

**AN ANALYSIS OF FACTORS INFLUENCING STUDENTS' PERFORMANCE IN
KENYA CERTIFICATE OF SECONDARY EDUCATION MATHEMATICS IN
BORABU DISTRICT, NYAMIRA COUNTY, KENYA**

BY

MAINA AREGE PETER

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JUNE, 2014

DECLARATION

I confirm that this thesis is my original work and has not been presented in any other university/institution for consideration of any certification. This thesis has been complemented by referenced works duly acknowledged. Where text, data or tables have been borrowed from other sources - including the internet, these are specifically accredited through referencing in accordance with anti-plagiarism regulations.



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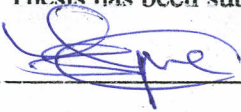
Date

MAINA AREGE PETER

E55/CE/14074/2009

Department of Educational Communication and Technology

This Thesis has been submitted with our approval as University Supervisors



Signature

16/6/14

Date

for
Dr. Miheso M. K. O'Connor

Department of Educational Communication and Technology,

Kenyatta University



Signature

11/6/2014

Date

Dr. Rukangu M. Simon

Department of Educational Communication and Technology,

Kenyatta University

DEDICATION

This work is dedicated to my wife Sheba Bogomba and sons Franklin Maina, Neville Oino and Allan Arege whose emotional encouragement galvanized my desire to study.

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ABBREVIATIONS AND ACRONYMS

FSE	-	Free Secondary Education
IPO	-	Input-Process-Output
K.C.P.E	-	Kenya Certificate of Primary Education
K.C.S.E	-	Kenya Certificate of Secondary Education
KIE	-	Kenya Institute of Education
KNEC	-	Kenya National Examinations Council
M.Ed	-	Master of Education
MoE	-	Ministry of Education
MoHEST	-	Ministry of Higher Education, Science and Technology
MS	-	Mean Score
PGDE	-	Post Graduate Diploma in Education
PPMC	-	Pearson's Product Moment Correlation
RoK	-	Republic of Kenya
SMASSE	-	Strengthening of Mathematics and Sciences in Secondary Education
SPSS	-	Statistical Package for Social Sciences
TIMSS	-	Trends in International Mathematics and Science Study

ABSTRACT

Mathematics is one of the subjects offered in secondary schools in Kenya that is poorly performed. On average, 61.3% of candidates in Borabu District, Nyamira County scored below D (plain) in the K.C.S.E examination from the year 2006 to 2010. The purpose of this study was to analyze the factors influencing K.C.S.E performance in mathematics among secondary school students in Borabu District, Nyamira County, Kenya. The specific objectives of the study were to determine; teacher-related factors, school-related factors, assessment practices and student-related factors that influence students' performance in Mathematics at K.C.S.E level. The study adopted the descriptive survey research design. The target population constituted 23 secondary schools in Borabu District with a total population of 5,200 students, 53 mathematics teachers and 23 principals. Stratified random sampling was used to sample 12 schools while simple random sampling was used to select 240 form three student respondents, 20 from each of the participating schools. In addition, 30 mathematics teachers and 6 principals were purposively selected to participate in the study. Data collection instruments were students' and teachers' questionnaires and an interview schedule for the principals. The collected data was coded and analyzed both qualitatively and quantitatively using the Statistical Package for Social Scientists (SPSS) computer software. Quantitative information was summarized and presented in percentages and frequency distribution tables while the hypotheses were tested using Pearson Product Moment Correlations (PPMC) and tested at alpha 0.05 set *a priori*. The study established that there was a significant, positive relationship between teaching experience ($r = 0.402, n=30, p < .05$); teacher's promotion of personal and professional growth ($r = 0.516, n=30, p < .01$); school-related factors ($r = 0.743, n=30, p < .01$); assessment practices ($r = 0.46, n=240, p < .01$) and student-related factors ($r = 0.423, n=240, p < .01$) and performance in Mathematics at K.C.S.E level. The study concluded that teacher's promotion of personal and professional growth, teaching experience, teaching approaches, the school's human resources, teaching/learning facilities and class size significantly influenced students' performance in mathematics at K.C.S.E level. Student's assessment approaches in mathematics significantly influenced their ultimate performance in the subject. The study recommended that teachers should be provided with opportunities to attend workshops/seminars to equip them with modern mathematics teaching skills.

CHAPTER ONE

INTRODUCTION AND BACKGROUND OF THE STUDY

1.0 Introduction

This chapter is an introduction to the study and provides the background to the study, statement of the problem, purpose of the study, objectives and hypotheses of the study, significance, scope, limitations and assumptions of the study. The chapter also presents the theoretical underpinnings of the study as well as the conceptual framework showing the relationship between the independent and dependent variables of the study.

1.1 Background of the Study

Mathematics acts as a “power generator” to social progress. A qualification of mathematics at K.C.S.E level is considered as vital for many jobs as well as in the entry to University and College courses even if the course to be studied bears little connection to mathematics. Sidhu (1982) emphasizes that one cannot do without the use of fundamental process of the subject in daily life. According to Napoleon as quoted by Sidhu (1982), “The progress and improvement of mathematics are linked to the prosperity of the state”. Cockcroft (1982) notes that “It would be very difficult perhaps impossible to have a normal life in very many parts of the world in the twentieth century without making use of mathematics of some kind”. Any person ignorant of mathematics will be at the mercy of others and will be easily cheated. All professionals and non-professionals require the subject for the accomplishment of their work.

According to Mutunga and Breakell (1992), mathematics is a very important subject to the continued growth of any nation or society. It is used in science subjects and is increasingly being

used in most social science subjects and arts. Arithmetic skills which have been learnt can be applied effectively and easily in the home, at work, and in leisure pursuits. Sidhu (1982) supports them by noting that, if taught in the right sense, it develops reasoning and thinking powers more and less from memory and the student comes to realize that thinking makes him a successful student of all the subjects. Orton and Frobisher (1996) observe that more mathematics lessons are taught in schools and colleges throughout the world than any other subject. In Kenya, second to English combined with Literature with the highest number of lessons, mathematics has six lessons in form one and two and seven in form three and four per week.

Due to the subject's core role in the country's development, the Ministry of Education in Kenya has made it a compulsory subject in the secondary school curriculum and set out twelve general objectives which the learner is expected to achieve by end of the four year programme. The objectives serve as an indicator that the country wants to produce future generations who are able to apply their mathematical knowledge and skills in a new technological context and every market place for its attainment of vision 2030. In that respect, the pressures on teachers of mathematics to make students perform well has increased from all quarters.

In spite of all these significance and emphasis, it is not new for the concern to be expressed about falling standards in mathematics. Such anxiety has a long history. Indeed it was against the background of unsubstantiated accusations of unsatisfactory mathematics teaching in schools and suspicious falling standards in Britain that the Cockcroft Committee was set up (Orton and Frobisher, 1996). According to Stringer as cited by Cockcroft (1982), there are many adults in Britain who have the greatest difficulty with even such apparently simple matters as adding up money, checking their change in shops or working out the cost of five gallons of petrol. Yet these adults are not just the unintelligent or the uneducated. They come from many walks of life

and some are very highly educated indeed. Cockcroft (1982) also quotes the speech made in 1976 by the then Britain Prime Minister Collaghan, “I am concerned on my journeys to find complaints from industries that new recruits from the schools sometimes do not have the basics to do the job that is required. There is concern about the standards of numeracy of school learners”. This depicts the sorry state in mathematics understanding and to that extent performance.

According to Orton (1987), some of the factors affecting mathematics performance include but not is limited to language of instruction, preferences and attitudes, gender and related differences, assessment practice and methods of instruction. Thwaites (1961) attributes this to poor attitude of mind towards teaching and learning of mathematics. Conversely, there is evidence that many of the serious problems facing secondary school mathematics instruction today should not be attributed to deficiencies in the curriculum, teaching or assessment but emerge from language variables rather than the inherent difficulties of the subject (KNEC, 2000). Performance of mathematics among secondary school students in Kenya has also been less than impressive as indicated in Table 1.1.

Table 1.1: National Mathematics Mean marks at KCSE for the Years 2006-2009

YEAR	2006	2007	2008	2009
MS	19.04	19.73	21.21	21.13

Source: KNEC (2009)

Table 1.2 shows the students’ performance in KCSE mathematics in Borabu district from 2006 to 2010.

Table 1.2: Borabu District Mathematics Grades at K.C.S.E from 2006 to 2010

Year	GRADES						Total entry
	A	A-	B+	D	D-	E	
2006	1.3%	1.7%	2.1%	11.4%	16.2%	36.1%	842
2007	1.8%	1.5%	3.2%	10.7%	19.0%	36.8%	998
2008	0.8%	1.9%	3.2%	13.1%	15.8%	28.9%	1218
2009	1.9%	1.4%	2.4%	11.4%	17.7%	27.6%	1049
2010	3.1%	1.6%	3.0%	14.9%	20%	27.3%	1149
AVERAGE	1.8%	1.6%	2.8%	12.3%	17.7%	31.3%	1050

Source: Borabu DEO'S Office

The percentages in Table 1.2 above indicate that although the percentage of students obtaining a mean grade of E consistently dropped from 2006 to 2010, performance still remains less satisfactory given that the percentage increase in those obtaining higher mean between grades A and B+ remained relatively lower if not fluctuating. When compared to other subject areas, the results shown in Table 1.3 below are revealed.

Table 1.3: Borabu District Subjects Mean Scores at K.C.S.E for the years 2006 to 2010

Year	SUBJECT						
	English	Kiswahili	Maths	Biology	Physics	Chemistry	Mean score
2006	3.94	4.35	2.39	3.87	3.46	2.93	4.28
2007	4.83	5.31	3.14	4.30	4.48	3.71	4.57
2008	4.44	4.00	2.63	4.54	4.50	3.04	4.34
2009	4.95	4.81	2.94	4.21	3.68	3.01	5.12
2010	4.10	4.47	2.38	3.89	3.49	3.00	4.66

Source: Borabu DEO'S Office

From table 1.0, 1.1 and 1.2, it can be observed that generally there is dismal performance in mathematics. Reasons for such poor performance still remain elusive. As such, the trend is worrying and has far reaching implications since mathematics knowledge and understanding is critical not only for scientific progress and development but also for its day to day application in government, business, Management studies and household chores (Mutunga and Breakell, 1992). Therefore, there was an urgent need for conducting research to investigate the factors which affected the students' performance in Mathematics in public Secondary schools in Borabu district, Nyamira County, Kenya.

1.2 Statement of the Problem

The importance of mathematics is emphasized when the future employment of a child is being considered. It is used as a 'spring' more often than any other subject, in that an examination pass at an appropriate level is demanded before an entry into a particular profession or occupation. Despite this significance, world over there is concern over poor performance in the subject. Concerted efforts have been put in place in many countries to improve the performance in mathematics. In Britain for example, poor performance in the subject led to the commissioning of the Cockcroft committee to look into the root causes and suggest the way forward. In Kenya, mathematics syllabus has been modified and re-organized since the advent of the 8.4.4 system of education. Teachers have been trained and re-trained whereby the latest SMASSE programme piloted in 1999 and rolled out in 2004 was thought to be a panacea to the problem. District, Provincial and National Mathematics Contest have been held yearly. Schools have also come up with 'maths hour', an extra time meant for studying only mathematics. But still, there is generally poor performance in mathematics among Secondary school students. Nationally, candidates have frequently scored a mean mark of less than 22% at K.C.S.E since the year 2006.

In Borabu District, Nyamira County, an average of 6.2% and 62.3% of registered candidates, scored high and low grades respectively at K.C.S.E level from the year 2006 to 2010. Also of all the compulsory and science subjects, mathematics has always been ranked last since the year 2006 with very low mean marks. If at any time it can be proved that standards are wanting, then certainly there is a problem to be addressed. Research has been done in other areas like Nairobi province and factors that significantly affect performance at K.C.S.E have been addressed. However it has not been proved that the same factors apply for Borabu District and there is no documented evidence which shows that factors affecting performance in mathematics among secondary school students in Borabu District have been addressed. It is on this basis that the study sought to examine the influence of the teacher-related factors, school-related factors, assessment-practices and student-related factors on the students' performance in mathematics in Borabu District.

1.3 Purpose of the Study

The purpose of the study was to analyze the factors that influence students' performance in the Kenya Certificate of Secondary Education mathematics examinations in Borabu District and suggest possible solution.

1.4 Objectives of the Study

The study sought to establish:

1. The influence of Teacher-related factors on students' performance in mathematics at K.C.S.E level.
2. The extent to which School- related factors influence students' performance in mathematics at K.C.S.E level.
3. The role of assessment practices on students' performance in mathematics at K.C.S.E level.

4. The influence of Student-related factors on students' performance in mathematics at K.C.S.E level.

1.5 Hypotheses of the Study

The following null hypotheses were tested at 0.05 alpha levels:-:

H0₁: There is no statistically significant influence of Teacher-related factors on students' performance in mathematics at K.C.S.E level.

H0₂: There is no statistically significant influence of School- related factors on students' performance in mathematics at K.C.S.E level.

H0₃: There is no statistically significant influence of assessment practices on students' performance in mathematics at K.C.S.E level.

H0₄: There is no statistically significant influence of Student-related factors on students' performance in mathematics at K.C.S.E level.

1.6 Significance of the Study

The findings of the study may help mathematics teachers in identifying the strengths and constraints in implementation of the mathematics curricular given that they are the direct implementers of the curriculum. For the curriculum developers, these findings will enlighten them on the achievement of objectives of teaching mathematics thus inform them in the development of appropriate mathematics curricular. The school administrators may use the findings to identify their weaknesses and strengths in the implementation of mathematics curriculum and improve accordingly while for students, the findings will be an eye opener on their core roles they ought to play in attaining good grades.

1.7 Limitations of the Study

Heavy rains posed a considerable challenge in accessing some schools due to sticky, muddy roads in the study locale. However, this was overcome by use of motor bicycles which were quite efficient in the muddy terrains. The study was only limited to secondary schools in Borabu and therefore the findings may not necessarily reflect the situation in schools in other Districts.

1.8 Delimitation of the Study

The study focused on student-related; teacher-related; school-related factors and assessment practices and their influence on students' performance in mathematics at the K.C.S.E level. The study was confined to secondary schools in Borabu District of Nyamira County and interviewed school principals, teachers and students in sample schools only.

1.9 Assumptions of the Study

The study was carried out on the assumption that all schools in the district experienced similar problems that led to poor performance, and that the final performance of the participating students would be similar to that of the previous years. It was also assumed that the responses received from the participants were true reflection of what was on the ground at the time of the study.

1.10 Theoretical Framework of the Study

The literature on models of educational indicators and their performance as a system together with research studies that model student learning achievement as a function of the characteristics of their schools and their family background is extensive (Glasman, & Biniaminov, 1981; Oakes, 1986; Kaplan & Elliott, 1997; Kaplan & Kreisman, 2000; Koller, Baumert, Clausen, &

Hosenfeld, 1999). However, no single model of educational performance has gained widespread acceptance (Oakes, 1986; Nelson, 2002). In Haertel, Walberg, and Weinstein's (1983) view, the models have more commonalities than differences. Haertel *et al.* conducted a meta-analysis of studies that modeled school performance data and found that the presented models had a common structure. Though the models differed in their specifications, their structures were comprised of three categories of pre-existing conditions (cognitive/affective attributes and resources), instructional processes (opportunity to learn, quality of instruction), and outcome measures (achievement, affective behaviors). These models presented student performance as a function of student, teacher, and/or school background variables.

