

**THE IMPACT OF TEACHER QUALITY ON PERFORMANCE OF
MATHEMATICS IN KENYA CERTIFICATE OF SECONDARY
EXAMINATIONS IN BUSIA SUB COUNTY PUBLIC SECONDARY
SCHOOLS, BUSIA COUNTY KENYA**

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**A research project submitted in partial fulfillment of the requirement for the award of
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DECLARATION

This research project is my original work and has not been presented for the award of the diploma or degree in any other university.

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L40/6675/2017

This project has been submitted for examination with my approval as the University Supervisor.

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DEDICATION

I dedicate this research project first to the Almighty God for allowing me time and resources to pursue this course to completion

Special dedication goes to Keith my son, daughters Damaris and NellyAgnes who always inspire me to greatness and pursuit of my higher calling-my life purpose as an outstanding teacher. My mother Tamara who has always encouraged me to work hard and smart even though she did not herself receive a formal schooling.

Lastly, my life partner and dear wife Diana for her encouragement to enroll for postgraduate studies and generous support that saw me complete my studies.

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Finally, special thanks to the Secondary school Principals, mathematics teachers and students who voluntarily participated in this study.

May God Almighty bless you abundantly and continue to guide you in your service to humanity.

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LIST OF ABBREVIATIONS AND ACRONYMS

B. A	: Bachelor of Arts
B.Ed.	: Bachelor of Education
B.Sc.	: Bachelor science
BOM	: Board of Management
CEMASTEA	: Centre for Mathematics, Science and Technology Education in Africa
CCSSI	: Common Core State Standards for Mathematics in the United States.
CDE	: County Director of Education
Dip.Ed.	: Diploma in Education
DTE	: Diploma Teacher Education
GoK	: Government of Kenya
HoD	: Head of Department
KCSE	: Kenya Certificate of Secondary Education
KICD	: Kenya Institute of Curriculum Development
KNEC	: Kenya National Examination Council
M.Ed.	: Master of Education
MoEST	: Ministry of Education Science and Technology
PGDE	: Post graduate Diploma in Education
PS	: Permanent Secretary
QASO	: Quality Assurance Standards Officer
SCDE	: Sub-County Director of Education
SMASSE	: Strengthening of Mathematics and Sciences in Secondary Education
TSC	: Teachers Service Commission
US	: United States

ABSTRACT

This study aims at establishing the impact of the quality of the teacher to the performance of Mathematics in the Kenya Certificate of Secondary Education (KCSE) Examinations in Busia Sub-County public secondary schools of Busia County in the examination years 2016-2019. Six schools were sampled from the 19 public secondary schools in Busia sub-county. This sample is 31.5% of the public secondary schools in the sub- county.

In each school 15 students were sampled, 4 teachers and the principal. A total of 90 students, 24 teachers and 6 principals were sampled. The study mainly focused on form IV students.

The researcher identified four research objectives to guide the study: determine to what extent which teacher's qualification and experience influence students' performance, how teacher lesson planning and preparation contributes to students' performance, effect of teachers teaching methodologies to student achievement in mathematics, and lastly effective use of assessment and evaluation tools in mathematics to promote students' good performance in mathematics at KCSE.

The study methodology adopted descriptive survey design. The simple random sampling technique was used to select the respondents and questionnaires were designed to collect the relevant data. The collected data was recorded in tables and analyzed using percentages.

From the research findings, it was deduced that teachers who employed effective learner teaching methods contributed to better student performance than those teachers who mostly used teacher-centred approaches. It was also found that teachers with longer teaching experience have greater impact on student achievement in mathematics than teachers with less than five years teaching experience. The study also revealed that teachers with a good rapport and good communication skills contributed to higher student performance.

The study also showed that although the performance in these schools was generally low, those schools where teachers prepared the lesson notes and worked examples well, related well with the learners, observed the individual differences in learning mathematics by different students', used relevant teaching resources quite often and gave students plenty of mathematics activities to practice acquisition of mathematics knowledge, skills and concepts showed marginally better performance than the other schools.

The research findings would be of great importance to mathematics teachers, students, county education quality assurance officers, college tutors and university lecturers towards improvement of Mathematics performance in our secondary schools.

CHAPTER ONE

1.0 INTRODUCTION

This chapter provides the background to the study, statement of the problem, purpose of the study, objectives of the study and research questions. It further highlights the significance, limitations, delimitations, basic assumptions, definition of terms used and organization of the study.

1.1 Background of the study

The study of mathematics in and out of school is of great significance due to its academic and real-life application. Most industrialized and developed nations have experienced its contribution to science and technology towards making the world a better place. For this reason, even the developing countries are also promoting its study in our schools and tertiary institutions. The National council of Curriculum and Assessment (2005), observe that mathematics is used to describe, illustrate, interpret, predict, explain patterns, illustrate patterns and relationships in numbers so as to convey and clarify meaning of varied issues in life. The Kenya National Examination Council (KNEC) secretary Wasanga (2009) stated that the training of mathematics is vital due to the talents and skills acquired by the student which is relevant to everyday life use. It is also useful in the academic world due to its relationship to all the other subject, application in industrial and world of technology. Ramani (2004) and Siringi (2005), noted that despite the serious role played by mathematics in life there has always been the problem of poor performance at KCSE. The quality of the teacher is arguably identified by education stakeholders to be the most important factor affecting student performance and achievement in school (Motoko, Gerald, LeTendre & Scribner, 2007). Additionally, Fester (2014) states, that an effective educator should aim and promoting the student academic development while in school and in future. The educator

should plan for now and what the student becomes after school. Wong & Wong found out that when learners come to school, they not only develop skills, gain insight, values and concepts in academic areas but also how they can apply this in life as responsible citizens contributing to nation building.

To realize better performance of students in school and productive citizens in the society, it is important to constantly review the standard of our teachers and teaching approaches used to pass learning instruction and evaluate student achievement from time to time.

A teacher has great influence on the performance of learners through the remarks, interest, attitude and methodologies used in the learning process (Fakinde,1978). Farrant (1980) in his study found out that mastery of content, use of learner centred approaches and develops the lesson in an orderly manner is able to realize the individual learners' specific interests.

Leigh and Mead (2005), in their study on factors influencing students' learning identified teachers understanding of the principles and concepts of a subject as the single significant factor. Omo (2011), in his study agrees that teachers' quality largely affects students' achievement. In another study by Goe (2007), found out the level of mastery of the subject by the teacher and approaches of delivery of the same content as the foremost qualities of a good educator.

In another study by Darling & Hammond (2000), found out that the quality of a teacher training and professional qualifications of the teacher play a significant role towards a student achievement in arithmetics. In a study conducted in primary schools in eastern Uganda to establish the relationship between teachers qualifications and pupils academic performance, Kasiisa & Bakaluba (2013) Kasiisa & Bakaluba (2013) found out that there is positive correlation between teachers experience and qualifications and pupils academic achievement. They thus went ahead and recommended that experienced teachers with professional qualifications be employed to teach Social studies in wester Uganda. Finally, in

a study by Kosgei, Jairo, Odhiambo and Ayugi (2013), in Nandi, Kenya to determine how teacher quality affects student performance. The researchers deduced that teachers experience has a significant effect on the performance of students however, their was no much correlation between teacher qualifications to students performance in academics. Education Permanent Secretary (PS) Professor George Godia (2010 Kenya) said an audit conducted after repeated below average students’ performance in arithmetic and science subjects revealed that most of those teaching the subjects are incompetent. The audit revealed that those teaching sciences including mathematics at primary school level scored as low as D (plain) grade within the subject at KCSE. This great emphasis on mathematics in class curriculum and the persistent dismal performance over the years within the subject has necessitated this study.

Table 1: Analyzed KCSE Mathematics Examination Results for Busia Sub-County

Year	2019	2018	2017	2016
Points out of 12	2.817	2.589	2.428	2.197
Grade	D (plain)	D (plain)	D- (minus)	D- (minus)

Source: Busia Sub-County Education Office

The data in table 1.1 for analyzed KCSE Mathematics results for the years 2016 – 2019, reveal that in 2016 the mean score in mathematics was 2.197 (D- minus), 2.428 (D- minus) in 2017, it slightly rose to 2.589 (D plain) in 2018 and remained at 2.817 (D plain) in 2019. This trend shows a very low performance in mathematics.

