematics.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Mathematics has been recognized as an important area of learning aimed at driving economies and technological transformation of any society. Therefore, the promotion of the subject is of paramount importance to the development of human kind. Mathematics is an embodiment of knowledge, skills and procedures that can be used in a variety of ways. It can be used to describe, illustrate and interpret, predict, explain patterns and relationships in numbers in order to convey and clarify meaning of various issues in life (National Council for Curriculum and Assessment, 2005). Developed nations seem to have very strong Mathematics policies which have propelled them to higher heights of development. It appears that no country has attained any breakthrough in its economic development without the development of minimum Mathematics base. However, in their advancement in these area schools are faced with the challenge of performance (Carroll, 2011).

The Kenyan government has underscored the importance of Mathematics literacy in educational institutions. Having recognized the role of Mathematics in national development, the Kenyan government has made Mathematics compulsory in primary and secondary schools under the 8:4:4 system of education. As such, students' performance in Mathematics and Sciences is of great concern to education stakeholders (Kenya National Examination Council, 2001). Despite the important role that Mathematics plays in society, there has always been the

challenge of performance in the subject in KCESE as noted by Ramani (2004) and Siringi (2005). This calls for urgent need to address the problem in schools. Various studies and reports have identified some of the causes that influence the teaching and learning of Mathematics. Some of the factors brought out include student and teacher perception of the subject, culture, facilities and equipment. (KNEC, 2006; O'Connor, Kanja & Baba, 2000; Strengthening Mathematicsand Science inSecondary Education, 1998).

Most pronounced factor that influence teaching and learning of mathematics is attitude, which as a concept is concerned with an individual's way of thinking, acting and behaving (Olatunde, 2009). Moreover, it has very serious implications for the learner, the teacher, the immediate social group with which the individual learner relates and the entire school system. Attitudes are formed as a result of some kind of learning experiences and may also be learned simply by following the examples or opinion of teachers, parents and learning situation.

Facilities and resources are critical in the performance of Mathematics. Teachers, books, geometrical sets, classrooms, furniture are very critical in terms of motivating performance. This hence out to be looked into objectively.There has been public outcry on the mean scores of mathematics every time KCSE results are released (Njoroge, 2014). The low scores has been a trend despite the fact that review of the subject was done in the new syllabus of 2006. (Kenya Institute of Education, 2006). The same trend has been noted in Butere Sub-County over the years as depicted in the analysis of KCSE for the years 2009-2014(District

Education Office, Butere Sub-County, 2015). The analyzed results are given in Table 1 below:

Table 1.1: K.C.S.E Mathematics Examination Results for Butere Sub-County

	Butere sub-county	Khwisero Sub-county	Mumias Sub-County
2014	6.001 C+	7.943 B	8.431 B+
2013	6.09 C+	7.001 B	8.224 B+
2012	4.059 C-	6.732 B-	7.831 B
2011	3.13 D	7.224 B	7.445 B
2010	3.68 D+	7.431 B	6.661B
2009	3.16 D	6.341 C+	7.000 B

Source: Education Office, Butere Sub-County, 2014.

The performance exhibited each year as evidenced in the mean scores in the subject in KCSE results is not so encouraging. Of particular interest to this study, the researcher will focus on the individual factors that influence teaching and learning of mathematics curriculum in secondary schools with specific reference on objectives, content, methods and evaluation strategies used in the subject in Butere Sub-County.

The low performance in Mathematics among learners reduces their scope of progress in higher education. This is because most courses offered in higher education require the learners to have attained an average of 7 points out of 12 points which is a C+ in Mathematics so as to enroll in any particular field. Studies conducted by Strengthening of Mathematics and Science in Secondary Education (SMASSE) indicate that Mathematics and sciences are persistently performed poorly (Wambui, 2002). Among the factors identified leading to low performance in Mathematics is the attitudes of both the students and teachers towards the subject. Thus, the role of attitude of both the students and teachers cannot be underestimated in the teaching and learning processes in schools hence performance. Therefore, it is important to undertake a study of individual factors influencing performance of secondary students in mathematics curriculum in secondary schools in Butere Sub-County.

1.2 Statement of the Problem

Various factors influence the teaching and learning of Mathematics in secondary schools. Over the past six years the performance of mathematics in Butere Sub-County has been on a steady growth in performance but still lagging behind as compared to other sub counties in the larger Kakemega County as revealed in Kenya Certificate of Secondary Education results posted from 2009 to 2014. This therefore raises queries as to what factors are making the Butere Sub-County lag behind in performance of Mathematics iin KCSE as compared to the other sub counties namely Khwisero and Mumias. This study therefore seeks to establish factors influencing performance in Mathematics in KCSE in public schools in

Butere Sub-County, Kenya. . No known structured survey has been undertaken in Butere Sub-County to establish the factors that influence KCSE performance in Mathematics. Therefore, this study is designed to identify those factors that influence performance in Mathematics in public secondary schools in Butere Sub-County, Kenya.

1.3 Purpose of the Study

The purpose of the study was to establish factors influencing student's performance in mathematics in KCSE in public secondary schools in Butere Sub-County, Kenya.

1.4 Objectives of the Study

The specific objectives of the study were:

i.   To determine whether the teachers' in service training influences student's performance in Mathematics in KCSE in public secondary schools in Butere Sub-County, Kenya.

ii. To establish whether the teachers' attitude influences students' performance in KCSE in public secondary schools in Butere Sub-County, Kenya.

iii. To examine whether students' attitudes towards mathematics influences in KCSE performance in Butere- Sub-County, in Kenya.

iv. To establish the availability of requisite resources at the disposal of students and teachers' influence in KCSE performance mathematics in public secondary schools Butere Sub-County, Kenya.

1.5 Research Questions

The study was guided by the following questions:

i. How does the teachers' in service training influence students' performance in Mathematics in KCSE in public secondary schools in Butere Sub-County, Kenya?

ii. How does the teachers' attitudes influences students' performance in KCES in Mathematics in KCSE in public secondary schools in Butere Sub-County, Kenya?

iii. How does the students' attitude towards mathematics influences their learning Mathematics in secondary school in Butere Sub-County, in Kenya?

iv. How has the availability of requisite resources at the disposal of students and teachers influence KCSE performance in mathematics in public secondary schools Butere Sub-County, Kenya?

1.6 Significance of the Study

The knowledge generated from the study may be useful to Center for Mathematics, Science and Technology Education in Africa (CEMASTEA) and may lead to review of workshops to suit the science teachers. The study may also serve as a base for further research in SMASSE related to secondary school system. The QASOs may use the research with the design of in-service training

programmes for teachers, review of learning and teaching materials in collaboration with Kenya Institute of Curriculum Development (KICD).

1.7 Limitations of the Study

Limitations are challenges anticipated or faced by the researcher, Kombo and Tromp (2006) in this study the use of closed ended questions led to floor and ceiling effect. It was also difficult to control the respondents as they inflated or deflated their responses to the questions in a way that they felt it was desirable to them.

1.8 Delimitations of the Study

The study was limited to Butere sub-county public secondary schools but not in private schools. The number of respondents was also limited it involved a few teachers and a few students. The sampled schools were given the scope.

The findings of the study were not generalized to other sub-counties in the county.

1.9 Assumption of the Study

The following were the assumptions of the study:

(a) That the respondents were conversant with the secondary school mathematics curriculum.

(b) All respondents cooperated in giving reliable responses.

1.10 Definition of Significant Terms

The following are the definitions of significant terms:

Mathematics refers to the study of numbers quantities or shapes.

In- Service Training: refers to the additional knowledge and skills acquired by mathematics teachers besides their academic qualifications.

Influence: refers to having an effects on, in this case having an effect on Mathematics Performance.

Performance: refers to and achievement of at least a mean of 6.1 and above against established mean of 12.

Teachers' attitude: refers to the way teachers look at Mathematics whether positively or negatively.

Students' attitude: refers to the way students look at Mathematics whether positively or negatively.

Requisite resources: refers to necessary material needed for effective teaching and learning.

1.11 Organization of the Study

The study was organized into five chapters. The first chapter highlighted the background to the study, statement of the problem, purpose of the study, objectives of the study, limitations of the study, delimitations of the study, assumptions of the study, definition of significant terms. Chapter two will dwell

on literature review. The related literature will be reviewed concepts of teaching and learning in Mathematics, role of teacher and students, methods of teachings , teaching facilities, teachers attitude and teaching and learning mathematics, students attitudes teaching and learning mathematics , summary of the literature review, theoretical and conception framework.

The third chapter covered the research methodology to be employed. This included research design, target population, sample size and sampling, research instruments, validity and reliability of the instrument, data analysis and ethical consideration. Chapter four consist of data analysis, Interpretations and discussion and chapter five deals with summary of the findings, conclusions and recommendations emanating from the study.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 Introduction

In this chapter, the study presented a critical literature review which included; concepts of teaching and learning in mathematics, teachers in service training, teaching and learning of mathematics, teachers attitudes and teaching of mathematics, students attitudes, teaching and learning of mathematics, attitudes towards mathematics curriculum and objectives, summary of literature review. Besides this, discussed are theoretical and conceptual frameworks.