The theoretical model that was of interest to this study was that which modeled students' performance as a function of their background variables. Thus, the model that informed variable selection for the study was the Input-Process-Output (IPO) model by Oakes (1986), or Rand Model (Shavelson, McDonnell, & Oakes, 1989). The IPO model has similar structural components as the models that were reviewed by Haertel *et al.* (1983) and models student achievement as a function of some resources. The model presents a holistic conception of student learning in a classroom setting and it appears frequently in literature that analyzes large scale data (e.g. Kaplan and Kreisman, 2000; Koller, Baumert, Clausen, & Hosenfeld, 1999 analyzing Trends in International Mathematics and Science Study (TIMSS) data). Additionally, it has been used extensively to guide education researchers in the selection, specification, and analysis of educational variables that correlate with student learning outcomes (Glasman, & Biniaminov, 1981; Kaplan & Elliott, 1997; Kaplan & Kreisman, 2000; Koller, Baumert, Clausen, & Hosenfeld, 1999). It is taken as one of the influential models in shaping public opinion and policy on how to foster school improvement.

The Input-Process-Output model (Oakes, 1986) is comprised of three components of an educational system as shown in Figure 1.1.

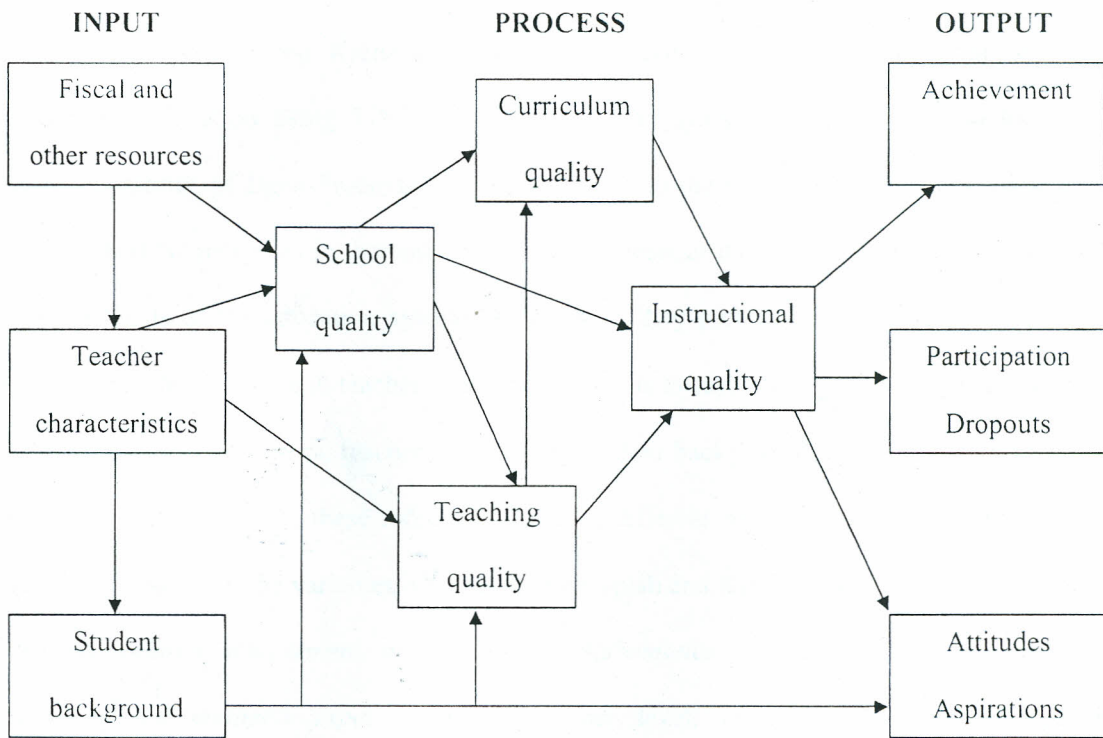


Figure 1.1: A comprehensive Model of an Education System (Oakes, 1986)

According to Shavelson, McDonnell, and Oakes, (1989) the model's inputs are the human and financial resources available to education: This includes teacher quality (e.g. certification and experience), student background (e.g. parents' education and home possessions), and school quality (e.g. school climate). Its processes are what is taught and how it is taught: This includes classroom characteristics such as curriculum quality (e.g. pace and coverage of materials), teaching quality (e.g. integration between teacher, pupil, and materials), and instructional quality (e.g. instructional tasks, teaching methods, and classroom climate) and its outputs are the consequences of schooling for students from different backgrounds such as academic

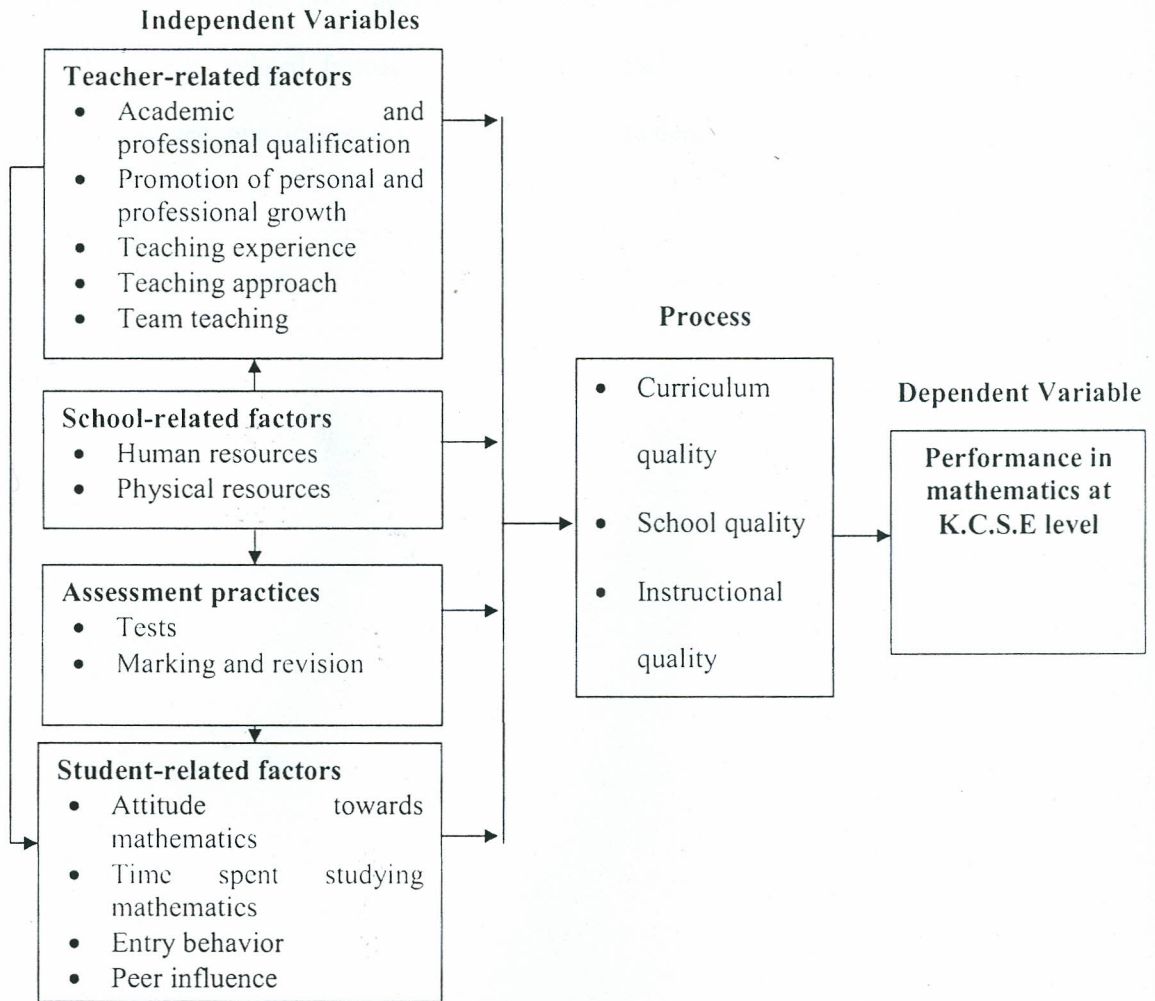
achievement, participation (what percentage graduate versus drop out), and attitudes (e.g. any desires to continue studying math or career goals that are math related).

In one study, Kaplan and Kreisman (2000) used Oakes' model to validate indicators of mathematics education using TIMSS data. Rather than group their variables into the three distinct categories of Input-Process-Output as outlined in the model structure, they contended that since Oakes' model was inherently multilevel, a subset of the inputs and processes occurred at higher levels of the education system. As a result, they grouped their indicators into three organizational levels: student, teacher, and school. That is to say, although Oakes' model (Figure 1.1) groups school resources, teacher quality, and student background as one category of input (or prerequisite) variables, these indicators occur at different hierarchical levels of the school organization. Some of the variables included in the Kaplan and Kreisman model were: At student level: *mathematics achievement, attitude toward mathematics, utility of mathematics, parents' education, and mother's expectations*; At teacher level: *method of instruction, teacher collaboration with colleagues, teacher's level of education, and teaching experience* and at school level: *opportunities for continuing professional development, good facilities, school climate, level of discipline, and outstanding teacher recognition*.

Notably, Kaplan and Kreisman's (2000) variables were representative of the three components of the IPO model even though the variables were grouped differently. Some of the variables they used were composite indicators. These were variables such as attitudes and methods of instruction. In summary, Oakes' model (1986) is more of a conceptual framework than a prescriptive one. That is, it does not prescribe what variables one should include in a statistical model for testing educational performance, but offers guidance about the components from which to draw the variables.

1.11 Conceptual Framework of the Study

The conceptual framework of the study was as shown in Figure 1.2 below.



Source: Adapted from Joe et al (1973)

Figure 1.2: Conceptual Framework of the Study

In the context of the conceptual framework in Figure 1.2, performance in mathematics at the K.C.S.E level is a complex process involving many variables. These include teacher-related factors, school-related factors, assessment practices and student-related factors among others.

The independent variables are teacher-related factors; school-related factors; assessment practices and student-related factors which may affect students' performance in mathematics at K.C.S.E level. The model also suggests that teacher-related factors affect student-related factors. The school-related factors influence the teacher-related factors and assessment practices. Assessment practices on the other hand, affect student-related factors

1.12 Operational Definitions of Terms

The following terms and phrases took the stated meanings in the context of this study:

Achievement: Is a summary of performance in a well defined task succeeded and demonstrated over a period of time.

Assessment: Measuring levels of acquisition of skills, knowledge and understanding.

Attainment: Refers to successful performance in a well defined task.

Average performing schools: Are those schools which attain a mean mark of 3.5 to 5.9 in mathematics at K.C.S.E level.

Good performing schools: Are those schools which attain a mean mark of 6.0 and above in mathematics at K.C.S.E level.

High grades: Are B+ to A grades scored by students in mathematics at K.C.S.E level.

Low grades: Are E to D grades scored by students in mathematics at K.C.S.E level.

Performance: Grades scored in examination in a mathematics test. They are A to E on a scale of twelve for the A grade and one for E grade.

Poor Performance: Performance recorded at K.C.S.E level of mean mark less than 3.5 in a scale of 12.

Poor performing schools: Are those schools which attain a mean mark of less than 3.5 mathematics at K.C.S.E level.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 Introduction

In this chapter, the literature related to the study is discussed based on the objectives of the study. The literature review is thematically organized into teacher-related factors, school-related factors assessment practices and student-related factors. The teacher-related factors include; professional and academic qualifications, promotion of personal and professional growth, teaching experience, teaching approach and working with other teachers. School-related factors include; human resources and physical resources. Assessment practices reviewed include assessment tests and marking. The student -related factors include; attitudes, time spent in studying, entry behavior and peer influence. Finally at the end of the chapter, a summary is given.

2.2 Teacher - Related Factors

2.2.1 Academic and Professional Qualifications and Performance in Mathematics

The academic mastery of a subject to be taught is of uttermost importance if the students are to achieve high academic standards. This is attributed to the fact that, deep conceptual understanding leads to increased procedural fluency and confidence (Bessoondyal, 2005). Monk (1994) states that undergraduate coursework in mathematics is positively related to students improvement in mathematics. All other things being equal, highly qualified teachers produce greater student achievement than comparatively less qualified teachers (Alexander and Fuller, 2005). In support of this school of thought, Goldhaber and Brewer (2000) found out that students with teachers who had degrees in mathematics had greater achievement than students with non-mathematics degrees teachers. In addition, Erenberg and Brewer (1994) found out that,

the percentage of teachers with at least a master's degree was associated with a greater achievement in passing mathematics. At all times the level of teachers' training must be distinctly higher than the level at which he/she is to teach (Servais and Varga, 1971). This is important according to Bell (1978) because, the teacher who has both the breadth and depth of his or her understanding of mathematics will be better prepared to teach mathematics in a manner which is accurate, interesting and helpful to every student.

Servais and Varga, (1971) noted that if desired quality of mathematics teaching is to be maintained, if not improved, the vital problem is to train teachers not only in the content of mathematics but also teaching methods Alexander and Fuller (2005) added that, subject matter is necessary but not sufficient in developing effective teachers since in addition to the subject matter, the teachers need to know how to transfer the mathematical knowledge to the students. Therefore, in addition to the subject matter, the qualifications in pedagogical knowledge in developing effective teachers are also important. Orton and Wain (1994) observe that conscious efforts involving professional skills and training are made to ensure that as much of what is taught is learned. The teacher training is an important ingredient that contributes to good performance of students (Eshiwani and Achola, 1988). In Kenya, pedagogy is learnt while the teachers are being trained in professional qualifications such as diploma in education, bachelor of education and postgraduate training in education.

However, while the subject content and the pedagogical issues are important in explaining student achievement, the researcher did not come across any literature that shows the relationship between the mathematics teachers' qualification and the students' performance in K.C.S.E mathematics examination in Borabu District in particular. Therefore, the study sought to

establish the relationship between mathematics teachers' qualification and students' performance in mathematics in K.C.S.E in Borabu District.

2.2.2 Promotion of Personal and Professional Growth and Performance in Mathematics

Even the person who graduates from a teacher education programme as an outstanding teacher will soon become mediocre or worse as a teacher if he/she merely applies what was previously learned (Bell, 1978). Thwaites (1961) argues that, a teacher cannot afford to remain static for more than a short time when the world is in the state of dynamic flux witnessed by changes in technology, mathematics, school and society. In this setting, the teacher makes a lifelong commitment to a professional development. Servais and Varga (1971) support this school of thought by saying that, in our rapidly evolving world, the further training of serving teachers is a necessity. Those in positions of leadership within the education system must understand that further training should be a regular part of the teacher's professional life, but should not be additional to their already very heavy school duties.