Table 2: Grades attained in KCSE Mathematics Busia Sub-County in 2019

Grade	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	E	X	TOTAL
Number	39	33	25	32	40	43	59	57	50	280	584	736	1	1,978
Percent%	2	1.7	1.3	1.6	2	2.2	3	2.9	2.5	14.1	29.5	37.2	0	100%

Source: Busia Sub-County Education Office

The percentage of students who scored grade E (37.2%), D- (29.5%) and D (14.2) account for 57.9% of the total 1,978 candidates who sat the exam in 2019. The above poor results in mathematics could be attributed to teacher and student factors affecting performance in mathematics. The continued trend of below average results in KCSE mathematics prompted the researcher to conduct this study.

1.2 Statement of the problem

Many researchers in academics have found out that the success or the failure of a learning programme relies a lot on the implementor of the curriculum who is the teacher. As such low performance of students in arithmetic's is always attributed to the lack of skills and ability of the teacher to transfer mathematics knowledge and concepts to the learners (Adeniyi & Ayinha, 2012). The researcher seeks to examine teacher quality factors and their effect on student's achievement in mathematics in Busia sub-county public secondary schools of Busia county in Kenya. Four factors considered were: teacher's professional qualifications and teaching experience, lesson planning and preparation of the teacher, teaching techniques employed by the teacher and assessment of student level of achievement in mathematics.

1.3 Purpose of the Study

The main aim of the study was to determine how teacher quality influences teacher quality influences student's achievement for public secondary school Kenya Certificate of Secondary Education (KCSE) Mathematics Examinations of Busia Sub county.

1.4 Objectives of the Study

The main objective of the study is to investigate the effect of teacher quality to the achievements of students KCSE Mathematics examination in public secondary schools in Busia sub-county.

The researcher identified four specific objectives to guide the study in Busia Sub-county.

- i) To establish how teacher qualifications and experience influences achievement of public secondary school students in KCSE mathematics Examinations.
- ii) To investigate how lesson planning and preparation of a teacher in public secondary school affects students' performance in KCSE mathematics Examinations.
- iii) To determine the extend to which the teaching methodology used by the teacher affects the performance of students in KCSE mathematics in public secondary schools of Busia sub-county.
- iv) To investigate how assessment and evaluation of mathematics activities by the teacher affects students' achievement in KCSE mathematics in public secondary schools in Busia sub county.

1.5 Research Questions

The researcher developed the following research questions to direct the study

- i) How are the teacher's professional qualifications and experience affects the performance of students in KCSE Mathematics Examinations in Busia sub county public secondary schools?
- ii) To what extend does a mathematics teacher lesson planning and influence the performance of students in KCSE mathematics Examinations in Busia sub county?
- iii) How does teaching methodology relate to student's performance at KCSE mathematics examinations in Busia sub county public secondary schools?
- iv) To establish the degree to which assessment and evaluation of mathematics activities by the teacher affect the performance of students in mathematics Examinations in Busia sub county public secondary schools?

1.6 Significance of the Study

The research findings are expected to provide useful information on the relationship of teacher quality factors to the performance of students in mathematics at KCSE. This will further assist mathematics teachers to embrace learner centred teaching methodology towards higher achievement of students in the subject and the other subjects.

The principals and Mathematics Heads of Department shall use the findings of the study to look for ways of supporting mathematics teachers to better their performance in mathematics in their schools.

Furthermore, the findings will help teacher training institutions to adopt better practices in training of mathematics teachers for better performance of students in mathematics.

Finally, the findings will provide relevant knowledge to the Ministry of Education on which teachers quality factors should be reinforced to realize better performance by the students in the subject that determines advancement to further careers at tertiary level.

1.7 Limitations of the study

The researcher limited the study to one county from the seven sub counties in Busia county.

The researcher considered only public secondary schools because they all engage TSC registered teachers. And are also expected to promote quality in all aspects of education.

1.8 Delimitations of the study

The researcher selected six schools from the 19 public secondary schools in the sub county.

The respondents included six principals, 24 teachers and 90 students equally drawn from the six schools. Therefore, these studies cannot be generalized to other schools outside the sub-county.

The researcher also aimed at investigating only four of the teacher quality factors as it is logically impossible to study all the teacher quality factors affecting performance of students in mathematics.

1.9 Assumptions of the study

- i) All the respondents shall give honest and accurate responses to their understanding.
- ii) All six schools sampled have engaged qualified teachers registered with the TSC.
- iii) All students in selected schools have equal study time
- iv) All the schools under study use the same syllabus books.
- v) Data on students' performance at KCSE math in the years 2016-2019 is available.

1.10 Definition of terms

Student- Anyone enrolled for learning at secondary school institution.

Examination: a formal test that you take to show your knowledge or ability in a particular subject

Mathematics teachers: refers to both male and female instructors teaching mathematics in Kenya.

Kenya certificate of Secondary Education: National examination sat by all form four candidates registered with KNEC to make the completion of the four years of secondary education preparing them for higher academic and professional training.

Principal: Chief administrator of all activities taking place in a secondary school.

Mathematics teacher: Both male and female person with post-secondary professional training to carry out instructions to secondary school students.

Performance in mathematics: Marks, alphabetical grades (A to E) and numerical point (1 to 12) obtained by a student in internal and national examinations.

Teacher quality: This is the professional qualifications and the teaching strategies employed by the teacher to ensure effective learning of the students.

Teaching methodology: Strategies and techniques used by the teacher to deliver subject content to the learners. For example, problem solving, lecturer, discussion, among others.

1.11 Organization of the study

This study was organized into five chapters. Chapter one is the introduction to the project. This chapter offers an insight into the basis of the study by describing eleven sub titles namely; the background to the study by highlighting the background to the study, outlining the statement of the study, the purpose of the study, the objective of the study, research questions, identifying the limitations of the study, delimitations of the study, definition of significant terms used in the study and organization of the study.

The second Chapter looks at the summary of the review of related literature to teacher quality factors and their influence on students' performance in mathematics. The related literature will be reviewed in terms of importance of mathematics, teachers' qualification and experience, lesson planning and preparation of the teacher, teaching techniques employed by the teacher and assessment of student level of achievement in arithmetic's and summary of the literature review. Lastly, it shows the conceptual framework to the study.

Chapter three specifically looks at the research methodology used in the study. The researcher discusses the research design, the target population, sample size and sampling procedure used, research instruments used, the validity and reliability of the research instruments, analysis of the data and ethical considerations made by the researcher.

The fourth chapter analyses the data results collected in tables, highlights the interpretations and discussion of the study.

Lastly, chapter five gives a summary of the findings in relation to the study objectives, states the conclusions from the analyzed data and makes recommendations based on the study and suggestions for further studies.

CHAPTER TWO

2.0 REVIEW OF RELATED LITERATURE

The researcher critically reviewed the literature related to the topic of study under the following sub-headings; importance of mathematics, teacher's qualifications and experience, teachers lesson planning and preparation, teaching strategies employed by the teachers for effective content delivery, assessment and evaluation of mathematics activities, summary of literature review. Lastly, the conceptual framework of the study.

2.1: Importance of mathematics

The study of mathematics is of great importance to both an individual and the society. To the student it equips him with relevant numeracy skills and concepts to logical problem solving. As a society it enables to carry out business transactions with fairness.

Mathematics as a subject is applied to many aspects of life. Be it in building and construction, farming and livestock keeping, banking, insurance, technological advancements develop sequences from numbers, medical field, architecture among other applications. The knowledge of mathematics help us to identify patterns, sequences and relationships to come up with formula and behavior patterns of animals, people, plants and the universe. In research we use mathematics to identify correlations, scattering, deviations from the centre, percentages to make meaningful and tangible conclusions.