2. 2 Concepts of Teaching and Learning in Mathematics

Rhodes University Mathematics Project (RUMEP) research finding indicated felt that if teachers felt enthusiastic and confident, their attitudes towards delivering content was influenced positively, hence they taught more effectively (Spanneberg, 2001). This implied that the kind of attitude teachers had towards the content would determine the style they were going to present it.

According to Bashora (2004) study on the content in secondary schools in Gucha District, many teachers still struggled with the whole question on whether it was the process or content that was important for effective learning. This led to the formation of attitude on the content on the side of the teachers which eventually affected the perception they would be having towards the subject. The study further showed that experiments were shallow with teachers concentrating on completing the syllabus at the expense of students' understanding of concepts. In this study it could be seen that the attitude formed by teachers on the content might have a direct impact in the manner in which one will handle a given content when presenting it in class.

The National Council of Teachers of Mathematics (2000) also reported that teachers who had mastery of content gave details in their lesson, linked the topic to other topics and most importantly they were able to motivate learners by creating good environment for learning. According to Ball (2003), a teacher with good mathematical pedagogical content knowledge could break down mathematical knowledge into less polished and abstract forms, thus making it accessible to students who are at different cognitive levels. Through this, interest was created making learners to enjoy the content presented to them and at the same time it may influence a change of attitude as they got attracted to the presentation.

The Report of the Commission of Inquiry into the Education System of Kenya (Republic of Kenya, 1999) expressed similar sentiments. It suggested the revision of some of the subjects' content and reducing the number of examinable subjects

in the KCSE examination. Furthermore, the Commission cited the integration of some topics within a given subject as reasons for overcrowding of the curriculum especially the Mathematics curriculum. It therefore recommended revision of the secondary school curriculum with the view of removing inappropriate content thus making all the subjects manageable. This would reduce the work load and at the same time it may promote the attitude of teachers and students since the content shall be manageable. In this report, they looked at the content coverage by learners while in this study the researcher will sought to find out the attitudes of students and teachers had towards Mathematics content.

2.3 Role of Teacher and Student

2.3.1 In-Service Training and Performance in Mathematics

This refers to the policies and procedures designed to equip prospective teachers with the knowledge, attitudes, behaviors and skills they require to perform their tasks effectively in the classroom, school and wider community, Although ideally it should be conceived of and organized as a seamless continuum, teacher education is often divided into the following stages. These are initial teacher training/education (a pre-service course before entering the classroom as a fully responsible teacher); induction (the process of providing training and support during the first few years of teaching as the first year in a particular school) teacher development or continuing professional development (CPD) an in-service process for practicing teachers.

A study carried by SMASSE (1998) also indicated that most teachers lacked clear vision on the set objectives in Mathematics and Sciences. The perception of the teachers towards objectives affected the level of the achievement of the lesson that was being presented in class. This was supported by Kemp (1986) who asserted that for curriculum planning to be rational, it must start with clear and specific aims and objectives and then address it to discovering the means, the content and methods in terms of which the objectives were to be achieved. Since curriculum is implemented by teachers, they ought to be clear on what had to be achieved at the end of the lesson. Findings of the survey that was conducted in 2011 revealed that most science teachers (72%) were still using teaching methods that were inclined towards expository approach. Only 28% of the lessons could be classified as tending towards learners –centered approach

2.4 Methods of Teaching

The other problem which face the learning of Mathematics in secondary thus leading to wanting performance in KCSE exams is the methods used by the teacher. There are various views about the nature of Mathematics. Teachers should have insight and be resourceful in whatever methods they use. Classroom organization is very important in this case SMASSE (2005)., practical work, investigations, group experiments and individual assignments are required more frequently than the usual 40 or 80 minutes lessons of lecturing. Once these activities are through, it is hoped that overall objectives of attitudes and personal social development will be achieved.

We must give prominence to the students' participation in class discussions. This could be done by allowing one student to demonstrate a concept and others to pay attention to what is said. It can also be done by trying to correct or improve upon the statements made. According to Wambui (2002), Mathematics is a complex social activity in the context of the society. He distinguishes between relational and instrumental understanding as far as Mathematics is concerned. Relational understanding includes all descriptions, classifications and understanding the relationship which help to explain the social phenomena.

Mathematics is a difficult subject to learn as well as to teach SMASSE (2005). This is because Mathematics is a hierarchical subject since the new work depends on the previous one. Students learn at different speeds, therefore some will get the concept in one period and others will get it after a long time. As such, the subject requires hard work and practice. If teaching is too fast, understanding is not developed. On the other hand, if the pace is slow, the students became bored, particularly the fast learners. Whatever the level of attainment, students should not be allowed to experience repeated failures. Effective teaching of Mathematics should pay attention to the following, Watson (2003): Facts and skills: facts in this case are the items of information which are essentially unconnected. Examples include conventions, rotations, conversions and factors. Skills include ability to use numbers and computations; Conceptual structures: these are richly inter-connected bodies of knowledge; General strategies: these are procedures, which guide the choice of skills.

A study carried by SMASSE (1998) also indicated that most teachers lacked clear vision on the set objectives in Mathematics and sciences. The perception of the teachers towards objectives may affect the level of the achievement of a lesson that is being presented in class. This is supported by Kemp (1986) who asserts that for curriculum planning to be rational; it must start with clear and specific aims and objectives, and then, address it to discovering the means, the content and methods in terms of which the objectives are to be achieved. Since curriculum is implemented by teachers, they ought to be clear on what to be achieved at the end of the lesson.

2.5 Teachers' Attitude and Performance in Mathematics

Njoroge (2004) carried a study on teaching methodology in secondary schools and explained that, teaching and learning of science and Mathematics had been subject of debate for a long time. Attitude being one of the key components that determines implementation of curriculum, the debate centered on the teaching approach and methodology. They observe that one particular method that brings some dislike of the subject as traditional or teacher centered methods of teaching which results in learners not enjoying lessons and missing the benefits of discovering what they know on their own. This has led to the low achievement in examinations.

Sentiments echoed by SMASSE (1998) observe that some Mathematics and Science teachers were still using lecture methods and students were given rigidly formulated statements, which they had to memorize and regurgitate when required to do so by the teacher. In addition, little or no emphasis was placed on

understanding. This made learners unable to conceptualize what was being taught in class and it led to the formation of negative attitude towards the subject. Bolaji (2005) in a study of the influence of students' attitude towards Mathematics found out that the teachers' method of teaching Mathematics and his personality greatly accounted for the students' positive attitude towards Mathematics.

2.6 Students' Attitude, and performance in Mathematics

Students expressed like or dislike of Mathematics depending on the manner in which the content was delivered. They naturally formed a given attitude on the subject that eventually determined the level of success in that particular course.

When students positively perceived the content to be learnt as interesting, fun, meaningful, and relevant they got motivated to learn, were stimulated and their interest was aroused in readiness to understand the content being presented to them by the teacher. Wills (2010) asserted that positive attitude towards a subject was related positively to performance. In Kenya, research done by some key stakeholders (Nui & Wahome, 2006) in secondary education, has showed that consistent failure in Mathematics and sciences might be attributed to attitudes of students and teachers had towards the subjects. Based on this research, it means, attitude is a key component that influences performance. In agreement to this Manoah, Indoshi and Othuon (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 which was an indicator that it was a very essential element in the Mathematics curriculum. The role of attitude from these literature

showed that it had a key factor in determining how well a curriculum is implemented in learning institutions and in particular Mathematics subject.

2.7 Teachers Attitude and Performance in Mathematics

Most researchers dwelt on lack of syllabus coverage, low entry marks and poor mastery of content, but not much had been done on performance. The role of the teacher, teaching facilities and methods of teaching could be done to improve on performance. This creates a knowledge gap which has to be explored. Scanty literature apart from some statistical data in the sub-county. Hence a lot still needs to be done in terms of publishing on the subject area with regard to demarcation of the country (Kenya) to the newly formed county structure. Clear solution and comprehensive policy to address the problem of performance should be put in place. This would facilitate equal opportunities for both girls and boys to access higher education.

2.8 Theoretical Framework

The theory that guides this study is the Social Learning Theory of Albert Bandura as cited by Pajares and Schunk (2001). The theory attempts to tackle the forces that influence one to behave in a certain way, in this case the influences that changed the learners' and teachers' attitudes to be either positive or negative towards Mathematics curriculum. The theory further point out that human behavior is due to a reciprocal determinism that involves behavioral, cognitive, and environmental factors. Contemporary psychologists agree that attitudes are vital due to the fact that they act as directive factors in daily endeavors of mankind. Jung (2006) asserts that the basic work of attitudes is to give some form

of organization of the universe we live in. Moreover, they act as standards that assist human beings to understand the world. Both the students and teachers will always form certain opinion in regard to the tasks head of them. Mathematics may therefore be viewed either negatively or positively and this will determine the level of success in the task to be undertaken.