Teaching is a difficult and demanding profession and therefore requires continuing programme of self improvement if it is to be practiced effectively (Bell, 1978). The teacher can improve his/her methods of teaching by learning more about various teaching strategies through joining in-service training, furthering his studies, attending workshops and seminars and also learning from others. Howson, Keitel and Kilpatrick (1982) show that, other than pre-service training which is important, there must also be provision for in-service training for the constant updating of professional knowledge. Orton and Wain (1994) further show that in-service training accordingly informs teachers of the new materials contained within the syllabuses. This study sought to bridge the missing link of the relationship between teachers' promotion of personal and

professional growth and students' performance of mathematics among secondary school students particularly in Borabu district.

2.2.3 Teaching Experience and Performance in Mathematics

Teacher experience is thought to affect students achievement with more experienced teachers associated with higher students' achievement (Alexander and Fuller, 2005). Ferguson (1991) argues that teaching experience is positively associated with students' achievement in examinations. However, it has been realized that the experienced teachers who do not adopt student centered pedagogy might do more harm to students' performance than influencing them positively. Costello (1991) supports him by arguing that, for both the inexperienced and experienced teachers alike, the potential for growth lies in the ability to conceptualize alternatives. The study sought to establish the levels of experience among the teachers in Borabu district and how it affected performance in K.C.S.E mathematics examination.

2.2.4 Teaching Approach and Mathematics Performance

Students' values including attitudes are greatly influenced by the teachers (Reys Marilyn and Lindquist, 1992). Teachers who enjoy teaching mathematics and share their interest with enthusiasm for the subject tend to produce students who like mathematics (Busbridge and Womack, 1991). It is therefore important that the teacher establishes what is important and valued within each mathematics classroom so that he may greatly influence what is learned, how it is learned and students attitude towards mathematics. A mathematics teacher should make clear to the students the career prospects of a trained mathematician (Thwaites, 1961). According to Bell (1978), a good teacher should motivate his or her students' learning through both its inherent aesthetic appeal and its many applications in the society. Ngirachu (Daily Nation

23/4/2010) supports the idea by noting that there is need to relate mathematical concepts to real life situations and reduce abstract nature of mathematics depicted in the classroom in favour of its application in other fields of study and in its contribution to the improvement of the physical world. When students are exposed to these, they feel motivated and challenged to work towards achieving high grades in mathematics.

Equally important for the performance of students in class, is a teacher's attitude towards his or her students. Ng'ang'a (Daily Nation 26/04/2010) observes that the difficulty questions in Highway Mathematics were made worse by the attitude of their teacher who appeared to have faith and confidence in one pupil. Busbridge and Womack (1991) also argue that when pupils seem to be experiencing difficulty with a topic, give plenty of praise and encouragement for the correct work. Students need to be seen. This means that a teacher must talk to the students. Cosin, et.al (1977) quotes a teacher who said this about students from poor background; "They don't have the right kind of study habits ...of course it is not their fault. They are not brought up right... Those children do not learn very quickly. A great many of them do not seem to be real interested in getting an education... They simply do not respond". Such kind of negative attitude specially when verbalized in class with an abusive tone tends to highly discourage the learners from participating in class hence low achievement in mathematics. There is no any literature showing the relationship of teaching approach with performance in mathematics particularly in Borabu District. The study therefore investigated the relationship between teaching approach and performance in mathematics.

2.2.5 Team Teaching and Performance in Mathematics

According to Bell (1978), Primary school teachers may not know what secondary school students are expected to study and what the prerequisites are for secondary school mathematics courses. Secondary school mathematics teachers may only have a vague idea about what mathematics is taught in primary school and how it is taught. Therefore, secondary school mathematics teachers should organize through their school administrators to schedule in-service programmes where teachers from both sides of the divide can come together to discuss the common concerns. This will make the teachers to help bridge the gaps between primary and secondary school mathematics. Thwaites (1961) also observes that it is important for mathematics teachers to work with teachers from other departments. This will enable them acquire enriching examples which they can use in teaching mathematics. Teachers of the same department need to work together in the spirit of team teaching for the benefit of the learner. There is lack of literature review showing whether mathematics teachers in Borabu District work with other teachers. Also lacking is the evidence of the relationship between mathematics teachers working with others and the performance of mathematics in K.C.S.E in Borabu District. This is the gap the study intended to bridge.

2.3 School -Related Factors

2.3.1 Human Resources and Students' Performance in Mathematics

According to Servais and Varga (1971), there is a shortage of qualified mathematics teachers in every country. This means that countries use unqualified staff in order to cope with the massive intake of students (Servais and Varga, 1971). Sometimes, primary school teachers move up to teach at secondary school without gaining more knowledge in mathematics. In a region where

substantial proportion of mathematics teachers have never been given adequate basic training, the situation becomes worse when classes are often overcrowded and the teacher lacks a thorough grasp of his subject.

According to Eshiwani and Achola (1988), when a teacher is overloaded, he tends to follow the way of easy resistance. He does not emphasize learning and cannot cater for individual differences since he has no spare time. He may not make use of teaching aids leave alone making them. They further points out that a teacher handling large number of students could be overworked and thus affect the performance and achievement of the students. They conclude that, big class size creates a big problem in managing the behaviour in the class. Some students in such a class become indisciplined during the instruction and this distracts the attention of other learners. Abagi (1997) also observes that the pupil-teacher ratio and teachers' inputs; teaching-learning contact hour affect the performance of any school subject.

Class size mostly determines the methods that teachers use in teaching mathematics. Teachers of small class size tend to use heuristic methods while teachers of large class size tend to apply expository methods. The research conducted by Miheso (2002) found out that heuristic methods which are interactive in nature are superior to expository methods especially with respect to achieving higher order cognitive skills. Proper teaching therefore demands for increased contact hours between the teacher and the learners where the teacher has enough time not only to prepare for the lessons but also to check the learners' work covered as means of developing their manipulative and cognitive skills in class. However, Miheso (2002) found out that the class size per see has no significant and direct influence on students' achievement in mathematics.

The above literature review illustrates the importance of having manageable class size and workload in the performance of students in mathematics. However the relationship between teachers' workload and class size with the performance of students in mathematics in Borabu District is a gap that the study looked into.

2.3.2 Physical Resources and Performance in Mathematics

The introduction of new curriculum places demands upon resources both that are already in existence and those which are required specifically to support of the latest development (Orton and Wain, 1994). Effective teaching depends on the availability of suitable, adequate and appropriate teaching resources. Physical resources include textbooks, laboratory materials, library materials, chalkboard, rulers and mathematical models. The quality of education, adds Abagi (1997) can be judged by assessing among other factors, the adequacy of basic supplies like books and blackboards, and their utilization.

Textbooks are both source of information and basis for examination and appraisal. According to Lockheed (1993), testing in the early 1980s found out that students in Philippines and Nicaragua with textbooks scored significantly higher by one third of a standard deviation than those students without. Some experts have suggested that the ratio of 1:3 should be regarded satisfactory. But, experiment conducted in Philippines suggests that when school books are property of the school and are not taken home, there is only a marginal difference between the ratios 1:1 and 1:2 (Brunswic, Ettienne and Habbib, 1992). A study conducted in Nairobi Province, Kenya, by Miheso (2002) found out that there was no significant difference in performance when the availability of textbooks was at student/ textbook ratio level of 1:1 and 1:2. However, ratio levels beyond 1:3 were found to have a negative effect on performance. The

study sought to give insight to the availability and utilization of textbooks in enhancing performance in mathematics among secondary school students in Borabu District since no such research had been conducted there.

2.4 Assessment Practices

2.4.1 Assessment Tests and Performance in Mathematics

According to Wilson (1986), assessment practices includes formal classroom processes such as observing pupils tackling a task, questioning them about their work, looking at their record of work or listening to their discussions. More formal processes include testing and assignment for marking. Nayak and Rao (2002) argue that people learn to do well only what they practice doing. Therefore, regular tests are to be given on regular occasions.

Orton and Wain (1994) support this idea by drawing a parallel to sportsmen and sportswomen who develop skills to an extremely high level of mastery and maintains that level through practice. Further, Wilson (1986) notes that the techniques and frequency of assessments profoundly affect achievement. However we must ensure that tests measure what is of value. Cockcroft (1982) believes that there are two fundamental principles which should govern any examination in mathematics. The first principle is that the examination papers and other methods of assessment which are used should be such that they enable the candidates to demonstrate what they do know rather than what they do not know. The second principle is that the examinations should not undermine the confidence of those who attempt them. Research into the use of formative assessment in classroom setting has confirmed the important contribution that they can make to effective teaching and learning (Black and Wiliam, 1998). They offer immediate information to support important teaching functions. Pirie (1989)

classifies those to benefit from classroom based assessment into three; pupil, teacher and perceived needs of others. Desforges (1989), Beck and Earl (2002) and Costello (1991) all seem to be in agreement that classroom assessment helps much in the planning of the future lessons more effectively to the learning characteristics and needs of particular groups of society.

All assessments whether formal or informal, formative or summative, should be supportive. This is to say that one of the objectives of assessment should be to enable each student demonstrate positive attainment. In order for the pupils to demonstrate positive attainment, they have to know precisely what is expected of them. After each lesson and especially after a series of lessons, the mathematics teacher reviews events of the classroom, checks the extent to which the specified objectives have been achieved and makes hypothetical proposals for improvement should the same topic ever be presented to similar class again (Costello, 1991). According to Reys, Marilyn and Lindquist (1992), this can be done through developing good classroom questioning strategies. They argue that it is important for teachers to be sensitive to the needs to raise good questions and to encourage the students to do so as well. Nayak and Rao (2002) also argue that sound teaching usually begins and ends with questions that are interesting and familiar to students.

Homework is a valuable activity for students in learning mathematics and for it to be meaningful; they should be made integral part of teaching and learning strategies and post-assessment activities (Nayak and Rao, 2002). Eshiwani (1983) found out that homework influence academic performance of learners. Fuller (1985) confirmed that students' achievement especially at secondary school level, can increase significantly when homework assignment is assigned regularly and completed. A study by Miheso (2002) found out that there was a very high prevalence of homework assignments though the amount of time students take in

mathematics was minimal. Conversely as noted by Costello (1991), reality has it that other pressures and routine daily assignments are neglected aspects of teaching. He is supported by Eshiwani (1983) who found out that sixty per cent of the schools studied, no formal homework assignment was given to students and where administered, there was no follow up. This is a pity because memories of most lessons soon become blurred and the potential for development which early reflection can provide is not realized.

2.4.2 Marking Students' Work and Performance in Mathematics

Bell (1978) argues that, regardless of how well homework assignments are planned and how fast students are in completing them, their full advantage is not realized if the teacher does not carefully evaluate students' work on their assignments. Pirie (1989) notes that marking students work provides students with feedback on how correct or worthwhile their work is. It keeps the teacher informed about students' progress and the success or otherwise of the teaching and learning which is taking place. Costello (1991) observes that regular marking has diagnostic and supportive functions. It enables the teacher to become aware of mistakes and misunderstandings which arise and encourage students to seek help when necessary.

There are basic minimum requirements of marking. It cannot be satisfactory for example for the students to continue repeating a particular mistake because some idea or method has not been understood. Marking must at least enable this to be picked up and corrected (Costello, 1991). This could be done by the teacher reading and commenting on the students' paper or discussing homework assignment in class and students evaluate their own mistakes during the discussion (Bell, 1978).

Marking and preparations are activities most usually quoted as occupying teachers' attention outside school hours. In reality however marking which can be reduced to simple mechanical exercise is hardly of any valuable use to a hard-pressed teachers' time and it is not likely to prove particularly informative to students. Ticks and crosses in mathematics are of little assistance (Costello 1991). Cockcroft (1982) also identified some situations in which it was felt that students were not being set enough work because teachers were unable to find the time to mark it. He notes that marking has got to be a response to students' work and not a restraint upon it. If detailed marking is given such priority that it determines how much work is done, something is wrong.

Generally on assessment, Black et.al (2002) identified five assessment factors seemingly crucial for successful learning and a further five that hinder it. Those which improve performance include:

- i. Regular classroom testing and the use of the results to adjust teaching and learning rather than for competition and grading.
- ii. Enhanced feedback between teachers and students which may be oral or in the form of written comments on students' work.
- iii. Careful attention to the motivation and self-esteem of students, encouraging them to believe that they can learn what is being taught.
- iv. The active involvement of all the students.
- v. Time allocated for self assessment by students, discussion in groups and dialogue between teachers and students should be fairly enough.

Standards are hindered by:

- i. Tests which encourage rote and superficial learning even when teachers claim they wish to develop understanding.
- ii. Failure by teachers to discuss and review testing methods between themselves.
- iii. Over emphasis on giving of marks and grades at the expense of useful advice to learners.
- iv. Approaches that compare students in a way that persuade the purpose of comparison rather than personal improvement. This demotivates some students.
- v. Feedback, testing and record keeping which serves as managerial rather than learning function.

Unfortunately, a class test is often presented as a motivating device – a stick or a carrot. A report to the Nation on the Future of Mathematics Education (1989) states that; “By confusing means and ends, by making tests more important than learning, present practice holds today’s students hostage to yesterday’s mistakes.”

From the foregoing literature review, it can be realized that good testing techniques with good marking of students work is vital to the students’ performance in mathematics. However, it has not been revealed whether such practices are embraced in Borabu District and their relationship with performance in mathematics. Therefore, the study sought to establish whether the assessment practices in the literature review were carried out and their relationship with performance in mathematics of students at K.C.S.E in Borabu District.

2.5 Student -Related Factors

2.5.1 Students’ Attitude and Performance in Mathematics

The right attitude and commitment enables any worker (learner) to work (learn) better (Cosin et.al, 1977). A study by Abuyeka (2006) asserts that a student’s right attitude towards learning

greatly influences the learner's performance in examinations. He is supported by Osindi (2009) who found out in his research that 90% of the students' academic performance comes from positive attitude towards learning while combined skills and knowledge contributes to only 10%. Costello (1991) also believes that positive attitude particularly liking for and interest in mathematics leads to greater effort and in turn to a higher achievement.

There is a common belief that the major factors that affect the students' learning process is the way the students face the knowledge namely, their attitude to the subject. Attitudes have a profound feeling, relatively stable and are derived from positive or negative experiences across time, on learning mathematics. Beck and Murphy (1988) observe that, positive attitude towards mathematics makes problems interesting and engaging such that even students with disabilities are able to solve problems that emphasize higher level thinking skills. They also note that the general relationships between attitude and achievement are based on the concept that the more positive attitude a student has toward a subject or a task, the higher the achievement or performance level tends to be. Miheso (2002) found attitude to correlate directly with performance. This is what the study sought to establish in Borabu District.

2.5.2 Time Spent Studying Mathematics and Mathematics Performance

The role of education in our society is to train children to be creative and self reliant. This is through basically achieving mathematics objectives when motivational factors such as interest and attitude are inculcated into learners. In this way, Driver (1989) argues that students tend to spend more time studying the particular subject. This translates to higher achievement in mathematics. Students understand better when they spend more time studying mathematics and therefore achieve to the expected standards. The study sought to find out the relationship

between time spent in studying mathematics and mathematics performance in Borabu District, a study which has not been done there before.