Mathematics is important for life and supports all-round personal development. The knowledge of mathematics significantly influences learners' education both in a special branch (mathematical knowledge) and in terms of moral education.

The significant gains made by developed nations in promoting the study of mathematics have made developing nations like Kenya to make the study of mathematics a must at both primary and secondary schools. It is also the yardstick for those in the scientific and technological world.

Whether you are in Africa, Australia, Russia, or Dubai the symbols used in teaching mathematics, aims of studying mathematics and nature of teaching mathematics remains virtually the same. The importance of mathematics in the academic and real-world day to day activities is what prompted the researcher to carry out this study at Busia sub-county, Busia County.

2.2 Teacher qualifications and experience to students' performance

Abe and Adu (2013) in their study found that the bottom line to better grades and high achievement levels in mathematics is by engaging professionally qualified and highly experienced teachers in our schools.

Studies on teacher qualification by Larkin (1984) and Anderson (1989), suggest that teacher qualities such as gender, marital status, years of teaching the subject and professional qualifications of a teacher are important parameter in judging the student performance.

Rukangu (2000) emphasizes that the success of an education system anywhere in the world is judged by the kind of teachers they engage to implement the curriculum. The certainty of attaining the expected education objectives of a system of education largely depends on the qualifications and continuous training of the teachers to better pass on knowledge to learners.

The 2010 constitution of Kenya (2010) empowers the Teachers service commission (TSC) under Article 237 outlines the requirements for one to be registered and practice as a teacher in Kenya and beyond. The TSC is also mandated to continuously revise the professional qualifications of willing to train and practice as teachers. The TSC act (2012) section 23 (2) makes it a legal offence for one to practice as a teacher without being registered by TSC.

A person willing to be registered for employment as a secondary school teacher for mathematics in Kenya, must either be a holder of a Diploma in secondary Teacher Education (Dip.Ed.) or have a first degree in Education (B.Ed.). In addition, a Diploma

teacher must have obtained at least a mean grade of C+ (plus) and a C+ (plus) in each of the two teaching subjects and at least C (plain) in English at KCSE. While for a degree holder, B.Ed. one must have obtained a mean grade of C+ (plus) or its equivalent and C+(plus) in the two teaching subjects. Lastly, for those with general first degrees Bachelor of Arts (B.A) and Bachelor of Science (B.Sc.) one will still be expected to have attained at least a mean grade of C+ (plus) or its equivalent, C+ (plus) in the two subjects of specialization at KCSE level then farther pursue a Post Graduate Diploma in Education (PGDE) from a recognized tertiary institution.

From the above guidelines, it is evident that the minimum qualifications for one to become a secondary school teacher in Kenya are quite high. Onyekuru and Ibegbunam (2013) conducted a study in Nigeria, on efficiency of teachers to student performance and found that the efficiency of teaching in secondary school in Nigeria was below average.

In another study carried out by Kosgei *et al* (2013) to establish the relationship between teacher quality and student achievement. He observed that teachers with long years of service promote better performance among learners. However, the professional qualifications of a teacher do not significantly affect student achievements in learning.

2.3 Teachers' lesson planning and preparation in Mathematics

Clark & Peterson (1986), Floden et al (1980) and Hiebert (1999) all agree that good mathematics teacher is expected to prepare his teaching and learning resources, worked examples, practice test items and take away assignment before going to class. And that good planning creates order in presentation and confidence in mastery of subject content by teacher. Choy et al (2013) observe that a teacher who prepares a lesson plan and teachers notes or worked examples for mathematics show a teachers understanding of the subject matter, the appropriate teaching and learning approaches to use, previous relevant

knowledge to link to current lesson for continuity not only delivers effective lessons but improves students' performance.

Planning of a teacher therefore entails a teacher taking time to prepare the contents, appropriate techniques of delivery and relevant learner activities for learning. A teacher who plans both in the short, mid term and long term for his students is highly successful in his teaching career and even students perform better in his subject.

Jerome and Bhargava (2015) note that a successful teacher is one who is able to look at his students learning over a longer period of time like a year to four years and conceptualize how to assist them master the concepts you teach over a short period like a week, month or term. This they argue is key towards achieving better results for your students.

Takahashi (2011) observed that good teachers in Japan do not just follow the textbook rather think beyond the classroom for learners to relate theory with application in real life.

Yang and Ricks (2012) explained the *three-points framework* used by teachers in China to ensure both the teacher and learner achieve the intended objective. These are: the first is the *key point* which is what the learners are expected to learn, the second is the *difficult point* what learners are expected to do to learn the key point and lastly the *critical point* where the teacher helps the learners to arrive at the key point.

Using the *three-points framework* advanced above, Chen and Leung (2015) conclude that the most important thing in a lesson is help students learn the key points by overcoming the difficult points through the teacher's explanation.

Good planning therefore ensures that the teacher is well prepared to execute the lesson. The teacher prepares the relevant examples for use, teaching and learning aids, how to introduce develop and conclude the lesson systematically. And lastly the teacher prepares relevant revision questions and exercises for practice and mastery of the concept.

2.4 Methods of Teaching Mathematics and student performance

One of the leading factors to poor performance of students in mathematics in secondary schools is the learning and teaching approaches used by the teacher in learning process.

Dreck Myer (1994) defined a teaching method as an elaborate teaching plan which comprises of all the elements of teaching and learning. These may include content, techniques, resources.

Effective teachers innovate and look for relevant resources to make learning of interest to the learner and enjoyable.

Teachers should have insight and be resourceful in whatever methods they use. In a study by SMASSE (2005), it was recommended that classroom organization is very important to promote methods that encourage active participation by learners small group work, practice test items by whole class, mathematical projects, and individual assignments. These activities promote active participation and learning than the usual 40 or 80 minutes of lecturing. Teachers should also plan for a field study at least once a year. These activities not only promote achievement of academic objectives but also promote personal social development skills for patriotic and responsible citizenry.

Teachers should consistently encourage student's participation through small groups and chalkboard presentation. Also allow learners to brainstorm and discover a concept or formula in mathematics through repeated activities.

SMASSE (2005) argued that mathematics is not only a difficult subject to learn but also to teach. The teacher knowing how concepts built upon others from simple to complex should assist learners to understand the previous relevant knowledge required to move to the next topic or subtopic. The teacher should be able to link relevant previous knowledge to current one.

An effective mathematics teacher has a better understanding of the individual differences of his students. He therefore moderates his pace of teaching and learning neither to become boring for being too slow nor fast and students do not comprehend the concepts taught.

Students should be taught to use failure to their advantage. Several attempts using different approaches will eventually give the correct result. This encourages them not to give up.

Watson (2013) proposes that effective mathematics teachers should pay special attention to mathematical facts and skills, concepts and strategies used in mathematic

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 by SMASSE (1998) established that most mathematics and science teachers lack a clear vision on achieving the set objectives in these subjects. Majority focus on teaching the textbook with no regard to the syllabus. Lack of a clear vision and focus influences the degree of attainment of expected results from the teacher after presenting a lesson in class.

In another similar study by Kemp (1986), he maintains that to make meaning of our curriculum plans we must set clear, specific, measurable, attainable, realistic and time bound aims and objectives to be realized. The means and methods of content delivery can be informed by the aims and objectives set. Teachers should be clear on what is expected to be achieved at the end of the lesson, week, month term or year. Teachers being the curriculum

implementers, the quality of teaching and learning is always mirrored in the students' performance

2.5 Assessment and evaluation of Mathematics

Assessment of student level of achievement gives the teacher guidance on review of his teaching approaches and how to help the learner. In their study Morgan and Watson (2002) found out that the most used middle and high school assessment methods to assess student achievement were teacher constructed tests.

In his survey across the united states, Cooney (2002), discovered that most high school teachers used short answer test to evaluate student's achievement. In yet another study earlier Coony (1992) and Garet & Mills (1995) had found out that another of teachers used ready made tests without making any adjustments on them. Mathematics teachers should continuously evaluate learners to ensure consistency in acquisition of relevant knowledge, skills and concepts necessary for developing higher level mathematics.