According to the perceived self- efficacy theory by Bandura, people judge their capability to accomplish certain levels of performance. This theory relates to our feelings of the confidence that we can achieve from a desired outcome in specific areas. Beliefs of personal efficacy influence choices of activities, situations and ultimately shape lives. Bandura (1997) has defined self-efficacy as one's belief in one's ability to succeed in specific situations. Luszczynska & Schwarzer (2005) point out that one's sense of self-efficacy can play a major role in how one approaches goals, and challenges particularly when handling Mathematics tasks.

Understanding the mechanisms in Bandura's theory that determine perceived self-efficacy judgment is important. This will reflect and shed some light when trying to understand students/teachers' attitude towards Mathematics curriculum and contributing reasons. The beliefs of personal efficacy may influence the time one spends on each concept taught in Mathematics. For instance, one is likely to spend more time to learn/teach algebra and ignore vectors if self-efficacy is higher in algebra than vectors.

The attitude a person has is likely to influence the way one will perceive the objectives, content, methods and even evaluation strategies used in Mathematics.

For instance, a teacher's beliefs will influence his choice of Mathematics content, which he perceive comfortable or easy to teach. The methods and techniques applied when teaching Mathematics and evaluation strategies will be guided by his self-efficacy. The same belief will also apply to students on how they select what to understand in a given content that is being taught by a teacher in class.

2.9 Conceptual Framework

Input

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┌─────────────────────────────────────┐
│  - Teachers in service training      │
│  - Teachers attitude                 │
│  - Students attitude                 │
│  - Availability of requisite resources│
└─────────────────────────────────────┘
                 │
                 ▼  **Input**
┌─────────────────────────────────────┐
│  -Teaching                           │
│  -Learning                           │
└─────────────────────────────────────┘
                 │
                 ▼  **Out put**
┌─────────────────────────────────────┐
│   -High performance                  │
│   -Low performance                   │
└─────────────────────────────────────┘
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19
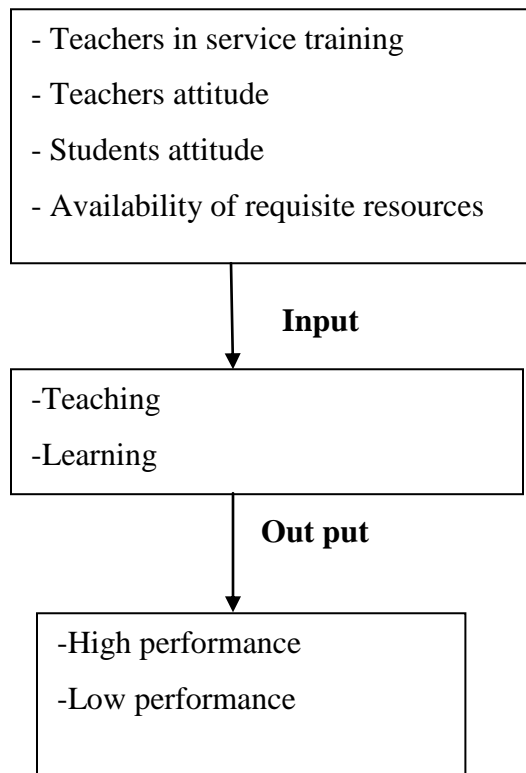
Figure 2.1: Factors Influence Students' Performance in Mathematics in Kenya Certificate of Secondary Education

This conceptual framework was intended to assist the researcher develop awareness and understanding of the situation under scrutiny and communicate it. Mathematics is a key subject that is mandatory to all students in secondary schools in Kenya. It forms a base to all post-secondary training. The teaching and learning of the subject is dependent on how teachers are prepared (in-service), Teacher skills (teaching of students(learning) the result being effective teaching and learning of mathematics (Results) The process which entails the students and teachers attitude on teaching and learning of Mathematics additionally is the level of preparedness of both.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This section discusses the research design, target population, sample size and sampling techniques, research instruments, validity and reliability of the instruments, data collection procedure, data analysis technique and ethical consideration.

3.2 Research Design

A descriptive survey design, employing the use of questionnaires was used in the study. A descriptive survey was adopted because the study sought to establish the views held by students and teachers on teaching and learning of Mathematics in secondary schools in Butere Sub-County. Mugenda & Mugenda (2003) notes that survey research seeks to obtain information that describes existing phenomena by asking individuals about their attitude and behavior. Questionnaires were specifically used to collect responses from participants. Gay (1992) asserts that descriptive survey design involves data collection in order to answer questions concerning the status of the subject of study. The design was preferred for this study because of its appropriateness in educational fact-finding as it yields accurate information.

3.3 Target Population

The study was carried out in Butere Sub-County. The target population was 26 Principals and 45 mathematics teachers in the 26 secondary schools in the sub-county and 1,896 form four students (Butere Sub-County Education Office, Statistics Department, 2014).

3.4 Sampling Size and Sampling Techniques

Krejcie and Morgan formula was used to select a sample of 192 form four students in the sub-county. Krejcie and Morgan provides the following formula for estimating the sample size needed (Kathuri & Pals, 1993).The sample size for this study will be as given in table 3.1 below:

Table 3.1: Population and Sample Frame

Category	Population size	Sample size	Percentage (%)
Principals	26	26	100
Mathematic teachers	45	45	100
Form four students	1,896	192	30

Source: Education Office, Butere Sub-County (2015)

Table 3.1 above indicates that 26 principals and 45 mathematics teachers sampled participated in the study. This represents a return rate of 100%).However 192 of the form four students were sampled to take part in the study representing 30%.

3.5 Research Instruments

The instruments that were used in data collection included questionnaires and interview schedule. The questionnaire was used as it enabled the researcher to reach a large sample within a short time (Creswell, 2003). The researcher administered the questionnaire to students and teachers in their respective schools with the help of Research Assistants. The students' questionnaire were used to

collect data concerning their attitudes, teaching methods, learning, problems encountered and strategies proposed to improve the teaching and learning of mathematics in secondary schools.

The teachers' questionnaire collected data concerning teachers' attitude towards the mathematics curriculum, role of in service training, problems encountered and possible remedies or recommendations on how to improve the teaching and learning of mathematics in secondary schools.

Interview schedule for the school Principals was critical as it allowed the researcher to interact with the respondents on a face to face mode. This also enabled clarification of any issue raised in the course of the study.

3.6 Validity of the Instruments

Validity is the extent to which an instrument measures what it is supposed to measure and performs what it is designed to perform (Kombo & Tromp, 2006). A research instrument is valid if its content is relevant and appropriate to research objectives. The researcher developed questionnaires of which their validity was ascertained by experts from the Department of Educational Administration and Planning of University of Nairobi. The researcher was alive to the fact that the results of the study had to be generalized from the sample to the population and also the instrument accurately assess what the study intended to know.

PART A Contained age of the learners and gender and Part B contained learners attitude towards the subject.

Validity of instrument

A pilot study was carried out in two public secondary schools. Two HOD, four mathematics teachers and eight students from sub-county were selected for piloting through purposive sampling to establish the content validity of the research instrument. The researcher discussed with colleagues and improvements were done (Orodho, 2007).

3. 7 Reliability of the Instruments

Reliability is the degree to which a particular measuring procedure gives similar results over a number of repeated trials (Orodho, 2003). The researcher used the test –retest method to assess reliability on instruments.

The questionnaires were given to eight students and four teachers. The completed questionnaires were analyzed after two weeks, the same instruments were given to the respondents, scores from the two tests were computed and correlated using Pearson product moment correlation co-efficient (s) 'r' was found to be 0.75, hence the instruments were reliable (Kathari 2004)

3.8 Data Collection Procedure

The researcher sought for permission from National Commission for Science, Technology and Innovation (NACOSTI). A permit was obtained, the researcher informed the DEO's Office, Butere Sub-County. The researcher prepared a letter of intent and request to heads of the schools she intended to collect data from. The researcher visited the sample schools to administer the questionnaires as she

assisted the respondents' had difficulties in responding to the items in the questionnaire. This took place during the months of June 2015. Respondents were given enough time to respond after which the tools were collected for analysis.

3.9 Data Analysis

After completing data collection process the researcher checked for completeness of the questionnaire before embarking on compiling and coding the data. Quantitative data was tabulated and analysed using simple frequencies and percentages. Qualitative data from open ended questions was organized into themes and presented for discussion. Descriptive statistics such as frequencies and percentages were used to profile sample characteristics and major patterns emerging from the data which were presented in tables and charts.

Before engaging in the actual fieldwork, the researcher applied for a research permit from the ministry of Education, Science and Technology, state Department of Education. Once the permit was granted, the researcher had to seek consent from the Butere sub-county Director of Education to enable her access the public secondary schools within the sub-county.

For the sake of confidentially, the respondents were requested to omit their names from the questionnaire.Further, the respondents were assured that the information given would be strictly confidential and only meant for research purposes. Data collected shall be used only for the purpose of the study and not for other uses contrary to the objectives of the study. No references would be made to individuals or schools.

3.10 Ethical Considerations

The researcher ensured that the study abides to laid down research protocols by the University. Further, the respondents were assured of total confidentiality on any information availed to the researcher. The study also has acknowledged any reference made on other researchers and scholarly works. The researcher tried to keep to the time lines set so as the results of the study can be of use in a time frame set.