2.5.3 Entry Behavior and Mathematics Performance

Entry behaviour of a student fosters his/her language, cognitive and social development with frequent and varied verbal interactions. It also improves students' interaction with their peers, intellectual development as well as school and social adaptations. Provision of education curriculum that permits students to initiate, and pace their own learning activities also influences the entry behaviour (Wilson, 1986). The prerequisite knowledge is very critical in achievement in any subject. Informally, it has been argued that students' understanding and mastery of content in primary schools which is reflected at K.C.P.E goes along to affect their performance at K.C.S.E. Arguments for and against entry behaviour (academic scores) determining students' achievement in secondary mathematics has been received with equal measures. It is on this premise that the study sought to establish the relationship between entry behaviour and students performance in mathematics in Borabu District.

2.5.4 Peer Influence and Mathematics Performance

Peer relationships exert their influence through the attitudes, expectations and understanding of roles that they leave with the individual (Erwin, 1993). The students misperceive how their peers evaluate their social and academic competence and do not recognize the contribution which their own social skills have on peer reactions, so that this affects their general academic achievement (Erwin, 1993). However, it has not been established whether peer influence contributes to poor performance at K.C.S.E level in Borabu District. This is what the study intended to find out.

2.6 Summary of Literature Review

From the foregoing review, it has been realized that performance in mathematics worldwide is a problem. Most countries have been forced to set up commissions to dig deeply into the root causes of this and suggest the way forward. In Kenya, every year when the K.C.S.E examination is released, mathematics as a subject has always remained to be the worst performed and ranked. In particular, performance in mathematics among secondary school students in Borabu District has been wanting. Various scholars have suggested general factors that positively or negatively affect performance in the subject. The same research has been carried out in other areas like Nairobi Province and factors that significantly affect performance in mathematics addressed. The literature review has explored some of these factors. They include; teacher-related factors, school-related factors, assessment practice and student-related factors. The most conspicuous from the literature reviewed is a gap on the study of factors affecting performance of students in mathematics in Borabu District. It is on this strength that the study sought to establish factors affecting the performance of mathematics among secondary school students in Borabu District, Nyamira County.

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

This chapter discusses the methodology and the specific procedures that were followed in conducting the study. The chapter is organized into: research design; study location; study population; sampling procedures and sample size; research instruments; pilot study; data collection procedures and a summary of data analysis.

3.2 Research Design

The study adopted descriptive survey research design. The survey involves collecting information by interviewing or administering a questionnaire to a sample of student and teacher respondents (Orodho, 2002). Information is obtained from a sample of the target population rather than the entire population from one to a few weeks (Fraenkel and Wallen, 2000). Kothari (2003) argues that descriptive survey design enables one to collect data from a wider area in a shorter time. It is the most suitable method for collecting information about people's opinions on various issues that affect them (Orodho2002). The design enabled the researcher to obtain information that provided reasons for poor performance in mathematics at K.C.S.E level.

3.3 Location of Study

The study was conducted in Borabu District which falls under Nyamira County. It borders with the following districts; Bomet to the South, Bureti to the East, Nyamira to the North, North Masaba to the West, Transmara to the South West, Ekerenyo to the North East. The choice of the district was based on the researcher's familiarity with the locality which enabled the researcher

to develop immediate rapport with the study's respondents, making data collection less cumbersome. Furthermore, the area was considered because of its poor performance in mathematics at K.C.S.E level as presented in chapter one of this study. Singleton (1993) points out that the ideal setting for research is one that is related to the researcher's interest is easily accessible and which allows the development of immediate rapport.

3.4 Target Population

The study's target population constituted 5,200 students, 53 mathematics teachers and 23 principals from all the secondary schools in Borabu District in Nyamira County, Kenya as per the student enrolment and teacher staffing records obtained from the District Education Officer's office as at 31st March 2012. The district has a total of 23 secondary schools (see Appendix).

The study specifically targeted the form three students because unlike their form one and two counterparts, they had been exposed to secondary mathematics for a period of at least two years, which made them better placed to provide objective responses to the questions asked. Unlike the form fours, they had relatively less pressure from impending K.C.S.E examinations and were expected to be mature in terms of attitude and opinions.

3.5 Sampling Techniques and Sample Size

3.5.1 Sampling Techniques

The targeted schools were stratified into three performance categories/strata: the good performing, average performing and poor performing schools. This was based on their consistency in Mathematics performance at K.C.S.E level for the years 2008, 2009 and 2010. Utilizing a sample of 52% of the target population, a total of 12 schools were selected (4 schools

from each stratum) to participate in the study using simple random sampling except, in the good performing category where all the four schools were purposively used.

To achieve the threshold for correlation analysis, purposive sampling was used to select 30 form three mathematics teacher respondents from the sampled schools. The teachers were proportionately sampled from each of the selected schools while ensuring that equal representation for the three school categories, that is, 10 teacher respondents from each category. Simple random sampling was used to select form three students from each of the sampled schools. In addition, 6 principals, 2 from each school category were purposively selected and interviewed.

3.5.2 Sample Size

According to Krathwohl (2007) and Mugenda and Mugenda (2003), a suitable sample size should at least be 10% of the target population. Given that there were 23 secondary schools in Borabu District, 12 schools were selected representing 52% of the targeted school population. Twenty (20) form three students were drawn from each of these schools, constituting a total of 240 students, 30 mathematics teachers and 6 principals who participated in the study. The distribution of the sample size is as shown in Table 3.1

Table 3.1: School Categories and Sample Size

School category	Number of schools	Sampled schools	Students' Sample	Teachers' Sample
Good performing schools	4	4	80	10
Average performing schools	6	4	80	10
Poor performing schools	13	4	80	10
Total	23	12	240	30

3.6 Research Instruments

The researcher utilized two sets of the questionnaires and an interview schedule to collect data. One set of questionnaire was for student respondents and the other for teacher respondents, while the interview schedule was used to collect data from the school principals. Gay (1992), Kothari (2003) and Orodho (2002) all seem to be in agreement that questionnaires are free from bias, are cost effective and give respondents adequate time to give well-thought answers. The questionnaires covered four areas of research; teacher-related factors, school related factors, assessment practice and student-related factors. The questionnaires contained mainly closed-ended questions to reduce wide variations in the responses thus ensure that there was consistency in the answers hence ensuring easy comparison.

3.7 Piloting of Research Instruments

Piloting refers to the pre-testing of research instruments to a selected sample which is identical to the actual sample to be used in the study (Orodho, 2002). He adds that piloting helps to detect deficiencies in the research instruments such as insufficient space and ambiguous questions. It also helps to reveal if anticipated analytical techniques are appropriate. A pilot study was conducted in two secondary schools in Borabu District using convenience sampling. The two schools were not part of the actual sample for the study. Two form III mathematics teachers and 20 form III students from the two pilot schools were used for the pilot study, representing 1 mathematics teacher and 10 student respondents from each of the schools. The findings from the pilot study were used to validate the research instruments and also test their reliability.

3.7.1 Validity of the Research Instruments

Validity is the degree to which an instrument measures what it is supposed to measure, (Kothari, 2003). The researcher ensured both content and construct validity of the instruments were obtained by seeking expert advice from the supervisors and other colleagues in the department.

3.7.2 Reliability of Research Instruments

According to Nachmias and Nachmias (1992) reliability is the consistence of a measuring instrument. Gay (1992) defines it as the degree to which a test constantly measures whatever it measures. Mugenda and Mugenda (2003) clearly define it as 'a measure of the degree to which a research instrument yields consistent results or data after repeated trials'. The reliability of the questionnaire items was determined using the Cronbach alpha coefficient, using data from pilot testing. Cronbach alpha provides a good measure of reliability because holding other factors constant the more similar the test content and conditions of administration are, the greater the internal consistency and reliability (Mugenda & Mugenda, 1999). Bryman and Cramer (1997) recommend a reliability coefficient of $\alpha = 0.70$ and above.

The data from the pilot test was coded and entered into the computer and a reliability check ran with the aid of the SPSS. The results of reliability analysis produced a reliability coefficient of $\alpha = 0.7775$.

3.8 Data Collection Techniques

An introductory letter was obtained from the graduate school, Kenyatta University, which was presented to the Ministry of Higher Education, Science and Technology (MoHEST) in order to apply for and obtain a research permit (Appendix E). The DEO in charge of the area of study was informed of the intended study and requested for permission to collect data from the

sampled schools. Thereafter, permission was sought from the principals of the participating schools. The participating schools were visited twice; the first visit aimed at introduction and soliciting for cooperation from participating teachers and students. The second visit was used for administration and collection of the filled in questionnaire. The students' questionnaires were then administered to the student respondents, and then the teachers' questionnaires to the teacher respondents. In-depth interviews were thereafter conducted with the principals on appointed dates. Before administering the questionnaires, the purpose of the study was explained to the participants, assuring them that information gathered would be treated confidentially and purely for the purposes of research and the seeking their consent to participate in the study. The researcher delivered the questionnaires in person and waited as respondents filled in their responses before collecting the filled in questionnaire immediately

3.9 Data Analysis

Before the actual data analysis, the filled in questionnaires were checked and the relevance of responses confirmed. The responses were organized into the main objective areas of study. A coding strategy was developed and the data gathered from questionnaires was coded after validation and editing. The coded data was then entered into the computer and analysis of the data done with the aid of the Statistical Package for Social Scientists (SPSS) computer program for windows. The hypotheses of the study were tested at $\alpha = 0.05$ using the Pearson's Product Moment Correlation Coefficient while the objectives of the study were analyzed descriptively by use of frequencies and percentages and the analyzed data presented using frequency distribution tables and bar graphs.

3.10 Logistical and Ethical Considerations

Informed consent was obtained from each respondent willing to participate in the study. The researcher introduced himself to the participants and summarily explained the purpose of the study. Respondents were informed of their voluntary participation and that they had a right to anonymity, confidentiality as well as the right to choose not to answer questions if they didn't feel comfortable doing so. They were also informed that they had the right to withdraw from the interview at any time. No direct identifiers were collected from the participants. Confidentiality was ensured since the participants remain anonymous. Identifiers such as name, personal identification numbers, ethnicity and addresses were not collected.

CHAPTER FOUR

PRESENTATION OF FINDINGS, INTERPRETATION AND DISCUSION

4.1 Introduction

The study sought to analyze the factors that influence students' performance in the Kenya Certificate of Secondary Education in mathematics examinations in Borabu District. Data was collected from students and teachers using respective students' and teachers' questionnaires. This chapter is therefore a descriptive analysis of data collected, interpretation and discussion of the findings. The chapter is divided into: response rate; Teacher-related factors and students' performance in mathematics; School-related factors and students' performance in mathematics; Assessment practices and students' performance in mathematics and Student-related factors and their performance in mathematics.

4.2 Response rate

The return rate was 100% as all the two hundred and forty students' questionnaires (240) and thirty (30) teachers' questionnaires that were administered were returned. These ensured the sample sizes remained as originally designed and thus representativeness of the target population.

4.3 Teacher - Related Factors

The study sought to establish the influence of teacher-related factors and students' performance in mathematics at the K.C.S.E level. Teacher-related factors were evaluated based on questionnaire item numbers 2-7 in the teachers' questionnaire and item number 9 (i-iv) in the students' questionnaire. This section therefore presents findings on the relationships between teacher's personal variables (academic and professional qualifications, promotion of personal

and professional growth, teaching experience), teaching approach team teaching and Performance in Mathematics.

4.3.1 Teachers' Personal Variables and Performance in Mathematics

Personal variables constituted teacher's academic and professional qualification, and promotion of personal and professional growth and teaching experience. Academic and professional qualification was assessed based on the highest academic and professional certification attained while promotion of personal and professional growth was evaluated on the basis of the number of mathematics-related seminars/workshops and induction courses attended. Scores were awarded for attending seminars/workshops and induction courses and the frequency of attendance, where a score of "1" was adopted for "Yes" and "0" for "No" attendance, while a score of 1 was adopted for "Rarely"; 2 for "Once in a year"; 3 "Once in a term" and 4 for "Frequently" attending the seminars/workshops. Total scores for personal and professional growth ranged from 0-5. For descriptive statistics, the scores were categorized into "Low" (0-2), "Average" (3-4) and "High" (4-5). The total scores were used for further correlation analysis. On the other hand, teaching experience was based on the number of years the teacher had taught mathematics. Table 4.1 shows the descriptive analysis of the teachers' personal variables.

Table 4.1: Teachers' Academic/Professional Qualification

Highest Academic/Profession qualification	School Performance Category			Total
	Poor	Average	Good	
Diploma	10.0%	10.0%	10.0%	10.0%
Bachelor's Degree	90.0%	90.0%	80.0%	86.7%
Postgraduate Diploma in Education			10.0%	3.3%
Total	100%	100%	100%	100.0%

The findings in the table show that teachers' academic qualifications were similar across all the school categories. There were 10% Diploma holders in each of the school categories, 90% in both poor and average and 80% in good performing schools of Bachelor's degree graduates respectively.

Table 4.2: Teaching Experience of Mathematics Teachers

Teaching Experience	School Performance Category			Total
	Poor	Average	Good	
Less than one year	20.0%	-	-	6.7%
1-3 years	20.0%	20.0%	10.0%	16.7%
4-6 years	30.0%	50.0%	40.0%	40.0%
7-9 years	30.0%	20.0%	10.0%	20.0%
10 years and above	-	10.0%	40.0%	16.7%
Total	100%	100%	100%	100%

The results in Table 4.2 show that whereas a majority of teachers in poor performing schools had teaching experience falling within 6 years and below (70%), a similar percentage of those in average performing schools had experiences of between 4-9 years while 90% of those in good performing schools had teaching experiences ranging from 4 to more than 10 years. At least 10% of teachers in average performing compared with 40% in good performing schools had more than 10 years' experience teaching mathematics.

Table 4.3: Teachers' Promotion of Personal Professional Growth

Teacher's promotion of personal Professional Growth	School Performance Category			
	Poor	Average	Good	Total
Low	80.0%	50.0%	30.0%	53.3%
Average	20.0%	50.0%	30.0%	33.3%
High			40.0%	13.3%
Total	100%	100%	100%	100%

Whereas 80% of mathematics teachers in poor performing schools scored “low” in personal and professional growth, half of those in average performing school scored either “low” or “average” in the same teacher-related factors. Majority of teachers at 70% in good performing schools scored between “average” to “high” in promotion of personal and professional growth, with 40% of these lying within the category of “high” scores. The total scores from the teachers’ personal variables were used to compute a Pearson Product Moment correlation to establish the relationship between teachers’ personal variables and performance in mathematics. The findings were as shown in Table 4.4.

Table 4.4: Relationship Between Teachers' Personal Variables and Students' Performance in Mathematics

		Teaching Experience	Professional Growth	Academic/Profession qualification
School	Pearson Correlation	.402*	.516**	-.124
Performance	Sig. (2-tailed)	.027	.004	.513
	N	30	30	30

*. Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

The PPMC analysis revealed that there was a significant but weak positive relationship between teaching experience ($r = 0.402$, $n=30$, $\rho < 0.05$) and promotion of personal and professional

growth ($r = 0.516$, $n=30$, $\rho < .001$) and school performance in mathematics. The correlations indicate that performance in mathematics at the K.C.S.E level was associated with longer teaching experience and higher attendance of mathematics-related seminars and workshops. However, there was no relationship between academic/professional qualifications and performance in mathematics.

4.3.2 Teaching Approach and Mathematics Performance

The students were asked to indicate the extent to which they agreed with the teaching approaches adopted by the mathematics teacher. Their responses were as shown in Table 4.5.