The table 2.1 below shows a summary of tests and assessment techniques a teacher can employ while teaching mathematics.

Table 3: Classroom Assessment Techniques.

No	Type of assessment	Nature/Purpose of assessment	Level
i.	Basic assessments	Oral and written responses of one's experience. Evaluate previous relevant knowledge	Basic
ii.	Written tests	Multiple choice, short answer, essay, constructed response, written reports, true or false. Assess students' acquisition of knowledge and concepts	Formative
iii.	Embedded Assessments	Assess aspect of student learning in the context of the learning experience.	Formative
iv.	Oral reports	Require student communication that demonstrates mathematical understanding	Formative
v.	Interviews	Assess individual and group performance before, during and after a mathematical experience.	Formative
vi.	Performance tasks	Require student to create or take an action related to the problem, issue, or mathematical concept.	Formative and Summative
vii.	Checklists	Monitor and record anecdotal information	Formative and Summative
viii.	Investigative projects	Require students to create or take an action related to a problem, issue, or mathematical concept	Summative
ix.	Extended or Unit Project	Require the application of knowledge and skills in an open-ended setting.	Summative
x.	Portfolios	Assist students in the process of developing and reflecting on a purposeful collection of students generated.	Formative and summative

Table 3: From Angelo & Cross (1993). *Classroom Assessment Techniques: A Handbook for College Teachers*. San Francisco: Jessey-Bass Eberly Center for Teaching Excellence, summer 2000.

A focused teacher will employ the above techniques at different levels and to different students to ensure good performance in mathematics.

2.6 Summary of Literature Review

In his study Hughes (1999) conducted a qualitative research on underlying factors to student achievement in schools concluded that teachers are the most important resource, then the student body, and lastly, the school environment. The school environment is made up of the physical facilities, class sizes, teaching approaches and all the other resources. All these factors influence student learning through interaction and behavior of teachers with students.

A study by Kimani, Kara & Njagi (2013) Nyandarua County, Kenya to investigate the correlation between certain teachers' demographic attributes, teaching approaches and students' academic achievement in the Kenya Certificate of Secondary Education (KCSE) in selected secondary schools. Considering KCSE results of 2010, 2011 & 2012 grouped the schools as above average, average and below average. The study found that age, gender, professional qualifications and experience of the teacher' have a positive relationship to student academic performance. Teachers job groups did not have a positive relation with student performance. A better teacher should demonstrate, good mastery of subject matter, use learner friendly teaching approaches, have good classroom control, share with learners the importance of mathematics in life and good communication skills.

In conclusion, total outcome of a learning program is dependent on how the teacher prepares the content to be delivered, how the teacher delivers the content to the learners and the objective the teacher intends to attain at the end of the lesson.

2.7 Conceptual Framework

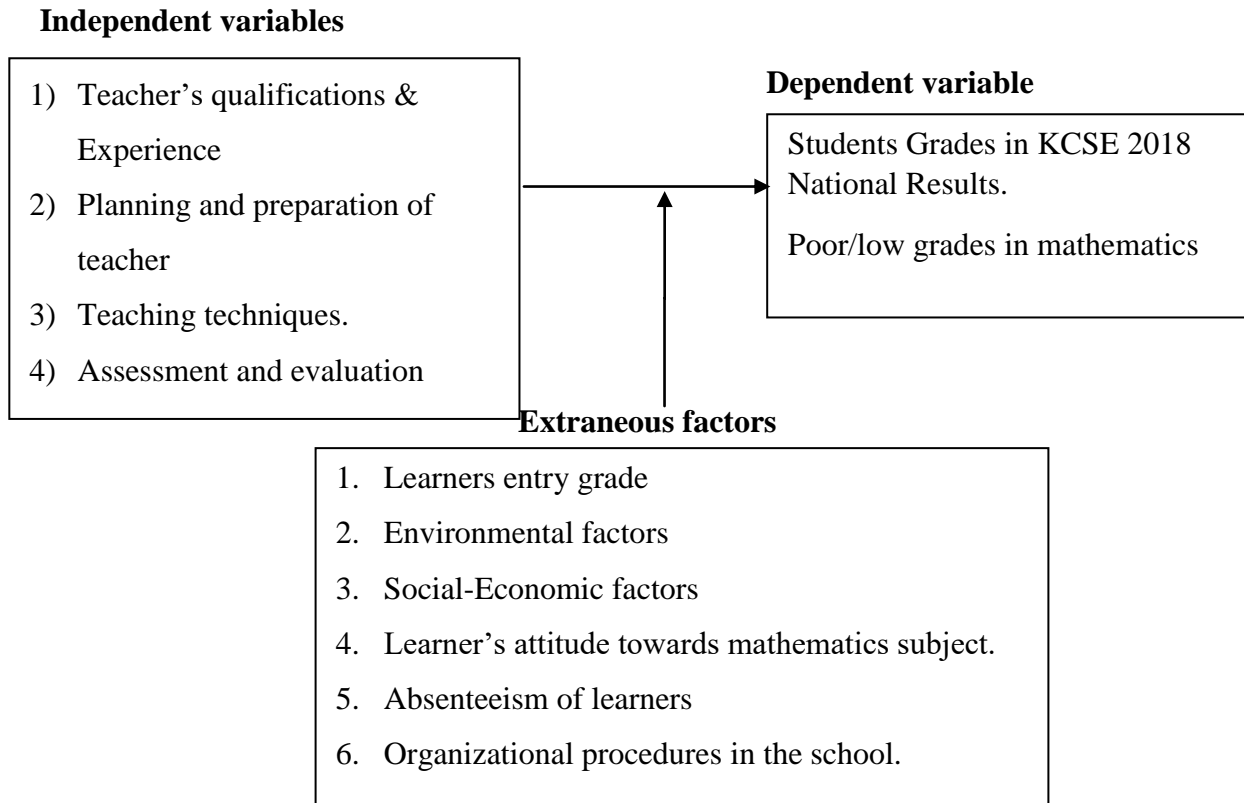


Figure 1: Diagrammatic relationship of Teacher quality attributes to learner's performance.

The researcher developed the conceptual framework to enable him focus on the key teacher quality factors under study. The factors include teacher qualification and experience, lesson preparation and planning, methodology employed by the teacher to teach Mathematics and how the teacher evaluates and assesses progress in learning mathematics.

The researcher was also able to identify and control six extraneous factors which are learners' entry grade, environmental factors, social-economic factors, learner's attitude towards mathematics, absenteeism due to fee and indiscipline and the organizational procedures in the school that to a large extent have an impact on students' performance.

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 Introduction

This chapter discusses the research methods used to obtain data for analysis, the research design, sampling techniques, the population of study, data collection and analysis and lastly the ethical considerations of the study

3.2 Research Design

The researcher used the descriptive survey design. This design was appropriate since it sought to gather firsthand information from principals', mathematics teachers' and students' on the teacher quality attributes affecting performance of mathematics in the national Kenya Certificate of Secondary Education (KCSE) examination in public secondary schools in Busia sub-county of Busia county. Mugenda O & Mugenda A (2003) states that survey research gathers information as it is currently on the ground about an existing occurrence. Three questionnaires were designed for the students, mathematics teachers and Principals. The questionnaires were easy to use by who the respondents were all literate.

3.3 Target Population

The researcher targeted 6 Principals, 24 Mathematics teachers and 90 students in Busia sub-county public secondary schools. This is 31.5% of the 19 public secondary schools in Busia sub county.

The target population size and actual sample considered for the study are indicated in table From the percentage of respondents, it shows there was a good response rate.

Table 4: Target population and sample size

Category	Target population size	Actual sample size	Percentage %
Students	90	84	93%
Mathematics teachers	24	21	88%
Principals	6	6	100%

3.4 Sampling Size and Sampling Techniques

The respondents were selected using the simple random sampling technique and the data was collected using questionnaires and analyzed using statistical descriptive methods.

3.5 Research instruments

Three questionnaires, one for the students, mathematics teacher and the principal were prepared. The researcher visited each school administered the questionnaire to the respondents and picked them before leaving the school.