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION AND INTERPRETATION

4.1 Introduction

This chapter presents findings of the study which have been discussed under thematic subsections in line with the study objectives. The thematic areas include

questionnaire return rate, demographic data of respondent, in-service training and performance on mathematics, teachers' attitude and performance in Mathematics, students attitude and performance in Mathematics and availability of requisite resources and performance in Mathematics.

4.2 Questionnaire Return Rate

Questionnaire return rate is the proportion of the questionnaires returned after they had been issued to the respondents. The researcher aimed at a sample of 26 principals, 45 teachers and 192 students. Thus a total of 263 participants were targeted for the study. The researcher issued 263 questionnaires. However only 21 principals 39 HODs Mathematics teachers and 171 from four students filled and returned the questionnaires. These rates were deemed adequate for data analysis since they exceeded 85.0% return rate suggested by (Mugenda, 2003). The table below shows the findings.

Table 4.1: Questionnaire return rate

Respondent	Sample	Returned	Percentage (%)
Principals	26	21	81.7
Teachers	45	39	87.0
Students	192	171	89.0

Total	**263**	**231**	**100**

This shows that 87.8% of the questionnaire were returned which was satisfactory for the study.

4.3 Demographic Data of Respondents

The demographic data information of the respondents was based on level of education and gender.

4.3.1 Gender of participants

Out of the teachers who participated in the study 30 (76.92%) were male while 28 (44.4%) were female. There were 7 (87.5%) male and 1 (12.5%) female head teachers as shown in Table 2.

Table 4.2: Gender Participation

Participants	Male	Percentage	Female	Percentage
Teachers	30	76.92	69	23.1
Head teachers	15	71.42	6	28.6
Total	**45**		**15**	

The disparity in gender could be attributed to traditional belief that mathematics is difficult and technical subject and thus only men handle it as it's assumed traditionally men are strong and can withstand it.

4.3.2 Age of the participants

The study also sought to know the age of the participants

Table 4.3: Age Bracket of Teachers

Age	F	Percentage
21-30	20	51.3
31-40	10	25.6
40 and above	9	23.1
Total	**39**	**100.0**

Table 4.4: Age Bracket of Headteachers

Age	F	Percentage
31-40	9	42.9
40 and above	12	57.1
Total	**45**	**15**

The high percentage of teachers within the age bracket 21-30 years may be attributed interest in teaching the subject whereas low percentage may be due tolow interest in the subject as one gets old. The high percentage in head teachers

may be attributed to experience and long stay in the service while low percentage may be due to lack of experience in the subject.

Figure 4.1: Participants Professional Qualifications

The respondents were asked to indicate their highest level of qualifications. These qualifications included masters, degree and Diploma in education.The findings revealed that 2 out of 39 were masters holders, 28 degree and 9 diploma holders in Education. The figure below shows this.
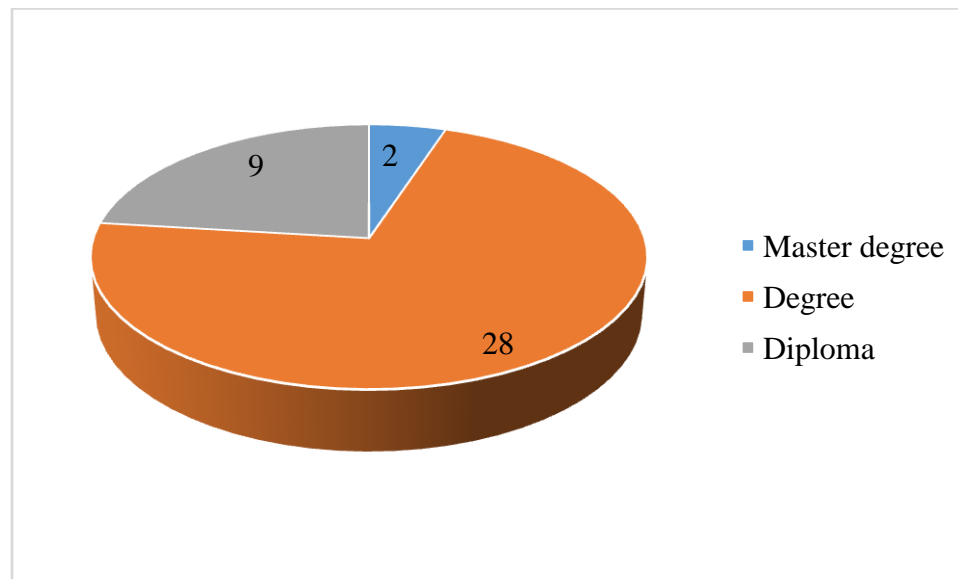
From the above figure it's an indication that mathematics teachers have qualifications to teach Mathematics. Despite these high qualifications students' performance in Mathematics low agreements with Kaur, (204) who argues that teachers' qualification is significant and can be used to predict students' performance in mathematics. The results in figure 4 shows that most of the respondents were diploma holders. This indicated 64% of the sampled respondents. However a number of them are holders of B. Education degree. This

was accounted by 26% of the sampled respondents. This finding suggests that the respondents have relevant professional qualifications to teach the subject.

4.4 In-service Training and Performance in Mathematics

The study found that 22 (56%) out of 39 HODs/Mathematics teachers had attended various in-service courses while 17(44%) had not attended an in-service course within the past two years. It was also evident that 13(59%) out of 22 teachers who attended the in-service course felt that they adequately used the skills acquired while 9 (41%) out of 22 teachers said they did not use the skills at all. By this can be tabulated as seen in the table below.

Table 4.5: In-service Training and Performance in Maths

Respondent	No	Percentage (%)
In serviced	22	56.0
Not in-serviced	17	44.0
Use skills	13	59
Do not use skills	9	22

According to Bell(1998), a better trained and experienced teacher produces high academic performance than the untrained. Based on the above views, the study established the teaching experience and in-service courses such as SMASSE attended by Mathematics teachers in the sub-county. A study by Fuller (1985) reveals that there is a positive correlation between in-service and performance.

Table 4.6: Teachers'Qualification and Performance in Mathematics

Qualification	Number	%
Masters in Education (Science)	2	5
B.Ed (Science)	28	72
Diploma in Education	9	23
Total	**39**	**100**

The finding in Table 4.6 indicates that2 out of 39 mare Masters holders, 28 out of 39 Mathematics teachers are holders of degree in education while 9 are holders of Diploma in Education. It's an indication that mathematics teachers have qualifications to teach Mathematics. Despite these high qualifications, students' mathematics performance was   low agreement with Kaur, (2004) who argues that; teachers' qualification is significant and can be used to predict students' performance in mathematics.

4.4.1 Teachers Experience and In-service Courses Undertaken

According to Bell (1998), a better trained and experienced teacher produces higher academic performance than the untrained. Based on the above views, the study established the teaching experience and in-service courses such as SMASSE attended by mathematics teachers in the county as discussed.

The study found that 22 (56%) out of 39 HoDs/Mathematics teachers had attended various in- service courses while 17 (44%) had not attended an in-service

course within the past two years. It was also evident that 13 (59%) out of 22 teachers who attended the in-service course felt that they adequately used the skills acquired while 9 (41%) out of 22 teachers said they do not use the skills at all. A study by Fuller (1985) reveals that there is a positive correlation between in-service and performance.

4.4.2 Availability of Mathematics Teachers

The Table 4.2 shows the number of mathematics teachers in the sampled schools. The schools are categorized according to the number of teachers they have.

Table 4.7:The Number of Mathematics Teachers in the Sampled Schools

School	HoDs/Mathematics Teachers	Teacher Student %
A	8	17
B	11	23
C	1	2
D	2	4
E	1	2
F	1	2
G	1	2
H	1	2
I	1	2
J	2	4
K	1	2
L	1	2
M	1	2
N	1	2
O	1	2

P	1	2
Q	1	2
R	1	2
S	1	2
T	1	2
U	1	2
V	1	2
W	1	2
X	1	2
Y	1	2
Z	1	2
A2	1	R
B2	1	2
C2	1	2

An effort to establish why mathematics was performed poorly, considered the issue of availability of teachers. Table 4.4 reveals that 8 out of 9 had a shortage of mathematics teachers according to the schools CBE. Mathematics teachers had 27 and above lessons per week. According to Ministry of Education (1999), the number of lessons a teacher should have for effective planning should not exceed twenty seven. This implied that the teachers are overloaded especially with highly populated schools due to subsidized secondary education. In the sampled schools, teacher-student ratio was above 1:45. According to Eshiwani (1983), a teacher- student ratio of 1:40 is appropriate and manageable. The percentage of teacher-student ratio in Butere County was above the recommended ratio of 1:45 by the Ministry of Education (1999). The study found it necessary to establish whether the available teachers can handle the current students'

population in schools.