Table 4.5: Teaching Approaches in Mathematics (n=240)

Teaching Approach		School Performance			
		Poor	Average	Good	Total
Teacher tells students about how Mathematics can be applied to real life situations during lessons	Strongly Disagree	15.0%	1.3%	1.3%	5.8%
	Disagree	35.0%	13.8%	1.3%	16.7%
	Uncertain	17.5%	16.3%	11.3%	15.0%
	Agree	17.5%	30.0%	37.5%	28.3%
	Strongly Agree	15.0%	38.8%	48.8%	34.2%
Total		100%	100%	100%	100%
Teacher involves students in activities that encourage them to use Mathematics in thinking and reasoning	Strongly Disagree	10.0%	2.5%	-	4.2%
	Disagree	45.0%	10.0%	13.8%	22.9%
	Uncertain	20.0%	12.5%	8.8%	13.8%
	Agree	10.0%	41.3%	53.6%	35.0%
	Strongly Agree	15.0%	33.8%	23.8%	24.2%
Total		100%	100%	100%	100%
Teacher advises students on the possible careers in Mathematics	Strongly Disagree	7.5%	3.8%	2.5%	4.6%
	Disagree	25.0%	10.0%	8.8%	14.6%
	Uncertain	15.0%	10.0%	2.5%	9.2%
	Agree	15.0%	20.0%	43.8%	26.3%
	Strongly Agree	37.5%	56.3%	42.5%	45.4%
Total		100%	100%	100%	100%
Teacher tells students how Mathematics is related to other subjects taught at the secondary school level	Strongly Disagree	5.0%	1.3%	8.8%	5.0%
	Disagree	32.5%	5.0%	-	12.5%
	Uncertain	20.0%	20.0%	15.0%	18.3%
	Agree	10.0%	47.5%	51.3%	36.3%
	Strongly Agree	32.5%	26.3%	25.0%	27.9%
Total		100%	100%	100%	100%

The percentages in the table indicate that teachers in average and good performing schools used approaches that encouraged learners to develop positive attitudes towards mathematics more than their colleagues in poor performing schools. From students' responses, it is clear that more students in average and good performing schools either agreed or strongly agreed to the indicated statements about teaching approaches adopted by their mathematics teachers, compared to students from poor performing schools who mostly denied use of the approaches by their mathematics teachers. The students' scores were computed and PPMC conducted to establish the relationship between teaching approaches and school performance in K.C.S.E mathematics. The findings were as presented in Table 4.6.

Table 4.6: Relationship Between Teaching Approach and Mathematics Performance (n=240)

Teaching Approach	Type of school	
	r	P-Value
Teacher tells students about how Mathematics can be applied to real life situations during lessons	.442**	.000
Teacher involves students in activities that encourage them to use Mathematics in thinking and reasoning	.312**	.000
Teacher advises students on the possible careers in Mathematics	.176*	.013
Teacher tells students how Mathematics is related to other subjects taught at the secondary school level	.142*	.044

***. Correlation is significant at the 0.01 level (2-tailed).*

**. Correlation is significant at the 0.05 level (2-tailed).*

The findings in the table indicate that there were positive relationships between the various teaching approaches adopted by the teacher: telling students about how mathematics could be applied to real life situations during lessons ($r = 0.442$, $n=240$, $\rho < .001$); involving students in activities that encourage them to use mathematics in thinking and reasoning ($r = 0.312$, $n=240$, ρ

< .001); Teacher advising students on the possible careers in mathematics ($r = 0.176$, $n=240$, $\rho < .05$); and the teacher telling students how mathematics is related to other subjects taught at the secondary school level ($r = 0.142$, $n=240$, $\rho < .05$) and school performance in mathematics respectively. This implies that the more the teachers teach about the general applications of mathematics knowledge the better was the students' performance in mathematics at the K.C.S.E level.

4.3.3 Team Teaching and Performance in Mathematics

The teachers were asked to indicate the extent to which they used team teaching in the teaching of mathematics in their respective schools. Their responses were as shown in Figure 4.1.

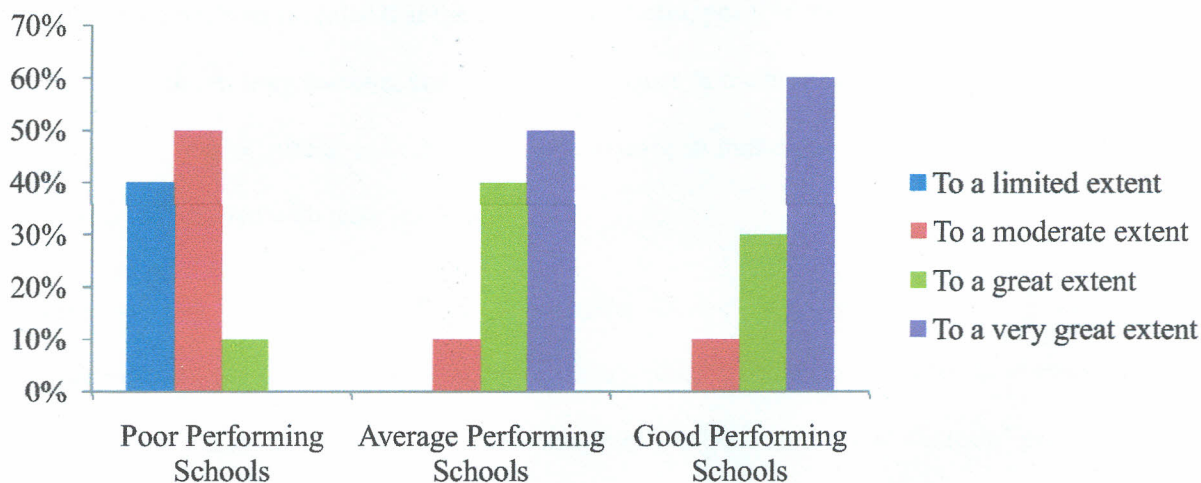


Figure 4.1: Team Teaching and Performance in Mathematics

The findings show that whereas 60% and 50% of teachers in good and poor performing schools respectively practiced team-teaching to a very great extent, none of their counterparts from the poor performing schools embraced the practice. Only 50% of mathematics teachers in poor performing schools did team-teaching to a moderate extent, 40% of them practicing it to a

limited extent. The total scores from these responses were used to compute the Pearson's Product Moment Correlation Coefficient to establish the relationship between team teaching and school performance at the K.C.S.E performance. The findings were as shown in Table 4.7.

Table 4.7: Relationship Between Team Teaching and Mathematics Performance

		School Performance	Team Teaching
School Performance	Pearson Correlation	1	.621**
	Sig. (2-tailed)		.000
	N	30	30
Team Teaching	Pearson Correlation	.621**	1
	Sig. (2-tailed)	.000	
	N	30	30

***. Correlation is significant at the 0.01 level (2-tailed).*

The PPMC analysis revealed that there was a significant, positive relationship ($r = 0.621$, $n=30$, $p < .001$) between team teaching and school performance in mathematics at the K.C.S.E level. The correlation was of strong, indicating that performance in mathematics at the K.C.S.E level was strongly associated with team teaching.

Despite there being no significant relationship between teachers' academic/ professional qualifications and performance in mathematics, the study established that there were statistically significant relationships between all the other teacher-related factors and students' performance in the subject. Therefore the null hypothesis (H_{01}) that there is no statistically significant influence of Teacher-related factors on students' performance in mathematics at K.C.S.E level was rejected.

The non-existence of a significant relationship between teachers' academic and professional qualifications could be attributed to the fact that teachers in schools are recruited based on some

minimum professional qualification standards and deployment is done irrespective of the status/scale of school performance as the government tries to ensure equal learning opportunities for all students. Teachers with long teaching experience influence their students to perform well in mathematics, given that they may have mastered the subject matter and having dealt with students with various abilities, they are in a position to devise effective teaching strategies and approaches that boost understanding of mathematics concepts by learners. This is supported by Alexander and Fuller, (2005) who posit that more experienced teachers are associated with greater gains in student's achievement. Ferguson (1991) argues that teaching experience is positively associated with students' achievement in examinations. With respect to teaching approaches, the positive and significant relationship with mathematics performance is due to the fact that teachers who enjoy teaching mathematics and share their interest with enthusiasm for the subject tend to produce students who like mathematics as indicated by Busbridge and Womack, (1991).

The principals from good performing schools confirmed that mathematics teachers in their school adopted team teaching methodologies and regularly organized mathematics forums at the school level where teachers freely interacted with students, thus encouraging them. On the contrary, principal of average and poor performing schools indicated non-existence of such opportunities and forums and indeed blamed low performance on the absence of such initiatives in their respective schools.

4.5 School -Related Factors

The study sought to establish the influence of school-related factors on students' performance in mathematics at the K.C.S.E level. School-related factors were evaluated based on questionnaire

item numbers 8-11 in the teachers' questionnaire. This section therefore presents findings on the relationships between human resources, physical resources and administration with Performance in Mathematics.

4.5.1 Human Resources and Students' Performance in Mathematics

Human resource was assessed on the basis of the number of lessons the mathematics teacher handled in a period of one week and the ratio of students to mathematics teacher in the surveyed schools. The teacher respondents were therefore asked to indicate the number of lessons they taught in a week and also the number of student's they had in their respective mathematics classes. The findings were as shown in Figures 4.2 and 4.3.

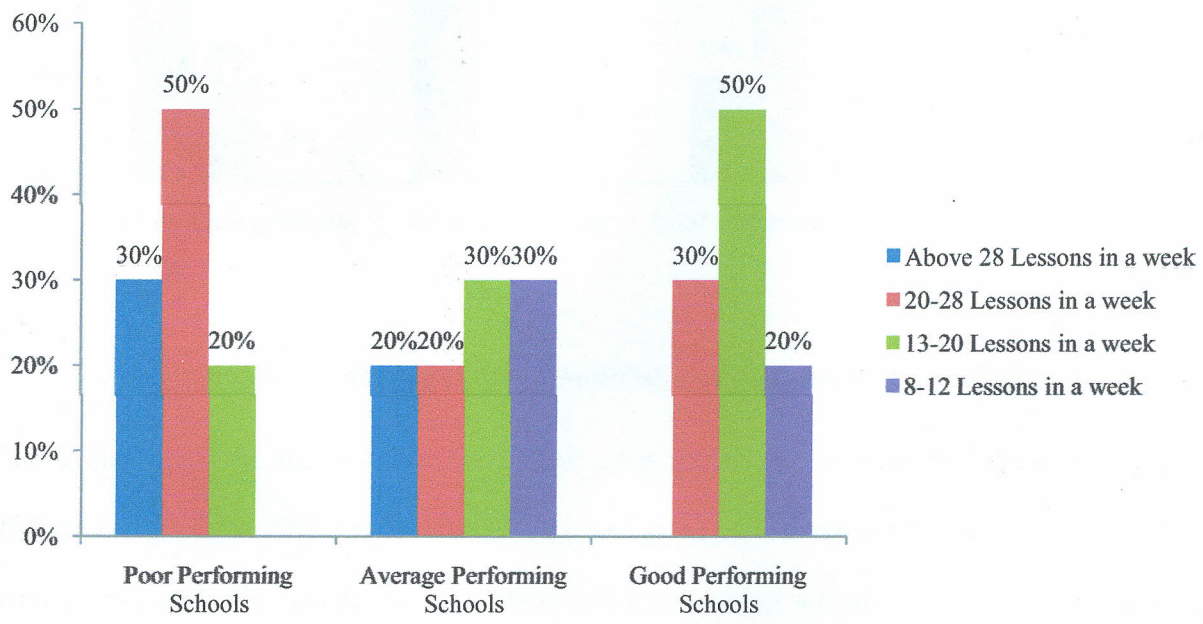


Figure 4.2: Number of mathematics lessons handled by the teacher

The findings show that majority of mathematics teachers in poor performing schools (50%) had more than 28 lessons per week compared to 20% of teachers in average performing schools with a similar number of lessons. Good performing schools did not have any teacher with more than

28 lessons. On the other hand, 50% of mathematics teachers in good performing schools had between 13 to 20 mathematics lessons compared to 30% and 20% of their counterparts in average and poor performing schools with the same number of lessons. This implies that teachers in low performing schools have heavier workloads compared to those in average and good performing schools.

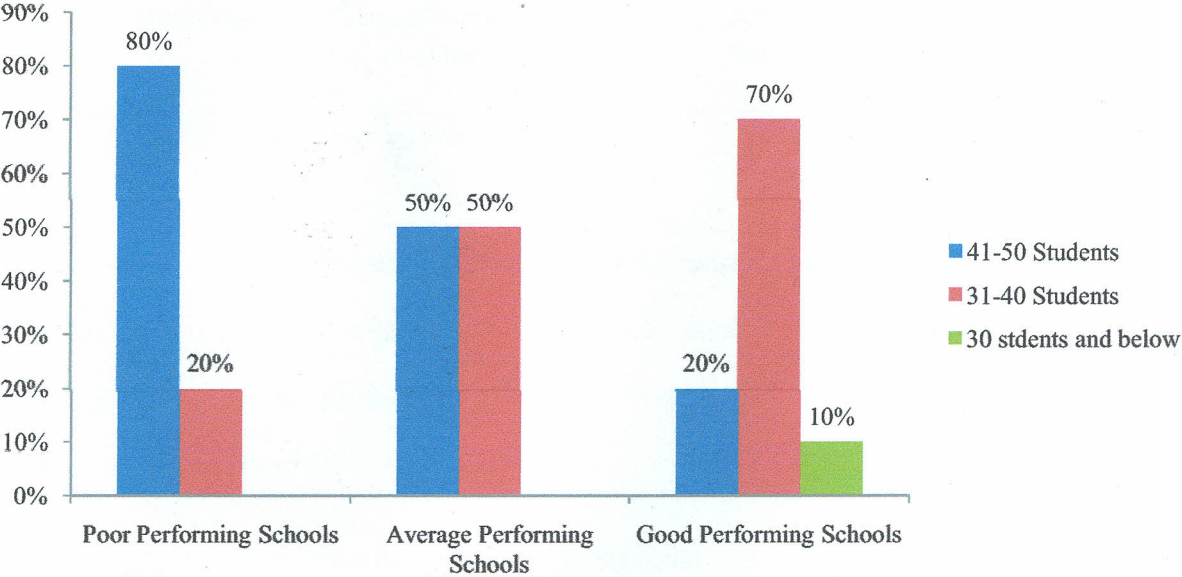


Figure 4.3: Number of students handled by the mathematics teacher

The findings indicate that 80% of teachers in poor performing schools had between 41-50 students compared to 50% and 20% in average and good performing schools respectively with similar class sizes. Comparatively, teachers in good performing schools had smaller class sizes with a majority at 70% having 31-40 students and at least 10% having a class size of 30 students and below. 50% and 20% of teachers respectively from average and poor performing schools had 31-40 students. The total scores for human resources (teachers' workload) were used to compute the Pearson's Product Moment Correlation Coefficient to establish whether there was a

relationship between human resources and performance in mathematics at the K.C.S.E level. The findings are as shown in Table 4.8.