3.6 Validity of the Instruments

Kombo & Tromp (2006) describe validity as the degree to which a research instrument measures what it is expected to measure and perform that which it is supposed to perform. The instrument will be valid if its content is relevant and apposite to the research objectives. Two other public secondary schools not in the sample were selected for a pilot study. The researcher used two mathematics Heads of subject, six mathematics teachers and two principals from these schools. These schools and respondents were selected using purposive sampling to establish the validity of the instruments. From the results the instrument was found to be valid with a few improvements being made after a discussion with the HODs.

3.7 Reliability of the instrument

Orodho (2003) defines reliability of an instrument grade to which a particular measuring process yields similar results over several repeated trials. The test retest method was used assess reliability. The instrument was found reliable producing similar results on a second test.

3.8 Data collection procedure

After presenting a letter of intent requesting for permission to visit the schools from the Sub-County Director of Education (SCDE) of Busia to carry out the stated research. The SCDE then signed the researchers' letter of intent requesting the principals of the sampled schools to allow the researcher to collect the relevant data. The researcher made visits to each of the sampled schools each per day to present the questionnaires. The researcher collected the filled questionnaires before leaving the school.

3.9 Data analysis

After collecting the questionnaires from the six schools the researcher embarked on data analysis. The quantitative data was analyzed in simple frequency tables and there percentages determined. Qualitative data from open ended questions at the end of the questionnaire was also analyzed according to similar themes and presented in the tables and percentages. Characteristics and common patterns from the collected and analyzed data was summarized in tables for conclusions to be drawn.

Descriptive statistics packages using frequencies and percentages were used to profile sample characteristics and major patterns arising from the collected data presented in tables and charts.

3.10 Ethical considerations

A major ethical concern in this study was the confidentiality of information availed voluntarily by the respondents. Confidentiality was maintained by requesting all the respondents not to write their names or name of school on the filled questionnaire. The respondents were also informed that all the information being collected was meant for academic research purposes only. All the reference materials used were appropriately acknowledged.

CHAPTER FOUR

4.0 DATA ANALYSIS AND RESULTS

4.1 Introduction

In this chapter the researcher shall discuss the findings of the research study to establish impact of teacher qualification and experience, lesson planning and preparation, teaching methodology and assessment and evaluation of mathematics activities to student achievement in the subject.

4.2 Questionnaire return rate

120 questionnaires were issued out to the participants. Out of which 111 were filled and collected for analysis. All the principal's returned the questionnaires (100%), 21 of the 24 targeted mathematics teachers filled and returned the questionnaires (88%) and 84 of the targeted 90 students returned their completed questionnaires (93%). According to Mugenda & Mugenda the percentage return rate of above 85% was made. The 92.5% return rate was satisfactory.

Table 5: Summary of questionnaire return rate

Groups	Target Population	Actual sample	Percentage (%)
Principals	6	6	100%
Mathematic teachers	24	21	88%
Form four students	90	84	93%

4.3 Respondents by sex

A total of 21 mathematics teachers participated in the survey, from this 12 (57.1%) were male while 9 (42.9%) were female. Out of the total 6 principals who undertook the survey

4 (66.7%) were male and 2 (33.3%) were female. Of the 84 students who participated, boys were 45 (53.6%) and girls were 39 (46.4%).

Table 6: Respondents by sex

Respondents	Male	Male Percentage	Female	Female Percentage
Principals	4	66.7%	2	33.3%
Teachers	12	57.1%	9	42.9%
Students	45	53.6%	39	46.4%

From table 6 above, more males were randomly sampled than females. The perception being that mathematics is a male dominated and difficult subject. Of the six schools sampled researcher sampled 2 boys only schools, two girls only schools and 2 mixed day schools. Distribution of male and female teachers is fair enough showing more females are embracing the learning of mathematics and careers related to mathematics and sciences. This should be encouraged by girls being taught mathematics by female teachers as their role models so as not to see mathematics as a male subject difficult for girls. In mixed schools both male and female teachers can do group teaching taking their preferred topics for the same class/stream instead of being restricted to a particular stream. In boy's schools both male and female teachers can be used as more boys will work hard seeing that even women teach the subject.

4.4 Respondents by age

Table 7: Teachers Respondents by age

Age bracket	Number of teachers	Percent %
21 – 30	6	28.6
31 – 40	8	38.1
41 – 50	4	19.0
50 and Above	3	14.3
Total	21	100%

The high number of young teachers below 40 years (14) 66.7% can be attributed to interest in teaching the subject and motivation to improve students' performance in the subject whereas the low number of old experienced teachers (7) 33.3% may be attributed to low interest in the subject as a result of students' low performance and heavy work load for marking exercises frequently in the subject as one gets older.

Table 8: Principals respondents by age

Age bracket	Number of principals	Percent %
31 – 40	2	33.3%
40 and above	4	66.7%

Table 8 indicates that all 67.7% of the principals are 40 years and above. This shows maturity and years of experience to guide the teachers and students realize good performance in KCSE Examinations. Even the 33.3% have enough experience to promote good performance in their schools. Hence the administrators ought to do better.

4.5 Teachers qualifications, experience, and Performance in Mathematics

In this section we analyze the professional qualifications and experience of mathematics teachers and how they affect students' performance in mathematics.

Table 9 : Professional Qualifications of Mathematics teachers in Busia Sub-County

Public secondary schools.

Teachers Qualifications	Number	Percentage %
Diploma in Education (Dip. Ed)	3	14%
Postgraduate Diploma in Education (PGDE)	4	19%
Bachelor of Education Science (B.Sc. Ed)	13	62%
Masters of Education (M.Ed)	1	5%

From the above table 9, it is evident that the teachers teaching mathematics in Busia sub-county public secondary schools have high professional qualifications. 62% had Bachelor's degree and 24% with postgraduate qualifications (Masters and PGDE) and only 14% had Diploma in Education. A study conducted in Nandi district, Kenya by Kosgei et al (2013) established that teacher quality has no much relationship with student achievements.

Despite the high qualifications of the teachers, the students' performance was still below average in these schools at D plain in 2019 and 2018, while D- minus in 2017 and 2016.

Table 10: Mathematics teachers Experience and students' performance.

Years of experience	Number	Percent %
Below 5 years	13	61.9%
6 to 10 years	6	28.6%
11 years and above	2	9.5%

This study agrees with Kosgei et al (2013) conducted in Nandi sub-county that experience of the teacher significantly affects the performance of the students. The poor performance can be attributed to the high number of teachers with little or no experience of less than 5 years. The teachers with 6 years and above of experience have mastered the content and gained the confidence to handle different students and produce good results. They however lacked the motivation due to the high enrolment due to 100% transition from primary to secondary schools and free day secondary school education by the Government of Kenya.

4.6 Teachers preparation and lesson planning

The researcher found out that the HoD's reported that most teachers maintained the requisite professional documents which included the syllabus, schemes of work, notes, records of work covered, progress records, teachers rarely kept the lesson plan.

Teachers who had prepared worked examples for use and exercises for practice were more organized and systematic in their content delivery.

Table 11: Professional documents maintained by mathematics teachers

Professional documents	n	Teachers with	% with	Teachers without	% without
Schemes of work	21	17	80.9	4	19.1
Lesson plans	21	11	52.4	10	47.6
Lesson notes	21	12	57.1	9	42.9
Records of work covered	21	19	90.1	2	9.9
Progress records	21	13	61.9	8	38.1

It is evident from the data above that most teachers keep schemes of work (80.9%). The 19.1% without had not picked a copy from the HoD for personal use. Almost half of the sampled teachers do not regularly prepare lesson plans. A good number (57.1%) prepare lesson notes, worked examples and take away assignments in advance.

Majority of the teachers (90.1%) prepare records of work covered in the sampled schools. Lastly, 61.9% of the teachers maintain their students mark sheet to monitor progress in their subjects. Some teachers handed marks to the director of studies not keeping a personal copy. It is evident from the data collected that majority of teachers adequately prepare the professional documents required. An analysis of these documents over the years would help the HoD's to foster good teaching practice among the teachers which will result in good grades in mathematics Kenya Certificate of Secondary Education (KCSE) Examination.