The study found that 15 (71%) out of 21 Principals said that mathematics teachers were not enough to handle the current student population especially in form four. Eshiwani (1983) found that; teacher-student ratio had some effect on performance of students in western province of Kenya. If the ratio is too high, teachers do not mark student books regularly. Such observation lowers the Students performance in mathematics examination as evidenced in Butere Sub-County.

It was found that 89 (52%) of the students said they had positive attitude towards the subject and 68 (40%) did not like mathematics. Attitude forms the basis of teachers and students interaction. Vygosky (1978) says interaction forms the social context in which children participate; mediate student's thinking and also significant in learning mathematics.

Table 4.8: Students Attitude

Issues	Consult	Not Sure	No
Positive attitude	Freely	7(18%)	Consultation
Negative attitude	18 (46%)	1(1%)	14 (36%)
Total	**21 (54%)**		**17(44%)**

Table 4.8 shows, 18(46%) out of 39 Mathematics teachers felt that students have positive attitudes towards mathematics while 14(36%) had negative attitude said that their students do not consult while 7(18%) were not sure. Further, 21 (54%)

of the teachers said that 21 (54%) of the students ask questions in class, 17 (44%) do not ask questions while 1 (1%) was not sure. The study revealed that, despite the students claiming there is positive relationship between the teachers and students, such attitude has a little impact on performance which is still very low as shown in Table 4.8.

4.4.3 Commitment of Teachers on their Work

It was also worth establishing the views on commitment of teachers towards their work. The results are as shown in Table 4.9.

Table 4.9: Commitment of Teachers on their Work

Response	Marking Student Lessons	Work Assisting attendance	Students after class
Very Committed	13	6	18
Committed	7	5	3
Not Committed	1	10	0
Total	21	21	21

The findings indicated that all Principals felt that their teachers were committed to marking students work, assisting students after class and attending their lessons regularly. Table 4.9. Principals views on commitment of Mathematics teachers.

The study also found the views of students on commitment of teachers in attending their lessons. The results were as shown in Figure 4.3.

Figure 4.2: Students' Views on Teachers' Attending Lessons (n=171)
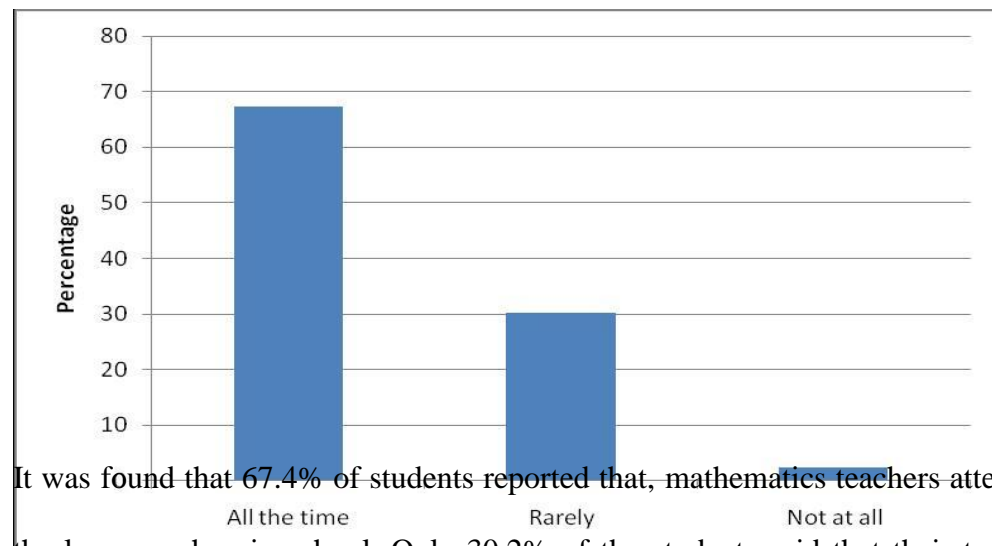
It was found that 67.4% of students reported that, mathematics teachers attend all the lessons when in school. Only 30.2% of the students said that their teachers rarely attend all the lessons. As noted in Figure 4.4, teachers were committed to attending their lessons except 2.4% who did not attend their lessons. The absence of mathematics teacher would affect syllabus coverage. This in turn would affect the performance of mathematics.

4.4.4 Teachers' Attitude towards Teaching Mathematics

Teachers' attitude is a significant predictor of pupils' mathematics performance (Smith, 1996). To establish the attitude of teachers in the County, their opinion about teaching mathematics was sought as shown in Table 4.10.

Table 4.9: Teachers' opinion on teaching mathematics (n=39)

Table 4.10: Teachers' Opinion on Teaching Mathematics (n=39) S.A

	S.A	A	S.D	D	UN
I teach Maths because I have no option	5	3	0	14	17
Mathematics is the best subject to teach	22	7	0	6	4
I enjoy teaching mathematics in school	24	8	0	3	4
Teaching Maths is difficult in my school	11	3	0	12	13

n=39

Table 4.10 shows that 31 out 39 disagreed that they teach mathematics because they don't have any option while 8 out of 39 agreed with the statement that they do teach mathematics because they do not have options. In addition, 29 teachers said mathematics is their best subject to teach while 10 disagreed. It is further seen that 32 out of 39 teachers said that they enjoyed teaching mathematics whereas 7 said they do not. Lastly 25 teachers said they do not find it difficult in teaching mathematics in their various schools while 14 stated that it is difficult.

This indicates negative attitude towards teaching mathematics. This forms the basis for further study to establish the reasons of such attitude among the teachers in Butere Sub-County. Negative attitude towards mathematics affects the Commitment of the teachers in preparation and teaching mathematics (Bell, 1981) and eventually the students' performance.

Table 4.11: Teaching Methods Used by Teachers (n21)

Methods	Very Often	Often	Rarely	Not at All
Lecture	15	6	1	0
Demonstration	16	5	0	0
Small group discussion	6	3	8	4
Practical	6	5	5	5
Drill & Practice	7	5	2	7
Problem solving	14	6	1	0
Question and Answers	16	4	1	0

From Table 4.11, it was revealed that majority of the teachers use demonstration and question answer sessions since 16 (76%). Lecture method at 15 (71%) and problem solving at 14 (70%) were the other most preferred methods of teaching mathematics by the form four teachers. These are teacher-centered approaches. Other teaching methods used according to the study were drill and practice, practical and small group discussions. Improvement of performance in mathematics by all students requires effective mathematics teaching in class. Effective teaching and learning occurs when students are actively involved in class activity. The study sought the opinion of students in relation to teaching and learning as shown in Table 4.12 and Figure 4.3.

Table 4.12: Students' Opinion on Mode of Teaching. (n=344)

Statement	Yes	No
My teacher used models and charts while teaching	67 (14%)	52 (24%)
My teacher does not revise elementary ideas before teaching	91(19%)	61 (28%)
Most examples and illustrations used are locally available	97 (20%)	42 (20%)
I am not able to cope with the teaching pace of my teacher	120 (25%)	39 (18%)
Mathematics ideas taught in class are linked to daily life issues	104 (22%)	21 (10%)
Total	**479 (100%)**	**215 (100%)**

Figure 4.3: Aspect of Mathematics Teaching Liked by Students (n=171)
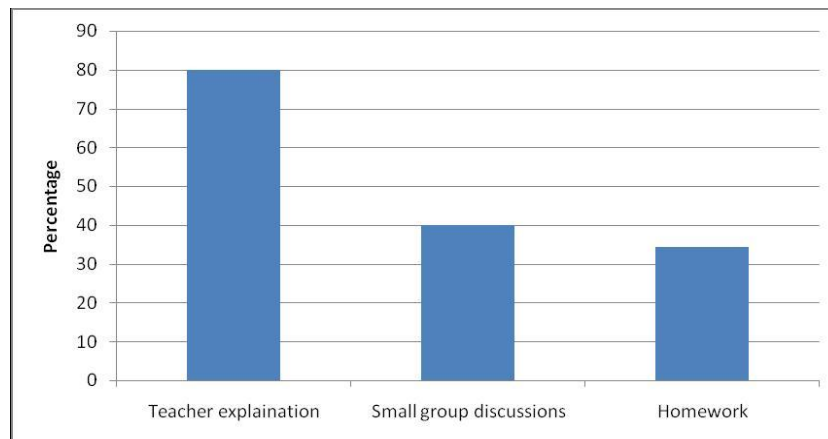
The findings in Figure 4.3 indicate that 80% of the students like small group discussions and 40% like teacher explanations while 34.3% like homework. An indication that students preferred learning in small groups which is rarely used by

the teachers as revealed in Figure 4.3. This indicates that, teachers rarely involved learners in their teaching approaches in class. According to Miheso (2002), the type of teaching approach used has an effect on students' performance. The study revealed that the teachers in Butere Sub-County prefer to use teacher-centered approaches, hence a possible reason for poor performance in mathematics examinations.

4.5 Teaching Resources and on Performance in Mathematics

The study sought to determine the available teaching and learning resources in Butere Sub-County schools. Results are as shown in Table 4.13.