Table 4.8: Relationship Human Resources and School Performance

		School Performance	Human Resources
School Performance	Pearson Correlation	1	.555**
	Sig. (2-tailed)		.001
	N	30	30
Human Resources	Pearson Correlation	.555**	1
	Sig. (2-tailed)	.001	
	N	30	30

***. Correlation is significant at the 0.01 level (2-tailed).*

The PPMC analysis revealed that there was a significant, positive relationship ($r = 0.555$, $n=30$, $\rho < .001$) between teachers' workload and school performance. The correlation was of moderate strength, indicating that performance in mathematics at the K.C.S.E level was associated with lesser teacher workloads.

4.5.2 Physical Resources and Performance in Mathematics

Physical facilities were assessed on the basis of mathematics textbook: student ratio and adequacy of the resources for teaching/learning of mathematics. Scores were assigned where higher textbook: student ratios received lower scores compared to lower ratios, while for resource adequacy, the following scores were adopted: Not available (1); inadequate (2); somehow adequate (3) and adequate (4). The combined total scores for textbook: student ratio and adequacy of the resources for teaching/learning of mathematics ranged from 5-15. Therefore, for descriptive analysis, resource adequacy was categorized into three: "Inadequate" (5-8); "Somehow adequate" (9-12) and "Adequate" (13-15). The total scores were used for further

correlation analysis. The interaction between resource adequacy and performance in mathematics was as shown in Figure 4.4.

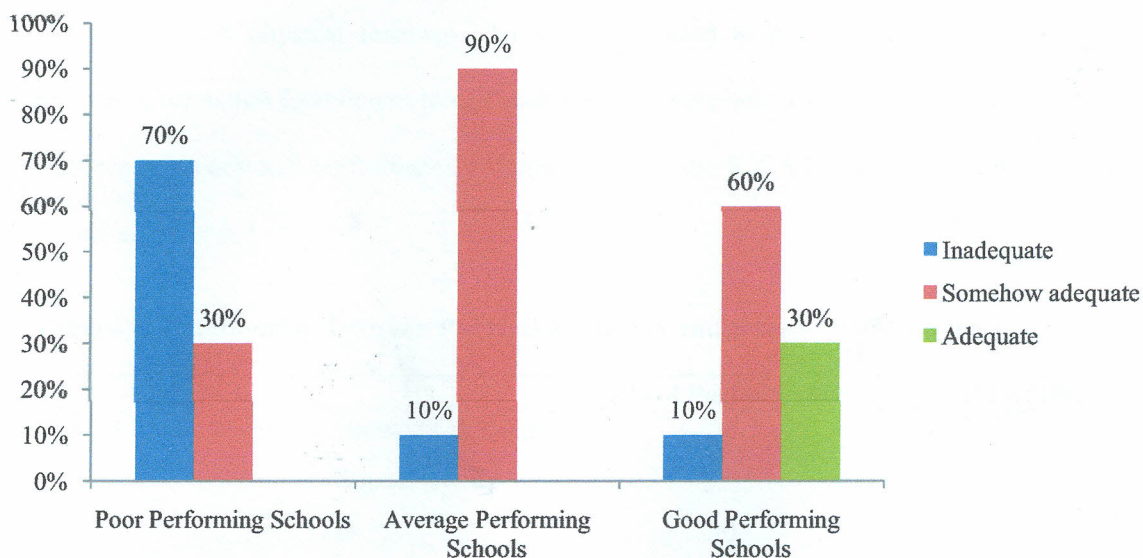


Figure 4.4: Resource adequacy and performance in mathematics

The percentages in the figure above indicate that 70% of teachers in poor performing schools indicated that they had inadequate physical resources for teaching and learning of mathematics compared to 10% in each case for average and good performing schools. On the other hand, 90% of teachers from average performing schools compared to 60% and 30% in good and poor performing schools respectively had somehow adequate physical facilities. Only 30% of teachers from good performing schools indicate that they had adequate teaching/learning physical facilities for mathematics. These findings implied that good performance in mathematics is attributable to adequate physical facilities.

Findings from the interviews with school principals confirmed that good performing schools had adequate teaching/learning facilities, with the students: mathematics text book ratios standing at

almost 1:1. However, principals of average and poor performing schools indicated having skewed resources which they linked to poor performance in mathematics. These findings implied that good performance in mathematics is attributable to adequate physical facilities.

The total scores physical resource adequacy were used to compute the Pearson's Product Moment Correlation Coefficient to establish whether there was a relationship between physical resource adequacy and performance in mathematics at the K.C.S.E level. The findings were as shown in Table 4.9.

Table 4.9: Relationship Between Physical Resources and School Performance

		School Performance	Physical Facilities
School Performance	Pearson Correlation	1	.650**
	Sig. (2-tailed)		.000
	N	30	30
Physical Facilities	Pearson Correlation	.650**	1
	Sig. (2-tailed)	.000	
	N	30	30

***. Correlation is significant at the 0.001 level (2-tailed).*

There was a significant, positive relationship ($r = 0.65$, $n=30$, $\rho < .001$) between physical resources and school performance. The correlation was strong, indicating that performance in mathematics at the K.C.S.E level was associated with adequate physical teaching/learning resources.

4.5.3 Overall Influence of School-Related Factors on Performance in Mathematics

The index for school-related factors was obtained by adding teachers' workload scores to physical teaching/learning resource scores. The total scores were used to compute a Pearson

Product Moment Correlation to the magnitude of the relationship between school-related factors and performance in mathematics at the K.C.S.E level. The findings were as shown in Table 4.10.

Table 4.10: Relationship Between School-Related Factors and Performance in Mathematics.

		School Performance	School-Related Factors
School Performance	Pearson Correlation	1	.743**
	Sig. (2-tailed)		.000
	N	30	30
School-Related Factors	Pearson Correlation	.743**	1
	Sig. (2-tailed)	.000	
	N	30	30

***. Correlation is significant at the 0.001 level (2-tailed).*

There was a significant, strong positive relationship ($r = 0.743$, $n=30$, $\rho < .001$) between school-related factors and performance in mathematics at the K.C.S.E level. The strong correlation indicates that good performance in K.C.S.E mathematics examination was associated with higher scores for school-related factors. This implies that school-related factors had an influence on the performance of students in K.C.S.E Mathematics in secondary Schools. Therefore, the null hypothesis (H_0) that there would be no statistically significant influence of School-related factors on students' performance in mathematics at K.C.S.E level was rejected.

Heavy workloads for mathematics teachers leave them with very limited time to attend to individual learner differences thus poor performance in mathematics. These findings were in agreement with Eshiwani and Achola (1988), who argue that when a teacher is overloaded, he tends to follow the way of easy resistance and therefore does not emphasize learning and cannot cater for individual differences since he has no spare time. As observed by Abagi (1997), the

student-teacher ratio and teachers' inputs; teaching-learning contact hour affect the performance of any school subject.

Effective teaching depends on the availability of suitable, adequate and appropriate teaching resources. Miheso (2002) established that there was no significant difference in performance when the availability of textbooks was at student/ textbook ratio level of 1:1 and 1:2. Textbooks are both source of information and basis for examination and appraisal. These findings were also in agreement with Lockheed (1993), who reported that students in Philippines and Nicaragua with textbooks scored significantly higher by one third of a standard deviation than those students without.

4.6 Assessment Practices

The study sought to establish the influence of assessment practices on students' performance in mathematics at the K.C.S.E level. Assessment-related factors were evaluated based on students' questionnaire item number 8 (I-VII). The findings in this section therefore are discussed under assessment tests and marking of students' work and their influence on Performance in Mathematics.

4.6.1 Assessment Tests and Performance in Mathematics

Assessment tests were evaluated based on student's questionnaire item number 8 (I-V). Students were asked to indicate their level of agreement with the given statements relating to assessment tests. Scores were awarded depending on the responses given where a score of 5 was adopted for "Strongly Agree"; 4 - "Agree"; 3 - "Undecided"; 2- "Disagree" and 1 - "Strongly Disagree". The total scores ranged from 5-25. Therefore, for descriptive statistics, the level of assessment was categorized into five based on the total scores into: "Very low" (5-8); "Low" (9-12); "Average"

(13-17); “High” (18-21) and “Very high” (22-25). The interaction between levels of assessment and performance in mathematics was as shown in Figure 4.5.

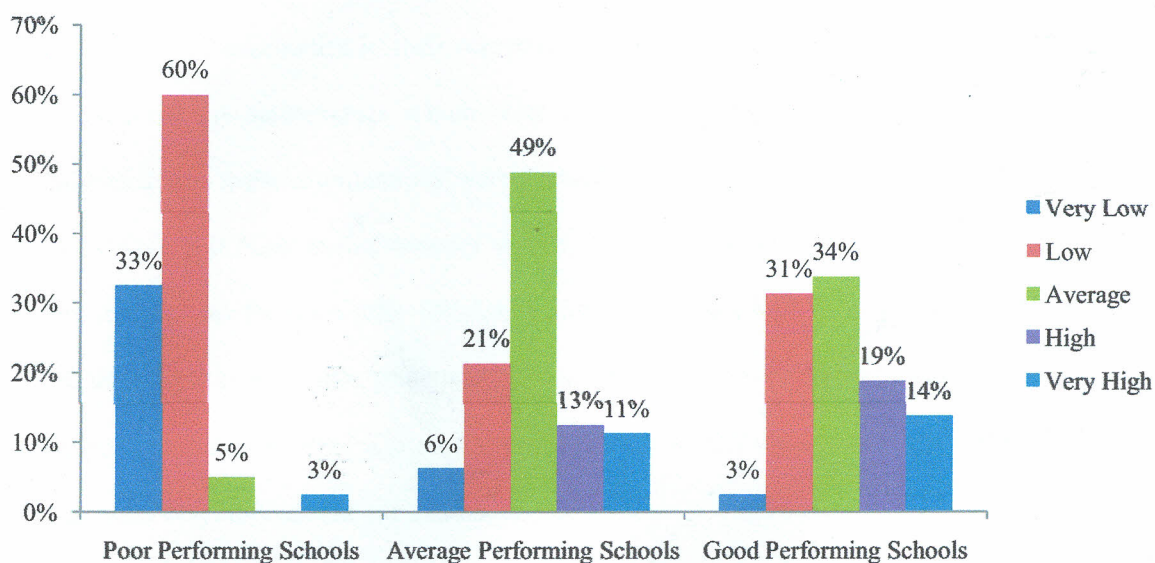


Figure 4.5: Interaction between levels of assessment and performance in mathematics

The findings revealed that a combined majority of students from poor performing schools (93%) recorded very low to low (33% and 60% respectively) assessment scores compared to a cumulative 28% and 34% of students from average and good performing schools respectively with similar assessment score categories. On the contrary, a cumulative 33% of students from good performing schools had scores ranging from “high” to very high in assessment compared to 24% and a paltry 3% of students from average and poor performing schools respectively that fell within the same cumulative score categories. Those who had average scores were 48% from average performing schools, 34% good and 5% from poor performing schools.

The high percentage (48%) of average score in assessment tests for the average performing schools explains their position in so far as performance in K.C.S.E performance in mathematics

is concerned. This trend also explains the positions of the poor and good performing schools based on the performance indices.

School principals confirmed the foregoing findings, where those of good performing schools indicated that mathematics in their respective schools had their students sit regular assessment examinations in mathematics which were administered on a weekly basis. The principals confirmed that these examinations were marked and revision done within the week while the issues were still fresh in the students' minds. Those of average performing schools confirmed that students sat for such tests fortnightly though marking took longer due to slightly heavy teachers' workloads, while principals of poor performing schools indicated that they lacked adequate resources to offer assessment tests regularly besides teachers' heavy workloads that left them with very limited time for extra assessments.

The total scores were used to compute the Pearson's Product Moment Correlation Coefficient to establish whether there was a relationship between assessment scores and performance in mathematics at the K.C.S.E level. The findings were as shown in Table 4.11.

Table 4.11: Relationship between Assessment Tests and School Performance

		School Performance	Assessment Tests
School Performance	Pearson Correlation	1	.383**
	Sig. (2-tailed)		.000
	N	240	240
Assessment Tests	Pearson Correlation	.383**	1
	Sig. (2-tailed)	.000	
	N	240	240

** . Correlation is significant at the 0.001 level (2-tailed).

The PPMC analysis revealed that there was a significant, positive relationship ($r = 0.383$, $N=240$, $\rho < .001$) between assessment tests and school performance. The correlation was weak.

Performance at the K.C.S.E level was associated with high levels of assessment tests.

4.6.2 Marking Students' Work and Performance in Mathematics

Marking of student's work was evaluated based on the students' responses to questionnaire item number 8 (VI and VII). The total scores from the responses ranged from 2-10. Therefore, for descriptive statistics, marking of students' work was categorized into three: "Low" (2-4); "Average" (5-7); and "High" (8-10). The interaction between marking of students work and performance in mathematics is as shown in Figure 4.6.

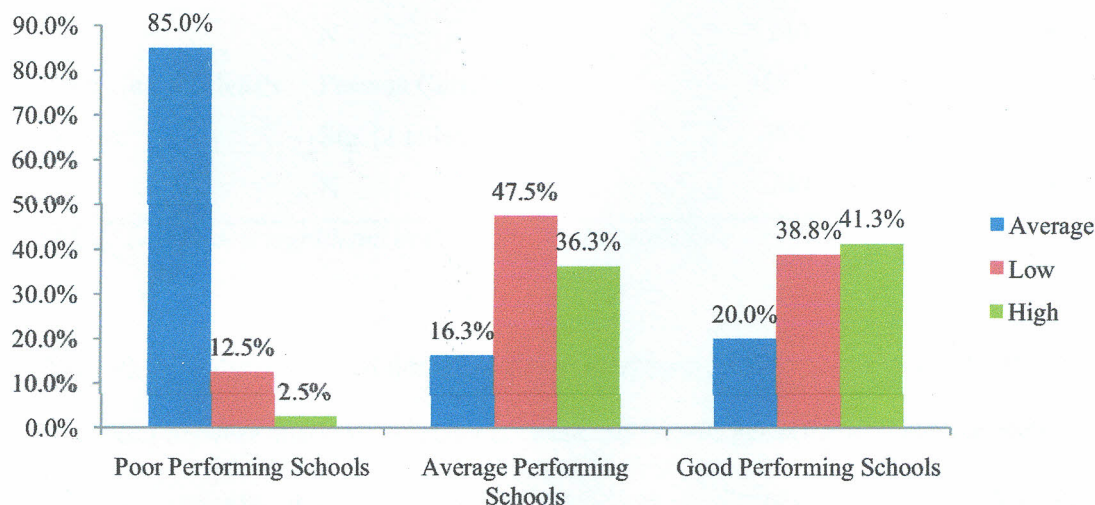


Figure 4.6: Marking of students' work and performance in mathematics

The findings indicate that majority of students from poor performing schools (85%) recorded low scores in teachers' marking of mathematics work compared to 16% and 20% from average and good performing schools respectively who recorded similarly low scores for marking of students' mathematics work. 41%; 36% and 3% of students from Good, Average and Poor

performing schools respectively recorded “High” scores in teachers’ marking of mathematics. On the other hand, 48%, 39% and 13% of students from Average, Good and Poor performing schools obtained “Average” score in this dimension of assessment practices. These findings equally reflect the respective performance indices for the three categories of schools studied.

The total scores were used to compute the Pearson’s Product Moment Correlation Coefficient to establish whether there was a relationship between marking of students’ work and performance in mathematics at the K.C.S.E level. The findings were as shown in Table 4.12.