4.7 Methodology, Communication, and class organization in teaching

The researcher analyzed the responses from teachers and students on teachers' methodology

Table 12: Teaching methods employed by mathematics teachers

Method	N	Very often	Often	Rarely	Never
Lecture	21	8	11	2	0
Demonstration	21	10	7	4	0
Guided discovery	21	5	4	5	7
Problem solving	21	12	6	3	0
Question and answer	21	15	5	1	0
Small group discussion	21	6	3	7	5
Field work/symposia	21	7	4	3	7

From the findings of the study most of the teachers use the Question & answer (71%), Problem solving (57%) and demonstration (48%) which are teacher-centred approaches. The Guided discovery (24%), small group discussion (29%) and field work/symposia (33%) were rarely used by the teachers. These are learner-centred approaches that make learning

Mathematics interesting and long retention of learnt content. These methods should be encouraged for use by mathematics teachers which encourages dynamic and lively students' participation in learning.

Table 13: Students views on teaching approaches used by teachers

Statement	n	Yes	No
My teacher makes learning mathematics enjoyable by using relevant local examples and illustrations.	84	50 (59.5)	34 (40.5)
My teacher uses models and charts to teach mathematics.	84	22 (26.2)	62 (73.8)
Teacher links previous relevant concepts to current.	84	41 (48.8)	43 (51.2)
I am able to follow the teachers' examples and explanations.	84	47 (56.0)	37 (44.0)
Teacher relates mathematics concepts to daily real life.	84	38 (45.2)	56 (54.4)
Teacher marks and revises assignments before giving further tests.	84	53 (63.1)	31(36.9)

Table 14: Aspects of learning mathematics liked by students

Aspect of Learning Mathematics	Number of students	Percentage %
Teachers Demonstration	24	28.5%
Small group discussion	20	23.8%
Symposia	26	31%
Homework	14	16.7%
Total	84	100%

From table 14, the researcher concluded that 28.5% of students like teacher's demonstrations while learning, 24% enjoy learning through group discussion, 31% enjoy learning through symposia and only 17% like doing homework.

It can also be concluded from table 13 that, 59.5% of teachers use local examples when teaching, 56% of the learners are able to follow the teacher’s explanations and most teachers 63% are able to mark class assignments and make corrections before introducing new concepts. However due to high enrolment teachers do not give homework regularly.

From this study, it can be deduced that most teachers use teacher centred approaches which contribute to low grades in KCSE mathematics.

4.8 Evaluation and assessment of mathematics

The researcher analyzed the frequency and type of assessments used by the teacher to evaluate mathematical skills, concepts, and ideas.

Table 15: Assessment approaches used by teachers to evaluate mathematics.

Statement	n	Always	Sometimes	Never
Teacher gives practice questions during lessons	21	16	5	0
Teacher gives homework after every lesson	21	5	7	9
Teacher gives group work test items after a topic	21	6	10	5
Learners do mid-term and end term exams	21	21	0	0
Form fours given exams with other schools	21	19	2	0

The data from the study revealed that all students do mid-term and end of term examinations and majority (90.4%) reported giving their form four candidates examinations with other schools within the sub-county. Also 76.2% give practice questions to learners in class.

It was also noted that only 24% and 29% gave assignments after the lesson and after every topic, respectively.

Table 16: Frequency of evaluating learning of mathematics concepts

Frequency	Number of respondents	Percentage %
Daily	19	23
Weekly	41	49
Fortnightly	13	15
Monthly	11	13

Analyzed data above show that, frequency of evaluating learner's acquisition of mathematics knowledge, skills and concepts is very low. Only 23% of the teachers give daily homework, 49% giving an assignment once or twice a week. It is also worth noting that some teachers 15% and 13% respectively give an assignment fortnightly and monthly respectively. The low frequency in evaluating acquisition of mathematics concepts suddenly contributes to low performance of students in mathematics. This is so because learners develop interest through continuous practice and achievement in tests and homework. The study established that the frequency of testing was low due to very high enrolment of students. Employment of more mathematics teachers by the government would help arrest the situation and promote better performance.

4.9 Responses on students' low grade in mathematics.

Table 17: Teachers and students' response on students' low grade in mathematics

Reason of poor performance	Percent % students	Percent % Teachers
Understaffing mathematics teachers	46.3	81.8
Lack of interest to learn mathematics	29.7	79.0
Inadequate resources-textbooks	63.4	30.4
Negative attitude that Mathematics is difficult	32.9	78.3
Truancy and absenteeism	21.5	76.2
Poor teaching methods by teachers	78.2	23.7
Not completing the syllabus on time	59.4	38.0
Lack of support from administration	48.3	14.3
Lack of adequate time for revision	70.8	52.3

Number of teachers and principals responded 27, students 84.

Teachers listed understaffing (81.8%), lack of interest (79%), negative attitude that mathematics is a difficult subject (78.3%) and truancy and absenteeism (76.2%) as the greatest contributor to poor performance in mathematics. While students stated that poor teaching methods (78.2%) and lack of adequate time for revision (70.8%) as they prepare to take the Kenya Certificate of Secondary Education (KCSE) Examinations. Teachers responded that lack of resources (30.4%) and lack of support from administration (14.3%) were not significant contributors to poor performance of learners in mathematics. A few students' (29.7%) showed lack of interest in learning mathematics. This indicated that teachers need to motivate learners while teaching mathematics and inform learners of the importance of mathematics in life.

4.10: Ways to Improve Students' low grades in KCSE Mathematics.

Table 18: Suggested ways to promote better students grades in KCSE Mathematics

Way of improving performance	Percentage %
Government to employ more mathematics teachers.	68.5
Guidance and counseling students on importance of mathematics in life and positive attitude towards mathematics.	72.8
Teachers should use student-centered approach like group discussions, guided discovery, symposia, deductive approaches.	65.2
Teachers to use KCSE reports to correct common mistakes students make when answering questions.	29.4
Teachers to organize more guided revision sessions with candidates.	63.3
School administrators to provide more resources for mathematics.	37.6

n = 111

The researcher found out that due to the increased enrolment of students in our secondary schools, the government should employ more teachers (68.5%) to meet the 1:40 teacher to student ration recommended by the Ministry of Education Science and Technology (MoEST) for better performance. It was also noted that students should be counselled on the importance of mathematics in life and developing a positive attitude towards the subject (72.8%). On teaching approaches 65.2% of the respondents suggested use of learner-centred approaches such as use of small group discussions, going out to mathematics symposia and other deductive approaches. These methods not only promote high retention rate of learnt concepts and skills. The other ways of improving student's performance in mathematics include use of guided revision (63.3%), use KCSE reports to correct student's mistakes

when answering questions (29.4%) and school administrators to provide adequate resources like different textbooks, calculators, charts, models and other improvised learning resources.

4.11: Summary of the Chapter

This chapter sought to analyze and discuss the research findings on the four teacher quality attributes the influence student's performance in Mathematics Busia sub-county public secondary schools Kenya Certificate of Secondary Education (KCSE) Examination. A summary of the findings outlined in the next chapter together with the conclusions and recommendations for improvement of students' grade in KCSE mathematics examination in Busia sub county.

CHAPTER FIVE

5.0 SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

Chapter five gives a summary of findings to the study in relation to the objectives outlined in the first chapter. It highlights the conclusion, gives recommendations from the findings of and suggestions for further research.

5.2 Summary of the Study

This study was aimed at determining impact of teacher quality on performance of students in public secondary school KCSE mathematics examinations in Busia Sub-county of Busia county in Kenya. The study investigated four factors: establish the extent to which teacher's professional training, TSC certification and experience, teacher lesson planning and preparation, teacher's use of teaching methodologies, and lastly effective use of assessment and evaluation tools in mathematics to promote students' good performance in mathematics at KCSE. The variables were analyzed against the analyzed KCSE Mathematics results of 2016 to 2018.