Table 4.13: Principals'Views on Availability of Resources. (n=21)

Resources	Available (%)	Available but not enough (%)	Not available (%)
	n	n	n
Text books	95	57	0
Models	23	23	61
Charts	57	29	61
Calculators	90	79	29

According to Kiragu (1986), textbooks, models, charts and calculators are known to strengthen the students command in mathematics. The study found that 20 out of 21 Principals (95%) were on agreement that textbooks are available but not

adequate while 19 (90%) said that the calculators are not available. On models, 5 (23%) out of 21 respondents said they were available but not enough for teaching mathematics and 12 (57%) out of 21 respondents indicated that there is neither commercial nor teacher made charts in their schools. The findings indicate shortage of these resources in schools.

With such observation, it was worth finding out the effort made by mathematics teachers to teach with resources. To begin with, the study sought to establish whether teachers improvised the resources using the locally available materials. The results were when resources are not available, 15 out of 21 teachers said they teach without while the rest improvise.

Table 4.14: Improvisation of Resources According to Teachers

Responses	Frequency	%
Administration not providing resources in time when required	26	67
Poverty Level: Student not able to buy calculators	39	100
Students not co-operating if requested to bring some models	29	74

n=39

Table 4.14 indicate that 26 out of 39 teachers blamed the administration for being reluctant in buying resources in time while all teachers said it was due to high poverty students could not acquire calculators. In addition 30 out of 39 cited that the students were not willing to bring resources from their locality if requested. Principals and HoDs were to respond on resource utilization by their

teachers. They were to rate how often teachers use resources as shown in Figure 4.4.

Figure 4.4: Improvisation of Resources According to Teachers
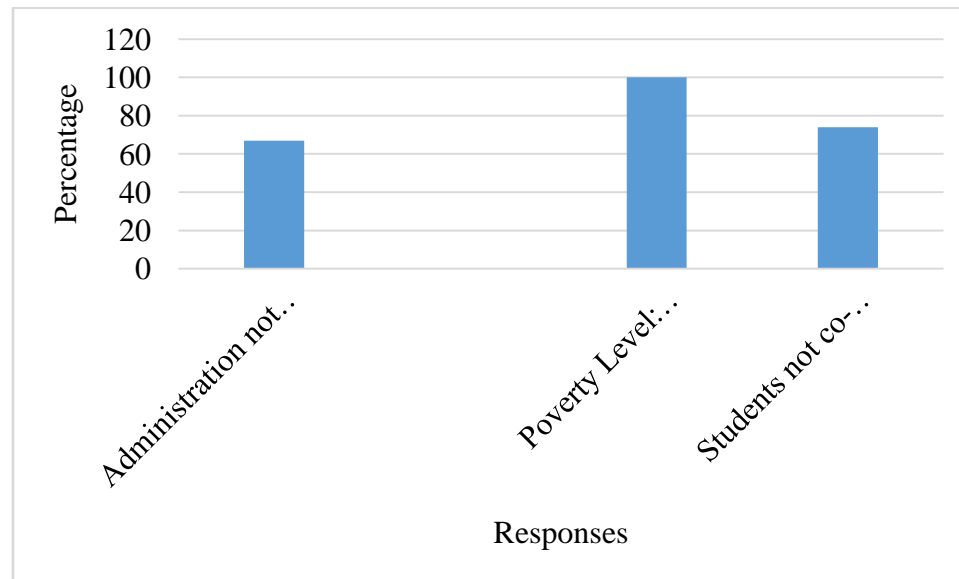
It was found that the rate of using the resources by teachers is wanting as cited by 83% of the respondents. Only 17 % of the teachers use the resources while teaching according to HoDs and Principals.

In general, the study established that there was a shortage of resources with teachers unwilling to improvise where possible. If resources were not used, students would have little interest in mathematics, eventually affecting students' performance (Mutunga & Breckwell, 1992). As resources are rarely used and teachers don't improvise, hence a possible factor influencing students' performance in mathematics examination level student couldn't acquire calculators. In addition 30 out of 3 9 cited that the students were not willing to bring resources from their locality if requested. Principals and HoDs were to

respond on resource utilization by their teachers.

4.6 Students-Related Factors that Influence Mathematics Performance

4.6.1 Attitude and its Influence on Performance

The Principals, HoDs/mathematics teachers and students were expected to answer the questions leading to find out the students attitude towards mathematics and their teachers.

Table 4.15:-Head teachers', HoD's and Teacher's Opinion on Students' Attitude towards Mathematics (n=27)

Responses	Percentages	Average Mean Score on Each Category
Positive	14.8	2.71
Neutral	18.5	2.05
Negative	66.7	1.76

Table 4.10 above reveals that, 66.7% of the respondents believed that their students had negative attitudes towards mathematics while 14.8% believe that their students had positive attitudes towards mathematics. The finding shows that there is low performance on the test done during the study but relative good performance on schools were the respondent said the students had positive attitude towards Mathematics.

In order to establish the attitudes of students; it was worth obtaining the opinion

of students. The results are as shown in Table 4.13.

Table 4.16: Opinions of Students' Towards Mathematics and Their Teachers (n=171)

Table 4.1.1 shows the attitudes of students towards Mathematics

Questions	Strongly Agree (%)	Agree (%)	Undecided (%)	Disagree (%)	Strongly Disagree (%)
Mathematics is very easy subject	8.7	24.5	3.5	41.3	22.1
Mathematics is purely theoretical and abstract	39.0	29.7	6.4	22.7	2.2
I dislike mathematics like my friendly.	28.0	43.0	4.1	19.1	5.8
My teacher is very harsh.	6.4	22.7	10.4	47.1	13.4
I dislike mathematics like my teacher	3.5	23.8	1.7	29.1	41.9
I like mathematics	6.1	12.4	21.1	45.3	15.0

Table 4.16 indicates that, 63.4% of students felt that mathematics was difficult while 33.2% said mathematics was easy to them. However, 68.7% of students find mathematics as purely theoretical and abstract subject, 71% of the students disliked the subject. Students' opinions towards their teachers indicated that 60.5% of them were friendly to their teachers while 79.0% said that their teachers were not harsh to them.

To obtain more information on attitude, the study sought the opinions of students on how often they studied mathematics during their free time at least one hour per session. The results are in Figure 4.5.

Figure 4.5: Opinions of Students' Towards Mathematics and Their Teachers
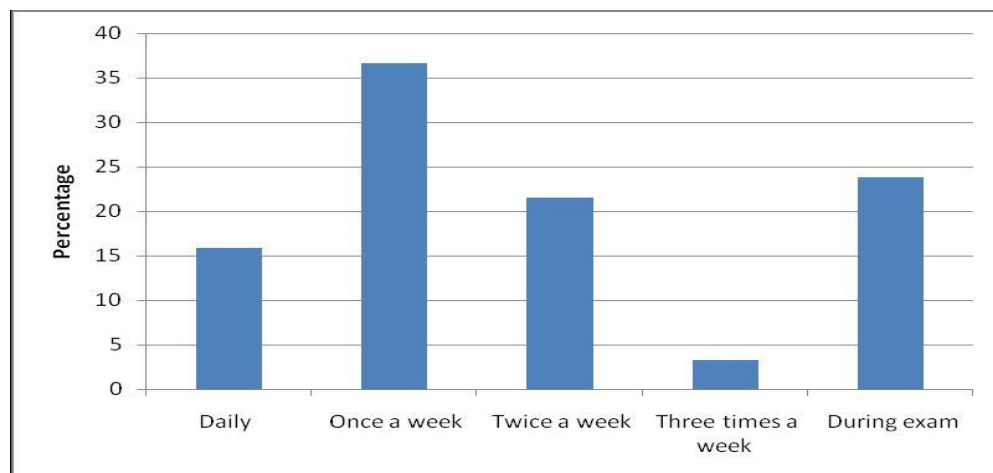
The findings revealed by students in various classic symptoms of mathematics such as poor performance as evidenced in Butere Sub-County.

4.6.2 Students' Background and its Influence on Mathematics

The study sought to establish whether the students' background has an influence on students' performance. The results were obtained from Principals and HoDs/ mathematics teachers as shown in Table4.17.

4.7 Opinions on Students' Background on Performance (n=50).

According to the study, gender stereotype was acknowledged by 92.5% of the respondents where girls are perceived inferior to boys and this affected their participation in class, especially in mixed schools. In addition 67.9% said early marriage have an impact on performance to these girls while 59.3% recognized that nomadic life also had an influence on performance. Language was another issue cited by 81.5% of the respondents as a factor having an impact on performance. It was noted that most students use their local language and rarely communicate in English. Only 7.4% of the respondents said religion had an impact on students' performance. In the study, it was worth establishing the commitment of parents in providing resources and encouraging their students while studying mathematics. Findings are as shown in Table 4.12.

Table 4.17: Parents support to Candidate

Question	Strongly Agree (%)	Agree (%)	Not Sure (%)	Disagree (%)	Strongly Disagree (%)
My parents provide me with Revision materials and calculators for mathematics.	3.5	5.8			38.4
My parents /Guardian are Not bothered by my performance in mathematics	30.7	48.3	1.2 7.0	51.1 4.7	9.3
At home I don't find comfortable place to do my homework	45.6	39.2	2.7	5.8	6.7

n=171

The study revealed that 89.5% of the respondents cited that the parents were not providing their children with revision materials for mathematics and calculators. In addition, 84.8% said that they don't have space for self-study at home while 79 their parents were not bothered by low performance. Involvement of parents improves the students" cognitive and social skills which help them to succeed in mathematics, (Jelfer & Lupart, 2001).