Table 4.12: Between Marking of Students’ Work and Performance in Mathematics

		School Performance	Marking Student's Work
School Performance	Pearson Correlation	1	.456**
	Sig. (2-tailed)		.000
	N	240	240
Marking Student's Work	Pearson Correlation	.456**	1
	Sig. (2-tailed)	.000	
	N	240	240

***.* Correlation is significant at the 0.001 level (2-tailed).

The PPMC analysis revealed that there was a significant, positive relationship ($r = 0.456$, $n=240$, $\rho < .001$) between marking of students’ work and school performance. The correlation was of moderate strength, indicating that performance in mathematics at the K.C.S.E level was associated with regular marking of students’ mathematics work.

4.6.3 Overall Influence of Assessment Practices on Performance in Mathematics

The index for assessment practices was obtained by adding assessment tests scores to marking of students’ work scores. The total scores were used to compute a Pearson Product Moment

Correlation to the magnitude of the relationship between assessment-related factors and performance in mathematics at the K.C.S.E level. The findings were as shown in Table 4.13.

Table 4.13: Relationship Between Assessment Practices and Performance in Mathematics

		School Performance	Assessment Practices
School Performance	Pearson Correlation	1	.460**
	Sig. (2-tailed)		.000
	N	240	240
Assessment Practices	Pearson Correlation	.460**	1
	Sig. (2-tailed)	.000	
	N	240	240

***. Correlation is significant at the 0.01 level (2-tailed).*

There was a significant, positive relationship ($r = 0.46$, $n=240$, $\rho < .01$) between assessment practices and school performance in mathematics at the K.C.S.E level. The correlation was of moderate strength, indicating that good performance in mathematics at the K.C.S.E level was associated high scores in assessment practices.

From the foregoing findings, it was concluded that assessment practices had a significant influence on performance in mathematics. The null hypothesis (H_0) that there is no statistically significant influence of assessment practices on students' performance in mathematics at K.C.S.E level was therefore rejected.

Giving students many assessment tests enhances their confidence and enables them to grasp and remember mathematics concepts easily. This subsequently leads to good performance in mathematics. This is in agreement with Wilson (1986) who notes that the techniques and frequency of assessment of examination do profoundly affect achievement. Black and Wiliam, (1998) add that use of formative assessment in classroom setting has an important contribution that it can make to effective teaching and learning. Assessment tests offer immediate information

to support important teaching functions. On the other hand, Marking of assignments while commenting on students work with follow up revision gives the students an opportunity not only to understand mathematics concepts better but also enables them to realize their shortcomings and make necessary corrections. This enhances grasping and retention of mathematical concepts.

4.7 Student -Related Factors

The study sought to establish the influence of student-related factors and their performance in mathematics at the K.C.S.E level. Student-related factors were evaluated based on the student's questionnaire item numbers 2-7. This section therefore presents findings on the relationships between; Students' Attitude; Time Spent Studying Mathematics; Students' entry Behavior and Peer Influence and Mathematics Performance.

4.7.1 Students' Attitude and Performance in Mathematics

Students' attitude was evaluated based on student's questionnaire item number 3 (I-VI). The students were asked to indicate the level of their agreement with the statements that reflected their attitude in mathematics. Scores were awarded based on the responses received where a score of 5 was adopted for "Strongly Agree"; 4 – "Agree"; 3 – "Undecided"; 2 – "Disagree" and 1 for "Strongly Disagree". Total scores ranged from 10-29. Therefore, for descriptive statistics, student's attitude was categorized into "Negative" (10-16); "Neutral" (17-23) and "Positive" 24-29. The total scores were used for further correlation analysis.

The findings in Table 4.14 indicate that, in the poor performing schools majority of the students at 52.5% had neutral attitude in mathematics followed by 27.5% negative and only 20% with positive attitude. Among the students in the average performing schools, attitude levels were:

Neutral (37.5%), positive (47.5%) and negative (15%) while students in good performing schools had Neutral (49%) and positive (51%) attitudinal rankings.

Table 4.14: Students' Attitude and Performance in Mathematics

Student Attitude Levels	School Performance Category			Total
	Poor	Average	Good	
Negative	27.5%	15%		14.2%
Neutral	52.5%	37.5%	48.8%	46.3%
Positive	20%	47.5%	51.3%	39.5%
Total	100%	100%	100%	100%

The findings in the table above imply that students in good and average performing schools had higher attitudes towards mathematics than those from poor performing schools. The total scores were used to compute PPMC to establish whether there was a relationship between the students' attitudes and students' performance in mathematics at K.C.S.E level. The findings were as shown in Table 4.15.

Table 4.15: Relationship between Student Attitude and School Performance

		School Performance	Student Attitude
School performance	Pearson Correlation	1	.351**
	Sig. (2-tailed)		.000
	N	240	240
Student Attitude	Pearson Correlation	.351**	1
	Sig. (2-tailed)	.000	
	N	240	240

** . Correlation is significant at the 0.001 level (2-tailed).

There was a significant, weak positive relationship ($r = 0.351$, $N=240$, $p < .01$) between Student Attitude and performance. Performance at the K.C.S.E level was associated with positive students' attitudes towards mathematics.

4.7.2 Time Spent Studying Mathematics and Mathematics Performance

Time spent by the student studying mathematics was evaluated based on the time spent by the student studying mathematics outside class timetable on their own. Students were therefore asked to indicate how often they spent by the student studying mathematics outside class timetable on their own. The findings were as shown in Table 4.16.

Table 4.16: Time spent Studying Mathematics outside Class Timetable

Time Spent studying	School Performance Category			Total
	Poor	Average	Good	
Rarely	22.5%	17.5%	12.5%	17.5%
Once a Week	2.5%	2.5%	2.5%	2.5%
2 Times a week	5.0%	7.5%	7.5%	6.7%
3 times a week	32.5%	20%	2.5%	18.3%
Daily	37.5%	52.5%	75%	55%
Total	100%	100%	100%	100%

The findings revealed that 75% of students in good; 53% in average and 38% in poor performing schools studied mathematics on a daily basis at their own time outside the class timetable. The percentage of students who rarely studied mathematics at their own time was higher in poor performing schools (23%) compared to average (18%) and good (13%) performing schools. Principals of poor performing schools reported that their students had poor reading habits and rarely spent time studying mathematics on their own. Average performing schools' principals indicated that at least their students spent some time studying mathematics on their own, while those of good performing schools lauded their students for taking personal initiatives and devoting personal time to ensure good performance in the subject.

Scores were awarded to the students depending on the frequency of studying mathematics at their own time outside class timetable where a score of 1 was adopted for rarely; 2 for once a week; 3 for twice a week; 4 for three times a week and 5 for daily studies. These scores were used to conduct a Pearson's Product Moment Correlation Coefficient analysis to determine whether there was a relationship between time spent in mathematics and performance in the subject at the K.C.S.E level. The findings were as shown in Table 4.17.

Table 4.17: Relationship Between Time Spent Studying Mathematics and performance in mathematics

		Type of school	Time spent studying Mathematics
Type of school	Correlation Coefficient	1.000	.243**
	Sig. (2-tailed)	.	.001
	N	240	240
Time spent studying	Correlation Coefficient	.243**	1.000
	Sig. (2-tailed)	.001	.
Mathematics	N	240	240

***. Correlation is significant at the 0.01 level (2-tailed).*

There was a significant, positive relationship ($r = 0.243$, $n=240$, $\rho < .01$) between time spent by the student studying mathematics outside the class timetable and performance in K.C.S.E. The correlation was weak. Performance at the K.C.S.E level was associated with more time spent studying mathematics outside the class timetable.

4.7.3 Entry Behaviour and Mathematics Performance

Student's entry behavior was based in their performance in mathematics at the K.C.P.E level. The student respondents were asked to indicate their mean grades in mathematics at the K.C.P.E level. This was to establish whether there were any differences in the entry grades with respect to the different school categories. The findings were as shown in Table 4.18.

Table 4.18: Student Respondents' K.C.P.E Performance in Mathematics per School Category

Performance Category	K.C.P.E Score in Mathematics					Total
	E	(D-) – (D+)	(C-) – (C+)	(B-) – (B+)	(A-) – (A)	
Poor	2.5%	12.5%	50%	32.5%	2.5%	100%
Average		3.8%	30%	48.8%	17.5%	100%
Good			15%	68.8%	16.3%	100%
Total	0.5%	4.0%	28.0%	53.5%	14.0%	100%

The findings revealed that whereas a majority of student respondents from the poor performing schools (50%) had an average of grades between (C-) - (C+) in their K.C.P.E, majority of those in average performing (49%) and good performing schools (69%) had mean grades of (B-) - (B+). The good performing schools did not have student respondents with lower than grade C- while the average performing schools had only 4% who had a mean grades of between (D-) – (D+) compared to 13% in the same performance range from poor performing schools. The poor performing schools had at least 3% with E scores in K.C.P.E mathematics. These findings reflect the disparities in the secondary school admission procedures where schools perceived to be good

admit students with higher scores in the K.C.P.E compared to the poor schools where majority of the admissions are based on lower thresholds.

A Pearson Product Moment Correlation was conducted to establish whether there was a relationship between student's performance in K.C.P.E mathematics and performance in mathematics at the K.C.S.E level. The findings were as shown in Table 4.19.

Table 4.19: Relationship Between Student's Entry Behaviour Mathematics and performance in K.C.S.E mathematics

		K.C.S.E Performance	K.C.P.E Score in Mathematics
K.C.S.E Performance	Pearson Correlation	1	.375**
	Sig. (2-tailed)		.000
	N	240	240
K.C.P.E Score in Mathematics	Pearson Correlation	.375**	1
	Sig. (2-tailed)	.000	
	N	240	240

***. Correlation is significant at the 0.001 level (2-tailed).*

There was a significant, positive relationship ($r = 0.375$, $n=240$, $\rho < .001$) between Student's performance in K.C.P.E and K.C.S.E performance. The correlation was weak. Performance at the K.C.S.E level was associated with students' entry behavior.

4.7.4 Peer Influence and Mathematics Performance

Peer influence was evaluated based on whether students belonged to mathematics discussion groups or not. Table 4.20 shows the descriptive matrix of the relationship.

Table 4.20: Peer Influence and Mathematics Performance

Belonging Mathematics Discussion Group		School Performance Category			
		Poor	Average	Good	Total
No	Frequency	34	14	7	55
	Expected Frequency	18.3	18.3	18.3	55.0
	Percentage	42.5%	17.5%	8.8%	22.9%
Yes	Count	46	66	73	185
	Expected Frequency	61.7	61.7	61.7	185.0
	Percentage	57.5%	82.5%	91.3%	77.1%
Total	Count	80	80	80	240
	Expected Frequency	80	80	80	240
	Percentage	100.0%	100.0%	100.0%	100.0%

The findings in the table indicate that among the students in the poor performing schools, 58% belonged to mathematics discussion groups compared to 83% and 91% of students who belonged to the groups in average and good performing schools respectively. A Pearson chi-square test was conducted to establish whether there was a relationship between peer influence and performance in mathematics at the K.C.S.E level. The findings were as shown in Table 4.21.

Table 4.21: Relationship between peer influence and performance in mathematics

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	27.786 ^a	2	.000
Likelihood Ratio	27.601	2	.000
Linear-by-Linear Association	25.685	1	.000
n of Valid Cases	240		

0 cells (.0%) have expected count less than 5. The minimum expected count is 18.33.

There was a significant relationship between peer influence and performance in mathematics (Chi-square value = 27.786, df = 2, $\rho < 0.01$). The Chi-square (χ^2) value 27.8 was significant at 0.01 confidence level, students' participation in peer mathematics discussion groups caused a statistically significant influence on performance in mathematics.

4.7.5 Overall Influence of Student-Related Factors on Mathematics Performance

Scores for individual student-related factors were added together to obtain an index for the student-related factors. The total scores ranged from 15-41. For descriptive analysis, the scores for student-related factors were categorized into “Very low” (15-19); “Low” (20-25); “Average” (26-30); “High” (31-35) and “Very high” (36-41). The totals scores were used for further correlation analysis. Figure 4.7 shows the interaction between student-related factors and performance in mathematics.

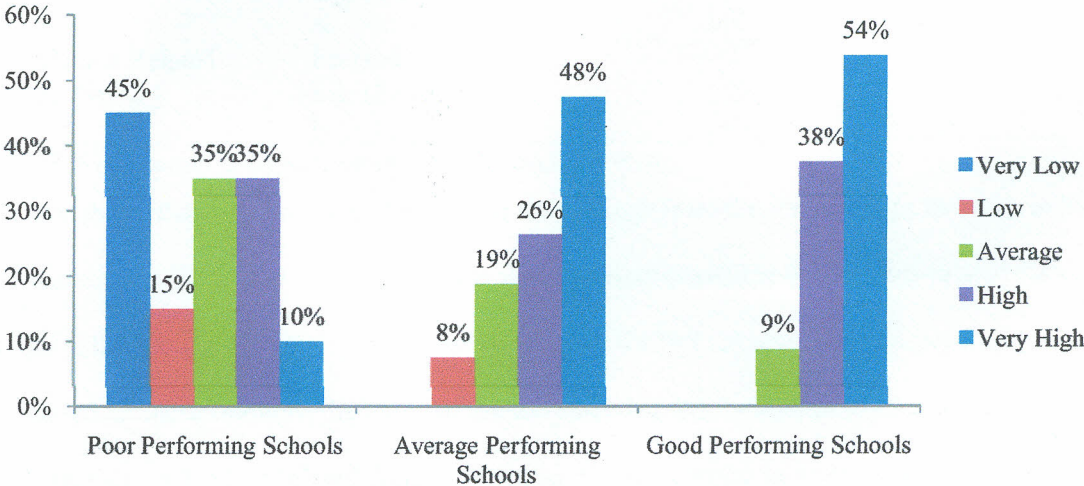


Figure 4.7: Interaction between student-related Factors and performance in mathematics

Generally, students in good performing schools scored between “average” to “very high” compared to those in average performing schools who had between “Low” to “very high” and

the those in poor performing schools who had some students with “very low” scores. Good performing schools had 54% of students scoring “Very high” compared to 48% and 10% from average and poor performing schools respectively with similar scores. The total scores were used to compute a Pearson Product Moment Correlation to the magnitude of the relationship between student-related factors and performance in mathematics at the K.C.S.E level.

The findings revealed that there was a significant, positive relationship ($r = 0.423$, $n=240$, $\rho < .01$) between student-related factors and performance in mathematics at the K.C.S.E. The correlation was of moderate strength. Good performance in K.C.S.E mathematics was associated with higher scores in student-related factors. The findings were as shown in Table 4.22.

Table 4.22: Relationship Between Student-Related Factors and Performance in Mathematics

		School Performance	Student Related Factors
School Performance	Pearson Correlation	1	.423**
	Sig. (2-tailed)		.000
	N	240	240
Student Related Factors	Pearson Correlation	.423**	1
	Sig. (2-tailed)	.000	
	N	240	240

***. Correlation is significant at the 0.01 level (2-tailed).*

The above findings, considered alongside the findings from the relationships between individual student-related factors and performance in mathematics confirm that student-related factors had an influence on the performance of students in K.C.S.E Mathematics in secondary Schools. Based on these findings, the null hypothesis ($H0_4$) that there would be no statistically significant influence of Student-related factors on students’ performance in mathematics at K.C.S.E level was rejected.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter is a summary of the findings from the analysis of data of the study's respondents, conclusions and recommendations based on the findings of the research study. The chapter also provides suggestions for further research in the field of mathematics.