120 questionnaires were prepared for the study, 6 principals, 24 mathematics teachers and 90 students in six public secondary schools. The response return rate was 92.5% with all the 6 principals, 21 mathematics teachers and 84 students.

Collected data was analyzed using descriptive statistics such as frequency tables and percentages.

The findings with respect to each research objective was as follows:

- i. There was no meaningful relationship between teachers' professional qualifications and training with students' KCSE mathematics grade results. However, a positive relationship exists between teachers experience and students' performance.

- ii. There was a positive correlation between the planning and preparation of a lesson with learners achievement in KCSE mathematics.
- iii. There was a positive effect on learning approaches used by the teacher with students' grade in KCSE mathematics.
- iv. A positive relationship exists between continuous evaluation of arithmetic concepts and students' performance in KCSE mathematics.

5.3 Summary of the Findings

The study sought to establish whether there exists significant relationship between the research questions and the research findings. The first question sought to find out how teacher qualifications and experience influence students' performance in KCSE mathematics Examinations in public secondary schools in Busia Sub-county of Busia County? The study established that teacher qualifications did not have significant effect on the performance of students. The study agrees with Muhammad, Rashida, Riffat and Fayyaz (2011), who found out that there wasn't much difference in the quality of teachers in schools with higher academic achievement and that with lower academic achievement. The study nevertheless, found out that teacher's experience promotes better student's performance than less experienced teachers.

The second question sought to determine the impact of mathematics teacher's lesson planning and to learner's performance in KCSE mathematics Examinations in public secondary schools of Busia sub-county. Findings from the study revealed that teachers who had schemes of work, lesson notes-worked examples, kept progress records and records of work covered were more organized and effective in their content delivery. This had a significant effect on students' attitude towards the subject which promotes good performance.

The third question looked at how the teachers teaching methodology influences students performance in KCSE Mathematics Examinations in public secondary schools in Busia sub county. Findings of the study established that learner-centred approaches like guided discovery, small group discussions and symposia were more effective in promoting learning and good performance in mathematics as opposed to the commonly used teacher-centred approaches like lecture and problem solving.

The fourth and last question sought to find out to what extend assessment and evaluation of mathematics activities by the teacher influences students' performance in KCSE mathematics Examinations in public secondary schools of Busia sub County of Busia County. Findings of the study established that frequent testing, marking and correction of students' work and examinations promoted better performance than less frequent evaluation of acquisition of learnt mathematics knowledge, skills and concepts. The poor performance can be attributed to 23% teachers giving homework daily, 49% once or twice a week and some teachers giving take away assignments fortnightly (15%) and monthly (13%).

5.4 Conclusion of the Study

From the findings of the study, the researcher made the following conclusions.

- i. Mathematics teachers in Busia Sub-county public secondary schools are of high quality. This is supported by the teachers' academic qualifications, professional qualifications (certification by TSC).
- ii. This high qualifications plus years of experience do not translate to better academic performance in Mathematics by the learners at Busia Sub-county public secondary schools.

- iii. Teachers with long teaching experience, adequately prepared their lessons, used a variety of teaching and learning approaches and frequently marked pupils work posted better performance than their colleagues who were not so organized.
- iv. The level of academic performance in mathematics of Busia sub county public secondary schools was far below average at (D Plain) in KCSE.

5.5 Recommendations of the study

The researcher made the following conclusions as per the findings of the study.

- i. Mathematics teacher should offer academic guidance to students about the importance of better performance in mathematics which influences most future career choices.
- ii. The study also revealed that students who were frequently tested produced better performance. Therefore, use of regular tests, marked, and corrected will keep the learners focused on improving the performance of the subject in class and KCSE.
- iii. The principals to promote adequate provision of relevant teaching and learning resources for students and teachers. Encourage Parents to provide calculators, geometrical sets, and funding for mathematics symposia with other students from other schools outside Busia county. Teachers should improvise relevant resources for use in teaching.
- iv. The Government through the Teachers Service Commission to recruit more mathematics teachers for deployment to schools with a shortage of qualified staff.
- v. Mathematics teachers should develop effective plans aimed at promoting better performance of mathematics among students.
- vi. School administrators to encourage and sponsor mathematics teachers from time to time to attend to seminars and workshops on better ways of teaching mathematics towards better grades at KCSE.

- vii. The results of the study showed that most teachers used the teacher-centred approaches when teaching the subject. The researcher recommends use of learner-centred approaches which actively involves the learners in the learning process, makes learning enjoyable and promotes high retention rate of learnt concepts.

5.6 Suggestions for further Research

With due considerations to the limitations and delimitations of this study, the results were restricted to the specific variables under study. Therefore, researcher recommends future considerations for study as follows:

- i. Enough resources be availed by the county and national government to carry out the same study in the whole Busia county considering both public and private secondary schools to determine the extent of problem and how it can be addressed.
- ii. The same research can be conducted but looking into other factors affecting students' performance in the Kenya certificate of secondary Education (KCSE) Examination Busia sub county.

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APPENDICES

Appendix 1: Letter of Introduction

Harun Molenje
P.O Box 155-50400
Busia (k)

The Principal,
.....Secondary School

Busia Sub-county

Dear sir/Madam,

**RE: TEACHER QUALITY FACTORS INFLUENCING STUDENTS
PERFORMANCE IN MATHEMATICS IN KCSE IN PUBLIC SECONDARY
SCHOOLS IN BUSIA SUB COUNTY, BUSIA-KENYA**

Being a postgraduate student at the University of Nairobi, and currently undertaking a research on teacher quality factors influencing students' performance in mathematics in KCSE in public secondary school in Busia Sub-County , your school has been sampled to assist in gathering relevant data for this study.

For ethical considerations, I hereby assure you that the information given will strictly be confidential and only meant for this research purpose. No reference will be made to individuals or schools. No name shall be required from any respondent or school.

Yours faithfully,

Harun Molenje

Appendix 2: Mathematics Students Questionnaire (MSQ)

Instructions to Respondents

This questionnaire is designed to help the researcher in finding out ‘teacher quality factors influencing performance of mathematics in Kenya Certificate of Secondary Education (KCSE) in public secondary schools in Busia Sub-county of Busia County. You have been identified as a respondent. The information you provide will be used for research purpose only and will be treated with utmost confidentiality. Please do not write your name or that of your school. Kindly, you are requested to respond to the items in this questionnaire as correctly and honestly as possible by ticking or filling in appropriately.

Section A. Demographic information

Please tick whichever is appropriate to you in the boxes provided.

1. What is your gender? Male () Female ()
2. What is your age ? 16-18 years () 19-21 year () 22-24 years () Any other ()

Section B. Factors influencing performance in Mathematics.

Mathematics Teacher professionalism (teachers experience and competence.)

Please tick whichever you think is appropriate in the boxes provided.

SA= Strongly agree, A= Agree, UD= Undecided , DA= Disagree, SD= Strongly disagree

No.	Statement	SA	S	UD	DA	SD
i.	My teacher understands mathematics concepts very well					
ii.	My math teacher has long experience teaching mathematics					
iii.	My teacher makes learning math interesting & enjoyable					
iv.	My teacher applies math concepts to real life experiences					
v.	My teacher encourages me to do well in mathematics					
vi.	My teacher shares the importance of math in life					

3. Teacher preparation and planning for Mathematics lesson.

Please tick whichever you think is appropriate in the boxes provided

NO	STATEMENT	Always	Sometimes	Never
i.	My teacher prepares relevant examples for use			
ii.	Teacher organizes his lessons systematically			
iii.	Links new topics to previous related topics			
iv.	Improvises and use teaching aids in learning math			
v.	Follows and completes the mathematics syllabus			

4. Students views on teaching methods used in teaching mathematics.

Please tick whichever you think is appropriate in the boxes provided

SA= Strongly agree, A= Agree, UD= Undecided , DA= Disagree, SD= Strongly disagree

NO	Statement	SA	A	UD	DA	SD
i.	I understand better when teacher solves/explains worked examples on the chalkboard.					
ii.	I always ask and answer questions when I don't understand what the teacher has taught.					
iii.	I enjoy solving practice questions in class with peers					
iv.	I understand better when teachers uses charts and models					
v.	I enjoy learning math in small group discussion					
vi.	I understand math concepts better when I discover new methods of solving them					
vii.	Revision of past math papers and tests makes math easier					

5. Assessment and evaluation of learning in mathematics.

Please tick whichever you think is appropriate in the boxes provided

No	Statement	Always	Sometimes	Never
i.	I enjoy solving math revision questions in class			
ii.	Teacher gives homework after every lesson			
iii.	Teacher gives test items after every topic to solve in groups			
iv.	Teacher marks all exercises before proceeding to next lesson			
v.	Teacher makes corrections before next lesson			

6 a). State three factors that affect learning and your performance in mathematics?