4.8 Suggested Solutions to Improve Students' Performance in KCSE Mathematics

To establish the measures to take in order to improve students' performance, the

researcher gathered information on possible reasons for poor performance from all the respondents.

4.8.1 Reasons for Poor Performance in Mathematics

Respondents gave reasons for poor performance in mathematics examination in their schools; they gave more than one reason. The frequency of the suggested causes of poor performance in mathematics according to them were analyzed and compared among students and teachers. The suggested reasons are in Table 4.18.

Table 4.18:Reasons for Poor Performance in Mathematics

Reasons for poor performance	Percentages %	
	Students (n=344)	Teachers (n=27)
Understaffing of Maths teachers	66.6	84.0
Lack of interest to learn ,mathematics	39.5	87.5
Inadequate resources	76.4	89.1
Harsh weather condition	64.0	67.4
Truancy and absenteeism	35.5	83.7
Very strict teachers	23.8	0.0
Influenced by peer pressure	18.0	60.0
Unsupportive administration	0.0	33.2
Lack of revision	60.5	87.6
Low entry marks in form one	7.2	93.3
Not covering the syllabus on time	54.1	23.4

Teachers: - Includes Principals, HoDs and Mathematics teachers and students. Table 4.18 indicates inadequate resource as a factor was cited by 76.9% of

students and 89.1% of the teachers. Negative attitude towards mathematics; characterized by lack of interest to study mathematics among students was mentioned by 39.5% of the students and 87.5% of the teachers. In addition lack of revision was mentioned by 60.5% of students and 87.6% of the teachers.

Another reason cited was, nomadic culture by 47.1% of the students and 13.3% of teachers while only 23.8% of students said that the few available teachers are very strict hence the students fear to approach them. Truancy and absenteeism was also mentioned by 35.5% of the students and 83.7% of teachers as a reason for poor performance in mathematics while peer pressure was cited by 18.0% of students and 60.0% of the teachers. Only 33.0% of teachers blamed the administration for being unsupportive in handling indiscipline among students.

Other reason for poor performance cited was inadequate coverage of syllabus by 54.1% of students and 23.4% of the teachers while low entry marks was mentioned by 7.2% of students and 93.3% of the teachers.

4.8.2 Suggested Solution to Improve Students' Performance in Mathematics Examination

All the respondents were required to give suggestions on how to improve form four students' performance in mathematics KCSE examination in secondary schools of Butere Sub-County.

The following were suggested solutions in Table 4.16.

Table 4.19: Suggested Solution to Improve Students' Performance (n=231)

Suggested solutions to improve performance of mathematics	Percentages %
Government to employ more teachers	65.8
Teachers should use student-centered approach	63.1
School administrators to provide resources in time	69.5
Community leaders to sensitize parents on the importance of educations	51.8
Guidance and counseling to change the students" negative attitude	77.5
Involve teachers who mark KCSE Mathematics to advice candidates	23.5

n=231

The study revealed that 77.5% of the respondents said that in order to change then negative attitude of the students towards mathematics, guidance and counseling sessions should be organized by mathematics departments in the various schools. In such forums role models in the county who performed well in mathematics should be invited On resources, it was suggested by 69.5% of respondents that the school administration should build more classes, buy more books and the teachers improvise resources where possible.

To solve the problem of shortage of teachers, 65.8% of the respondents said that the government should recruit and deploy more teachers in the county. In addition all recruitments should be done at TSC headquarters. Recruitments should not be decentralized in schools as the region has shortage of qualified teachers and those from other region rarely apply for advertised post.

It was also suggested by 63.1% of the respondents that the teachers should use teaching approaches which were students-centered. John and Raising (1972) suggested that teachers should always make the students feel they are friendly to the teacher regardless of success or failure. Eventually, students participate in the learning process. To involve the parents, it was suggested by 51.8% of the respondents that community leaders and school administrators should regularly organize seminars to enlighten the parents on the importance of their involvement in their child education. Ethington, (1992) says that parents play an important role in influencing their children's performance in mathematics.

Another suggested solution was guidance and counseling sessions to deal with students" negative attitudes towards mathematics as cited by 77.5% of the respondents. In addition, teachers involved in marking KCSE mathematics should be invited to guide the candidates was mentioned by 23.5% of the respondents.

4.9 Summary of the Chapter

In this chapter, findings of the study were presented and factors influencing form four students" performance in mathematics KCSE in Butere Sub-County were identified. Next chapter summarizes the findings; give conclusion and recommendations to be adopted if mathematics performance is to improve at school level and national examinations.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary of findings, conclusion, recommendations and suggestions for further research.

5.2 Summary of the Study

The study was guided by the following research objectives:

The sample size consisted of 21 principles, 45 HODs, 87 teachers and 171 students. The researcher used descriptive survey, sample random sampling for respondents. The main instrument was own constructed questionnaires for the Principals HODs and students.The findings obtained are presented in forms of frequency tables. Was processed and analyzed using descriptive statistics such as means, percentages and frequency tables.

5.3 Summary of the Findings

The research had four research questions. The first question of the study sought to find out how teachers in-service training influenced students' performance in Mathematics in K.C.S.E in public secondary schools in Butere sub-county. The study established that in-service courses are vital for good performance.

The teachers had a view that there was need for teacher in-service training for the subject was very crucial in character building for the learners and the training could equip the teachers with skills on how to handle the subject.

This is because majority of the respondents 56% HODs had attended various in-service courses while 44% had not.

The second question sought to find out how teachers attitudes influenced students' performance in Mathematics in K.C.S.E in public secondary schools in Butere sub-county.

The study revealed that HODs were positive Results indicated that 87.0% of HODs did their work as expected. However, a number of teachers were of the opinion that HODs did not play their role as expected for example 65% of the respondents HODs were not involving teachers in formulating Principles to improve performance .

The third question sought to find out how the students attitude influenced their performance in Mathematics the study revealed that most students had negative attitude on the subject due to methods of teaching used.

The fourth research question sought to find out how the availability of requisite resources at the disposal of students and teachers influenced KCSE performance in Mathematics. The study established that majority of the teachers 89% had enough textbooks, 78% had charts and wall maps and a few students had calculations 40% as a result the students were made to share calculators making teachers work heavy and delaying the syllabus coverage.

5.4 Conclusion of the Study

Considering the above findings, the study concludes that professional

qualification influenced students' performance in K.C.S.E Principals facilitated their teachers to attend subject workshops, training and seminars. It was also concluded that Principals recommend their teachers for higher education.

5.5 Recommendations of the Study

Based on the findings, the study recommend that:-

i.   The Ministry of Education (MOE) in conjunction with KICD should ensure adequate supply of Teaching –learning resources. Principals should also ensure that enough learning resources are made available to teachers.

ii.   The Government should employ more Mathematics teachers to improve on the student teacher ratios.

iii.   The schools should strengthen guidance and counseling so as to change the students' perception on Mathematics.

iv.   Principals should sponsor teachers to attend educational workshops and seminars to gain new knowledge, 4 grade themselves for rising opportunities and improvement of performance in K.C.S.E.

v.   The findings revealed that teaching learning resources were in adequate hence hampering the performance of mathematics, the study recommends that the ministry of education in conjunction with KICD should ensure adequate supply of teaching learning resources. Principles should also ensure that enough learning resources are made available to teachers.

5.6 Suggestions for Further Research

Based on the findings of this study the researcher recommends that further studies

be done in the following areas.

i.   Another study should be carried out on a wider area for comparison purposes

ii.   Further research could be done on other factors influencing students' performance in K.C.S.E for example the family background and school climate.

iii.   Influence of gender on teachers on performance in Mathematics should also be researched.

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APPENDICES

Alice dino
P.O.Box 312
Butere

The Head teacher,
--------------------- Secondary School,
Butere Sub-County

Dear Sir/Madam,

RE: FACTORS INFLUENCING STUDENTS PERFORMANCE IN MATHEMATICS IN KCSE IN PUBLIC SECONDARY SCHOOLS IN BUTERE SUB COUNTY, KENYA

I am a postgraduate student at the University of Nairobi. I am currently undertaking a research on factors influencing student's performance in mathematics in KCSE in Butere Sub-County.

I would like to inform you that all the information given will strictly be confidential and only meant for research purpose. No reference will be made to individuals or schools. No name shall be required from any respondent or institution.

Yours faithfully,

Alice Adino

APPENDIX B: STUDENTS' QUESTIONNAIRE

A study is being carried out to establish the *Factors Influencing Students Performance in Mathematics in KCSE IN Public Secondary Schools in Butere Sub-County, Kenya.* You have been identified to participate in the study as a

respondent. Please fill in the questionnaire as accurately as you can by ticking or filling in appropriately. This is purely an academic exercise and the information you provide will be treated in strict confidence.