5.2 Summary of the Findings

The purpose of the study was to analyze the factors that influence students' performance in the Kenya Certificate of Secondary Education mathematics examinations in Borabu District. Specifically, the study sought to determine the influence of teacher-related factors, school-related factors, assessments practices and student-related factors on students' performance at the K.C.S.E level.

The study utilized 240 student and 30 teacher respondents. Majority of student respondents from the poor performing schools (50%) had average of grades of between (C-) - (C+) in their K.C.P.E, while a majority of those in average performing (49%) and good performing schools (69%) had mean grades of (B-) - (B+).

With regard to teacher-related factors, the study established that there was a significant, positive relationship between teaching experience ($r = 0.402, n=30, \rho < .05$) and promotion of personal and professional growth ($r = 0.516, n=30, \rho < .001$) and school performance in mathematics but no relationship existed between academic/professional qualifications and students' performance in mathematics. There were also positive relationships between the various teaching approaches

adopted by the teacher: telling students about how mathematics could be applied to real life situations during lessons ($r = 0.442$, $n=240$, $\rho < .001$); involving students in activities that encourage them to use mathematics in thinking and reasoning ($r = 0.312$, $n=240$, $\rho < .001$); Teacher advising students on the possible careers in mathematics ($r = 0.176$, $n=240$, $\rho < .05$); and the teacher telling students how mathematics is related to other subjects at the secondary school level ($r = 0.142$, $n=240$, $\rho < .05$) and school performance in mathematics respectively. Additionally, a significant, positive relationship was established between team teaching and school performance in mathematics at the K.C.S.E level relationship ($r = 0.621$, $n=30$, $\rho < .001$).

With regard to School-related factors, majority of mathematics teachers in poor performing schools (50%) had more than 28 lessons per week compared to 20% of teachers in average performing schools with a similar number of lessons. Good performing schools did not have any teacher with more than 28 lessons. On the other hand, 50% of mathematics teachers in good performing schools had between 13 to 20 mathematics lessons indicating that teachers in low performing schools had heavier workloads compared to those in average and good performing schools. In terms of class size, 80% of teachers in poor performing schools had between 41-50 students compared to 50% and 20% in average and good performing schools with similar class sizes. Comparatively, teachers in good performing schools had smaller class sizes with a majority at 70% having 31-40 students. There was a significant, positive relationship between teachers' workload and school performance ($r = 0.555$, $n=30$, $\rho < .001$). There was also a significant, positive relationship between physical resources and school performance ($r = 0.65$, $n=30$, $\rho < .001$). Overall, there was a significant positive relationship between school-related factors and performance in mathematics at the K.C.S.E ($r = 0.743$, $n=30$, $\rho < .001$), leading to

the rejection of the null hypothesis (H_{02}) that there would be no statistically significant influence of School-related factors on students' performance in mathematics at K.C.S.E.

A combined majority of students from poor performing schools (93%) recorded very low to low (33% and 60% respectively) mathematics assessment scores compared to a cumulative 28% and 34% of students from average and good performing schools respectively with similar assessment score categories. The PPMC analysis established a significant, positive relationship between assessment tests and school performance ($r = 0.383$, $N=240$, $\rho < .001$). In addition, there were significant, positive relationships between marking of students' work ($r = 0.456$, $n=240$, $\rho < .001$) and overall assessment practices ($r = 0.46$, $n=240$, $\rho < .001$) and school performance in mathematics at the K.C.S.E level, equally necessitating the rejection of the null hypothesis (H_{03}) that there is no statistically significant influence of assessment practices on students' performance in mathematics at K.C.S.E.

Evaluation of the student-related factors established that in the poor performing schools, majority of the students at 43% had somehow negative attitude in mathematics followed by 35% somehow positive, 13% negative and only 10% positive. Among the students in the average performing schools, attitude levels were: positive (45%), somehow positive (31%), somehow negative (20%), negative (4%) while students in good performing schools had somehow positive (53%), positive (39%) and somehow negative (9%) attitudinal rankings. In the same regard, there was a significant, positive relationship between Students' Attitude and school performance in mathematics ($r = 0.351$, $N=240$, $\rho < .001$). There was a significant relationship between students' characteristics and performance in mathematics (Chi-square value = 17.5, $df = 2$, $\rho < 0.001$). 75% of students in good and 53% in average and 38% in poor performing schools studied mathematics on a daily basis at their own time outside the class timetable. There was a

significant, positive relationship between time spent by the student studying mathematics outside the class timetable and performance in K.C.S.E ($r = 0.243$, $n=240$, $\rho < .001$); Student's performance in K.C.P.E and K.C.S.E performance ($r = 0.375$, $n=240$, $\rho < .001$) and peer influence and performance in mathematics (Chi-square value = 38.2, $df = 8$, $\rho < .001$). Overall there was a significant, positive relationship ($r = 0.423$, $n=240$, $\rho < .001$) between student-related factors and performance in mathematics at the K.C.S.E. Consequently, null hypothesis (H_{04}) that there would be no statistically significant influence of Student-related factors on students' performance in mathematics at K.C.S.E level was rejected.

5.3 Conclusions

Based on the findings of the study, the study concluded that:

1. Teacher's promotion of personal and professional growth, teaching experience and teaching approaches significantly influence students' performance in mathematics. However, there was no significant relationship between teacher's academic and professional qualification and the overall school performance in mathematics given that teachers in all the schools across the board have similar academic/professional qualifications.
2. Factors militating around the school's human resources, teaching/learning facilities class size, significantly influence students' performance in mathematics at K.C.S.E. Heavy workloads for teachers are associated with poor students' performance in mathematics as is bigger class size and limited utilization of teaching/learning facilities
3. Student's assessment approaches in mathematics significantly influence their ultimate performance in the subject. The more the assessment tests the higher the chances of students performing well in mathematics. Marking of students' work promptly provides a feedback to

the students as regards areas they may be weak and thus reinforces understanding of mathematical concepts.

4. The overriding student-related factors that significantly influence their performance in mathematics include attitude towards mathematics; students' personal study characteristics and habits; time spent by the student studying mathematics and peer influence. Positive orientations of these factors translate to better students' performance in the subject.

5.4 Recommendations for Action

The study recommends that:

1. The study has shown that teachers' promotion of personal and professional growth positively influences students' performance. The school administration/managements should therefore provide teachers with opportunities and support to attend workshops/seminars to equip them with contemporary mathematics teaching skills. This will go a long way in ensuring that they are kept up to date on relevant teaching methodologies thus enhancing students' performance in Mathematics
2. Given the positive relationship between students' attitude and their performance in mathematics, mathematics teachers should endeavour to inculcate positive attitudes towards mathematics among the students with a view to changing the negative attitudes/perceptions among learners that the subject is only for the academic "elite".
3. The study clearly established that mathematics teachers in poor performing schools have heavier workloads than their counter parts in average and good performing schools. In this regard, the government should employ more mathematics teachers and deploy them to poor performing schools to ease the teachers' workload. This will ensure that learners in such

schools have increased teacher attention to attend to their individual needs thereby improving performance in the subject.

4. The positive influence of assessment practices on students' performance in mathematics should serve as an encouragement to the mathematics teachers to give more tests to their learners for practice, which should also be marked and revised with the learners to ensure that they understand where they may have missed the concept.
5. Schools should provide more mathematics teaching learning facilities such as models, books, chalkboards and charts to inspire mathematics interest among the students. However, teachers may also improvise such useful materials where possible while parents should be encouraged by the school administration to supplement such facilities by providing enough text books to their children.

5.5 Suggestions for Further Studies

The following are some of the areas for further research:

1. This study was carried out in a rural setting. Therefore, a comparative study on students' performance in mathematics in urban and rural schools would be necessary.
2. Learners' cognitive ability is a student-related variable that was not addressed by the current study, which may influence teachers' commitment to classroom instruction with respect to instruction in mathematics. A study on the relationship between teacher's perceptions of the learner's cognitive abilities in mathematics and their commitment to classroom instruction in mathematics is therefore recommended.

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Appendix A:

STUDENTS' QUESTIONNAIRE

INTRODUCTION:

This questionnaire seeks to establish the factors that influence students' performance in mathematics at K.C.S.E school level and suggest possible solutions. It has 4 parts; namely respondents profile and the others are questions related to the study objectives.

You are not required to fill in your names. All information given will be treated with utmost confidentiality and will only be used for this study.

Section A: Respondent Profile

Please fill in the blanks or tick or answer questions truthfully. Thank you.

1. Kindly indicate your sex

- Male
 Female

2. What was your K.C.P.E score in mathematics?

- E D C B A

Section B: Student-Related Factors and Performance in Mathematics

3. In the table below, use a tick (✓) to indicate your level of agreement as it relates to the following statements. Where SA = *strongly Agree*; A = Agree; U = Uncertain; D = Disagree; SD = Strongly Disagree

No.	Statement	SA	A	U	D	SD
I.	Making an effort in mathematics is worth it because it will help me in the work that I want to do later					
II.	My future career will require mathematics					
III.	Am just good at mathematics					
IV.	I learn mathematics quickly					
V.	I am not worried because I know I will get good marks in mathematics					
VI.	I understand mathematics concepts easily					

4. Do you belong to any mathematics discussion group in your school?

- Yes No

5. If yes, how often do you meet to discuss and practice and solve problems in mathematics?
 Daily 3 times a week 2 times a week Once a week Rarely
6. Do you have a personal study timetable?
 Yes No
7. If yes, how often do you spend time studying mathematics outside class timetable on your own?
 Daily 3 times a week 2 times a week Once a week Rarely

Section C: Assessment Practices and Performance in Mathematics

8. In the table below, use a tick (✓) to indicate your level of agreement as it relates to the following statements. Where SA = *strongly Agree*; A = *Agree*; U = *Uncertain*; D = *Disagree*; SD = *Strongly Disagree*

No.	Statement	SA	A	U	D	SD
I.	Our mathematics teacher frequently gives us assignments					
II.	Our mathematics teacher frequently asks us questions related to content being taught during his lessons					
III.	We do mathematics tests regularly					
IV.	Our mathematics teacher always informs us when we are to do our tests.					
V.	Our mathematics teacher likes giving us impromptu tests.					
VI.	Our mathematics teacher regularly marks our assignment and puts comments on our work or revises with us in class					
VII.	Our mathematics teacher usually marks the test and revises with us.					

Section D: Teacher-related Factors and Performance in Mathematics

9. In the table below, use a tick (√) to indicate your level of agreement as it relates to the following statements. Where SA = *strongly Agree*; A = *Agree*; U= *Uncertain*;

D = *Disagree*; SD = *Strongly Disagree*

Statement	SA	A	U	D	SD
I Our mathematics teacher usually tells us about how mathematics can be applied to real life situations during lessons					
II Our mathematics teacher usually involves us in activities that encourage us to use mathematics in thinking and reasoning					
III Our mathematics teacher usually advises us on the possible careers in mathematics.					
IV Our mathematics teacher tells us how mathematics is related to other subjects that we take at the secondary school level					

Thank you for responding to the questions. I wish you success in your academics

Appendix B:

TEACHERS' QUESTIONNAIRE

Serial no.

This questionnaire seeks to establish the factors that influence students' performance in mathematics at K.C.S.E school level and suggest possible solutions. It has 4 parts; namely respondents profile and the others are questions related to the study objectives.

You are not required to fill in your names. All information given will be treated with utmost confidentiality and will only be used for this study.

Section A: Respondent Characteristics

Please fill in the blanks or tick or answer questions truthfully Thank you.

1. Kindly indicate your sex

Male

Female

2. What is your highest professional qualification?

Dip Educ.

B.ED

PGDE

M.ED

Other specify _____

3. How many years have you taught mathematics?

Less than one year

1-3 years

4-6 years

7-9 years

10 years and above

4. Have you ever attended any seminar/workshop on mathematics

Yes

No

5. If yes, how often do you attend such seminars?
 Rarely Once in a year once in a term frequently
6. Have you ever attended any induction/in-service course in mathematics?
 Yes No
7. To what extent do you use team teaching in mathematics in your department?
 Not at all
 To a limited extent
 To a moderate extent
 To a great extent
 To a very great extent

Section B: School Related Factors and Performance in Mathematics

8. How many lessons do you teach in a week?
 8-12 13-20 20-28 above 28
9. How many students are there in your mathematics class?
 30 & below 31- 40 41 - 50 other specify _____
10. What is the mathematics student/ textbook ratio in your class?
 1:1 1:2 1:3 1:4 Other Specify
11. Indicate the status of the following facilities for teaching/learning of mathematics in your school:

	<i>Not available and never used</i>	<i>Inadequate and rarely used</i>	<i>Somehow adequate and sometimes used</i>	<i>Adequate and frequently used</i>
i) Mathematics course books				
ii) Mathematics reference books				
iii) Blackboard rulers				
iv) Mathematics models				

Appendix C:

Interview Schedule for Principals

This study seeks to establish the factors that influence students' performance in mathematics at K.C.S.E school level and suggest possible solutions. You have been selected to participate in the study as your views are considered very important in reaching at desirable conclusions. I am therefore going to ask you a few questions related to the study.

1. Comment on the students' attitude in mathematics in your school
2. a) What is the frequency of assessment tests given by mathematics teachers to students in your school?
b) Comment on the marking of the tests when administered.
3. What teaching approaches do mathematics teachers use in your school?
4. Comment on the adequacy of teaching/learning facilities for mathematics in your school
5. How does the number of lessons handled by mathematics teachers affect students' performance in the subject in your school?

Thank you for your participation

Appendix D:

List of Secondary Schools in Borabu District

1. Nyansiongo Boys High
2. Menyanya S.D.A
3. St. Patricks Kahawa
4. St. Andrews Kaggwa Girls
5. Rigoko secondary
6. Kineni mixed
7. Itumbe secondary
8. St. Thomas Moore Riangombe
9. St. Josephs Lietego
10. Mecheo secondary
11. Tinderet secondary
12. Kekinga secondary
13. St. Pauls Nyandoche Ibere
14. St. James Nyaronde
15. Onsando secondary
16. St. Mathias Mulumba
17. St. Gonzaga Gonza – Isoge
18. Mwongori secondary
19. Mugusii secondary
20. Manga girls
21. Eronge S.D.A Girls
22. AIC Gietai Girls
23. Matutu S.D.A

Appendix E:

Research Permit


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Research Permit No. **NCST/RCD/14/012/1283**

Date of issue **13th September, 2012**

Fee received **KSH. 1,000**

THIS IS TO CERTIFY THAT:
Prof./Dr./Mr./Mrs./Miss/Institution
Peter Arege Maina
of (Address) Kenyatta University
P.O.Box 43844-00100, Nairobi
has been permitted to conduct research in
Borabu District, Nyanza Province
on the topic: Factors influencing KCSE
performance in mathematics among secondary
school students in Borabu District, Nyamira
County, Kenya,
for a period ending: 31st December, 2012.



Applicant's Signature

Secretary National Council for Science & Technology