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.....

b) Give **three** ways that can be used to improve the performance of mathematics in your school?

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Appendix 3: Mathematics Teachers Questionnaire (MTQ)

Instructions to Respondents

This questionnaire is designed to assist the researcher to find out, the teacher quality factors influencing performance of mathematics in the Kenya Certificate of Secondary Education (KCSE) in public secondary schools in Busia Sub-county of Busia county. You have been identified as a respondent. The information you provide will be used for research purpose only and will be treated with utmost confidentiality. Please, do not insert your name, or your school. Kindly you are requested to respond to the items in this questionnaire as correctly and honestly as possible by ticking or filling in.

Please tick whichever you think is appropriate in the boxes provided

Section A. Background Information

- 1) What is your gender? Male () Female ()
- 2) What is your age? Below 25 years () 26-30 years () 31-35 years ()
36-40 years () 41-45 years () 46-50 years () 51 years and above ()
- 3) Indicate your professional qualifications: Diploma Ed. () PGDE ()
B. Ed () B.Sc. Ed () M. Ed () Any other _____
- 4) How long have you taught Mathematics in secondary school? Less than 5 years ()
6-10 years () 11-15 years () 16-20 years () above 20 years ()
- 5) How long you have taught Mathematics in your present school? Less than 5 years ()
6-10 years () 11-15 years () 16-20 years () above 20 years ()

Section B: Teacher factors Influencing Performance of Mathematics in the Kenya Certificate of Secondary Education (KCSE)

6. a). How would you rate your students' mathematics performance in Kenya Certificate of Secondary Education (KCSE)?

Excellent () Very good () Good () Fairly good () Fair () Poor ()

b) Please explain the reason for your answer

.....

7) Please indicate to what extent you agree with the following statements.

Please tick whichever you think is appropriate in the boxes provided

No.	Statement	Always	Sometimes	Never
i.	I vary the teaching methods when teaching mathematics			
ii.	I apply mathematics concepts to real life when teaching			
iii.	Some topics are harder to students			
iv.	I prepare lesson notes for teaching			
v.	I use teaching adequate resources for every lesson			
vi.	Give revision practice questions after every lesson			
vii.	Mark students assignments before the next lesson			
viii.	Organize math's symposia with other schools			
ix.	Give remedial lessons to poor performing students			
x.	Use group teaching in some topics with others teachers			
xi.	Give a test after every topic to test learners understanding			

8) a) Which of the listed professional documents do you keep? *Tick Yes or No*

No	Professional Document	Yes	No
i.	Schemes of work		
ii.	Lesson plans		
iii.	Lesson notes		
iv.	Records of work covered		
v.	Progress records		
vi.	Register		

b) In your opinion is there a difference in students' performance between teachers who maintain the above records and those who don't? Yes () No ()

c) Explain your answer in (b) above.....

9) How often do you use the following teaching resources to teach mathematics

No	Teacher/ Learning, Resource	Frequency of use. <i>Tick one for each resource</i>			
		Very often	Often	Rarely	Never
i.	KICD Syllabus				
ii.	Textbook				
iii.	Charts and posters				
iv.	Resource persons				
v.	Past KCSE and other test papers				
vi.	Computer & internet				
vii.	Radio and videos				
viii.	Newspaper and magazines				
ix.	Models				
x.	Calculator				

10) a) To what extent do you use the following methods in teaching mathematics.

No	Teacher/ Learning, Resource	Frequency of use. <i>Tick one for each method.</i>			
		Very often	Often	Rarely	Never
i.	Lecture				
ii.	Demonstration				
iii.	Guided discovery				
iv.	Problem solving				
v.	Question and answer				
vi.	Small group discussion				
vii.	Field work/symposia				

b) List any other methods you use while teaching mathematics?

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11) Key to students' performance is the frequency of quality evaluation. Tick the frequency you give students homework for practice of learnt concepts

No	Frequency of giving home work	Always	Sometimes	Never
i	Daily			
ii	Weekly			
iii	Fortnightly			
iv	Monthly			

C: Suggestions for areas of weaknesses and possible solutions.

12) State any challenges that you face that hinder good performance of your students in KCSE Mathematics?

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13) List **three** factors that contribute to students' poor performance in KCSE Mathematics?

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14) Suggest **three** way of improving mathematics performance in KCSE.

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Appendix 4: Principals Questionnaire (PS)

Instructions to Respondents

This questionnaire is designed to assist the researcher to find out, the teacher quality factors influencing performance of mathematics in the Kenya Certificate of Secondary Education (KCSE) in public secondary schools in Busia Sub-county of Busia county. You have been identified as a respondent. The information you provide will be used for research purpose only and will be treated with utmost confidentiality. Please, do not insert your name, or your school. Kindly you are requested to respond to the items in this questionnaire as correctly and honestly as possible by ticking or filling in.

Please tick whichever you think is appropriate in the boxes provided

Section A. Demographic Information

1. What is your gender? Male () Female ()
2. What is the level of your professional qualification? Diploma () PGDE () B.Ed () B.Sc Ed () M. Ed () Ph.D ()
3. How many years have you been working as a principal? Below 5 years () 5-10 years () 11-15 years () 16-20 years () 21-25 years () above 25 years ()
4. How long have you been in your current school? Below 5 years () 5-10 years () 11-15 years () 16-20 years () 21-25 years () above 25 years ()

Section B: Teacher Quality Factors Influencing Performance of Mathematics in KCSE

5. a) What is the level of professional qualification of your mathematics teacher.
SI () Diploma () PGDE () B.Ed () M. Ed () PhD () Any other ()
b) For each level state how many teachers you have?.....
.....
- 6.(a) How would you rate your students' mathematics performance in the Kenya Certificate of Secondary Education (KCSE) ?
Excellent () Very good () Good () Fairly good () Fair () Poor ()
b) Please explain the reason for your answer.....

7. a) To what extent do mathematics teachers in your school maintain the following updated professional documents

No	Professional Document	Always	sometimes	Never
i.	Schemes of work			
ii.	Lesson plans			
iii.	Lesson Notes			
iv.	Records of work covered			
v.	Progress records			
vi.	Register			

b) In your opinion is there a difference in students' performance between teachers who maintain the above records and those who don't? Yes () No ()

c) Explain your answer in (b) above.....

6. a) Does the school provide the relevant and adequate teaching and learning resources for mathematics? Yes () No ()

b) List some of the mathematics teaching and learning resources the school provides for:

i) Teachers

ii) Students.....

9) a) Does the school support continuous professional development of mathematics teacher in the school? Yes () No ()

b) Do you offer any support to teachers undergoing professional development?

Yes () No ()

c) What kind of support do you offer the teacher undergoing professional development?

10) a) Do you have enough mathematics teachers to student ratio? Yes () No ()

b) If No, how do you motivate your teachers to realize good results?

Section C: Suggestions for areas of weaknesses and possible solutions for Improving Performance of Mathematics KCSE Examinations.

11. a) What challenges do mathematics teacher face in realizing good performance in KCSE?

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b) In what ways is the administration helping the teachers to overcome these challenges and promote good performance of mathematics in the school and KCSE Examination?

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12. Do you think teachers' experience affect students' performance in mathematics?

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.....

13. State three contributing factors to poor performance of students in KCSE mathematics?

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14. Suggest at least **three** ways on improving mathematics performance in KCSE?

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