PART A: BACKGROUND INFORMATION
 (a) What is your age (years old)
    10-14
    15-19
    Above 19
…………………………………………………………………………..
(b) what is your gender
(c) Your sex   Male ( ) Female ( )

PART B: student's attitude and their performance K.C.S.E Mathematics.

Strongly Agree (SA); Agree (A); Undecided (U); Disagree (D); and Strongly Disagree (SD).

Please tick the option on the corresponding statements.

	STATEMENT	SA	A	U	D	SD
1	I enjoy learning Mathematics in class.	( )	( )	( )	( )	( )
2	I have developed confidence in Mathematics.	( )	( )	( )	( )	( )
3	I am interested and willing to use mathematical skills learnt to make conclusions and prediction from the result found.	( )	( )	( )	( )	( )
4	I cannot apply mathematical knowledge and skills of familiar and unfamiliar situation.	( )	( )	( )	( )	( )
5	I am happy for the mathematical skills that I have gained.	( )	( )	( )	( )	( )

SECTION C: STUDENTS' ATTITUDE TOWARDS MATHEMATICS TEACHINGMETHODS

A. Indicate the extent to which you agree with each of the following statements. Tick one option against each statement.

KEY: SA- Strongly Agree, A- Agree, U- Uncertain, D- Disagree, SD- Strongly Disagree.

Statement		Option			
I best understood when the teacher used:	**SA**	**A**	**U**	**D**	**SD**
1. I understand well when a teacher talks and Writes on the board.	( )	( )	( )	( )	( )
2. I understand better when I solve mathematical problems in class with my peers in class.	( )	( )	( )	( )	( )
3. I understand mathematical concepts well when I discover new methods of solving them on my own.	( )	( )	( )	( )	( )
4. It is difficult for me to revise Mathematics questions from tests and past examinations.	( )	( )	( )	( )	( )
5. I understand well when a teacher revises examination papers in class.	( )	( )	( )	( )	( )
6. The lesson is boring when I take part in mathematical games in class.	( )	( )	( )	( )	( )

PART D: strategies used to enhance the teaching and learning of Mathematics in secondary schools

In your opinion, list at least 3 factors that affect your learning of Mathematics
1……………………………………………………………..
2……………………………………………………………..
3…………………………………………………………….
In your opinion, list at least 3 solutions to improve your learning of Mathematics
1……………………………………………………………..
2……………………………………………………………..
3…………………………………………………………….

APPENDIX C: TEACHERS' QUESTIONNAIRE
Instructions:

A study is being carried out to establish the *Individual Factors Influencing Teaching d Learning of Mathematics in Secondary Schools in Butere Sub County Kakamega County.*

You have been identified to participate in the study as a respondent. Please fill in the questionnaire as accurately as you can by ticking or filling in appropriately. This is purely an academic exercise and the information you provide will be treated in strict confidence.

PART A Demographic data

1. What is your qualification?

SI   (   )   UT Graduate   (   )

Graduate   (   )   UT   (   )

2. Did you train as a Mathematics teacher? Yes (   ) No (   )

3. For how long have you taught Mathematics as a subject? ……….

1-3 years   ☐

4-6 years   ☐

Above 7 years ☐

PART B- Teachers in-services and performance in nation.

4. Indicate the extent to which you agree with each of the following statements. Tick once against each statement.

KEY: SA- Strongly Agree, A- Agree, U- Uncertain, D- Disagree, SD- Strongly Disagree.

Statement		Option				
No.	**ITEM**	**SA**	**A**	**U**	**D**	**SD**
i.	I have a good feeling towards Mathematics when am teaching it in class.	( )	( )	( )	( )	( )
ii.	Mathematics is not fascinating when teaching it like other subjects.	( )	( )	( )	( )	( )
iii.	Mathematics is a course in school which I have always enjoyed teaching.	( )	( )	( )	( )	( )
iv.	I am happier in a Mathematics class than in any other class.	( )	( )	( )	( )	( )
v.	My mind goes blank, and I am unable to think clearly when solving a problem.	( )	( )	( )	( )	( )
vi.	Mathematics is something which I enjoy a great deal when teaching.	( )	( )	( )	( )	( )

PART C: In service Training

Teaching/Learning resources

18. How often do you use T/L resource in teaching maths? (put a tick in the appropriate box

Teaching Resources   A ways   sometimes   never

a. K.E Syllabus

b. Charts /Posters

c. Resource persons

d. Newspapers/Magazines

e. Text books

f. Non- governmental publications

g. Video tapes

h. Radios

19. How adequate are the H/L/R/

20. What major challenges do you face when teaching maths

21. What suggestions would you offer remedy the situation in your school.

Thank you for co-operation.

Indicate the extent to which you agree with each of the following statements by ticking appropriately.

KEY: SA- Strongly Agree, A- Agree, U- Uncertain, D- Disagree, SD- Strongly Disagree.

Statement		Option				
No.	**Item**	**SA**	**A**	**U**	**D**	**SD**
1.	Mathematics objectives are not clearly stated for one to comprehend.	( )	( )	( )	( )	( )
2.	Mathematics has greater application to life outside classroom than other subjects.	( )	( )	( )	( )	( )
4.	Group work in Mathematics is appropriate in teaching.	( )	( )	( )	( )	( )
5.	Marking students' assignments is tiring and boring	( )	( )	( )	( )	( )
6.	Mathematics syllabus is too wide for students.	( )	( )	( )	( )	( )
9.	Mathematics should not be examined nationally.	( )	( )	( )	( )	( )

6. Suggest ways of improving teaching and learning of Mathematics in Secondary schools.

……………………………………………………………………………………………………
……………………………………………………………………………………………………
…………………………

PART D: Teaching learning Resources

How long to do use teaching learning resources in teaching Mathematics ?

Put a tick in the appropriate box

Teaching learning resources	Always	sometimes	never

    A. K.I.E Syllabus

    B. Charts /Posters

    C. Resource Persons

    D. News papers /Magazines

    E. Text books

    i) How adequate are the teaching learning resources ?

    ii) What major challenges do you face when teaching Mathematics?

    iii) What suggestion would you offer to remedy the situation in the
            school?

APPENDIX D:RESEARCH AUTHORIZATION LETTER

NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

Telephone: +254-20-2213471,
2241349, 310571, 2219420
Fax: +254-20-318245, 318249
Email: secretary@nacosti.go.ke
Website: www.nacosti.go.ke
When replying please quote

9ᵗʰ Floor, Utalii House
Uhuru Highway
P.O. Box 30623-00100
NAIROBI-KENYA

Ref: No.

Date:

26ᵗʰ **August, 2015**

NACOSTI/P/15/2747/7143

Alice Adino Weshirisiah
University of Nairobi
P.O. Box 30197-00100
NAIROBI.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on *"Factors influencing student performance in mathematics in Kenya Certificate of Secondary Education in public secondary schools in Butere Sub County Kakamega County, Kenya,"* I am pleased to inform you that you have been authorized to undertake research in **Kakamega County** for a period ending **31ˢᵗ December, 2015.**

You are advised to report to **the County Commissioner and the County Director of Education, Kakamega County** before embarking on the research project.

On completion of the research, you are expected to submit **two hard copies and one soft copy in pdf** of the research report/thesis to our office.

SAID HUSSEIN
FOR: DIRECTOR-GENERAL/CEO

Copy to:

The County Commissioner
Kakamega County.

The County Director of Education
Kakamega County.

National Commission for Science, Technology and Innovation is ISO 9001: 2008 Certified

APPENDIX E: RESEARCH PERMIT

THIS IS TO CERTIFY THAT:
MS. ALICE ADINO WESHIRISIAH
of THE UNIVERSITY OF NAIROBI,
312-50101 BUTERE, has been permitted
to conduct research in *Kakamega County*

on the topic: *FACTORS INFLUENCING STUDENT PERFORMANCE IN MATHEMATICS IN KENYA CERTIFICATE OF SECONDARY EDUCATION IN PUBLIC SECONDARY SCHOOLS IN BUTERE SUB COUNTY KAKAMEGA COUNTY, KENYA*

for the period ending:
31st December, 2015

Permit No : NACOSTI/P/15/2747/7143
Date Of Issue : 26th August, 2015
Fee Recieved : Ksh 1,000

....
Applicant's Signature

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

CONDITIONS

1. You must report to the County Commissioner and the County Education Officer of the area before embarking on your research. Failure to do that may lead to the cancellation of your permit
2. Government Officers will not be interviewed without prior appointment.
3. No questionnaire will be used unless it has been approved.
4. Excavation, filming and collection of biological specimens are subject to further permission from the relevant Government Ministries.
5. You are required to submit at least two(2) hard copies and one(1) soft copy of your final report.
6. The Government of Kenya reserves the right to modify the conditions of this permit including its cancellation without notice.

REPUBLIC OF KENYA

NACOSTI

National Commission for Science, Technology and Innovation

RESEARCH CLEARANCE PERMIT

Serial No. A 6331

CONDITIONS: see back page