AN ASSESSMENT OF FACTORS AFFECTING STUDENTS’ PERFORMANCE IN MATHEMATICS AT K.C.S.E LEVEL IN SECONDARY SCHOOLS IN KAKAMEGA COUNTY, KENYA

BY
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DEDICATION

This research project is dedicated to the Almighty God, who gave me the physical and mental strength to undertake and accomplish this work in the prescribed period of time, and to my principal Mr. Oliver Minish, staff mate Mr. David Sikulu who encouraged me to have an optimistic outlook on life and my daughter Faith for her inspiration for encouragement during my study period, without which I could not have made it to this level.
DECLARATION

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

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ABBREVIATIONS AND ACRONYMS

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>BED</td>
<td>Bachelor of Education</td>
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<tr>
<td>DEO</td>
<td>District Education Officer</td>
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<tr>
<td>Dip Ed</td>
<td>Diploma in Education</td>
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<tr>
<td>GNP</td>
<td>Gross National Product</td>
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<tr>
<td>IPAR</td>
<td>Institute of Policy Analysis and Research</td>
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<tr>
<td>KACE</td>
<td>Kenya Advanced Certificate of Education</td>
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<tr>
<td>KCSE</td>
<td>Kenya Certificate of Secondary Education</td>
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<tr>
<td>KIE</td>
<td>Kenya Institute of Education</td>
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<tr>
<td>KNEC</td>
<td>Kenya National Examination Council</td>
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<tr>
<td>MED</td>
<td>Master of Education</td>
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<tr>
<td>MoE</td>
<td>Ministry of Education</td>
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<tr>
<td>NGOs</td>
<td>Non-Governmental Organizations</td>
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<td>NLT</td>
<td>National Literacy Trust</td>
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<tr>
<td>PGDE</td>
<td>Post Graduate Diploma in Education</td>
</tr>
<tr>
<td>QASO</td>
<td>Quality Assurance and Standards Officer</td>
</tr>
<tr>
<td>RoK</td>
<td>Republic of Kenya</td>
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<tr>
<td>SCII</td>
<td>School Curriculum Implementation and Impact</td>
</tr>
<tr>
<td>SPSS</td>
<td>Statistical Package for Social Sciences</td>
</tr>
<tr>
<td>UNESCO</td>
<td>United Nations Educational Scientific and Cultural Organization</td>
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<tr>
<td>UNICEF</td>
<td>United Nations International Children Education Fund</td>
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ABSTRACT

The purpose of the study was to assess the factors that affect students’ academic performance in Mathematics in Kakamega County. The study had five objectives: (i) Investigating the extent to which instructional methods contribute to the student’s performance in Mathematics at Secondary school level, (ii) find out the extent to which attitudes affect the performance in Mathematics in Kakamega County, (iii) assess the extent to which teachers experience affect study performance in Mathematics at secondary level in Kakamega County, (iv) find out the extent to which teachers qualification affect performance in Mathematics in Secondary schools in Kakamega County. (v) Investigate the extent to which physical and financial resources affect the performance in Mathematics in Kakamega County. The study was guided by Bruno’s theory of Knowledge and Organization. The study employed the Survey design. The survey design was selected for the study because it involves describing, recording, analyzing and reporting conditions as they are. The target population was 150 principals, 4,500 form four students, 60 teachers of mathematics and one QASO. This yielded a sample size of 15 schools based on the entry of boarding schools of each type of school. From each school, 1 Principal, 2 teachers of Mathematics and 45 students were sampled. Data was collected through a questionnaire, interview schedule for the county quality assurance and standards officer and observation schedule for the researcher. The data was manually coded and descriptive statistics used for analysis. The statistical package for social sciences SPSS, was used to analyze data and to determine the correlation co-efficient of each independent variable on the stepwise multiple regression analysis as well as the interactive effect of independent variables. A pilot study was conducted to validate as appropriate the research instruments before the actual research commenced. The research used split-half method to determine the reliability of the research instruments which scored, r = 0.78. Qualitative and quantitative data was collected and the findings were presented by use of descriptive narrative, frequencies and percentages. The study established that there was a strong positive relationship between the teachers level of classroom preparedness, practice and instructional methods which influence the students’ academic performance in Mathematics. The study further established that personal character, attitudes of students towards Mathematics was strongly affected by fellow students’ perception of the subject. The study established that teacher’s experience affect the academic performance in Mathematics to a great extent. Student-textbook ratio and student-teacher ratio did not directly influence student performance in Mathematics. From the findings, the study concluded that teachers rarely incorporated varied learning activities in Mathematics lessons, their teaching methods and strategies were ineffective and inefficient. To enhance the incorporation of learning activities during Mathematics instructions, the study recommended reduction of Mathematics teacher workload to afford them adequate time to prepare and deliver the content effectively and efficiently. There is need for mounting of more regular in service training and education on pedagogy and attitude change in Mathematics by both students and teachers. For performance in mathematics to improve in secondary schools in the County, the study recommended that the government and other educational stakeholders should provide secondary schools in the county with sufficient capital, learning materials and human resources which should be equitably distributed in good time, based on each school population of students to avoid learning and teaching disruptions.
CHAPTER ONE
INTRODUCTION

1.1 Introduction

This chapter deals with the background to the study, statement of the problem, purpose, objectives, research questions, significance of the study, assumptions, limitations, delimitations, theoretical framework, conceptual framework and definitions of central terms.

1.2 Background to the Study

Education has been an important aspect of human life throughout the history of mankind. Education is one most fundamental instrument that can be used to bring about positive change in life of an individual and that of an entire society as far as development is concerned. According to Ballara (1992) on education and human rights, education is a human right and a necessary condition for the full exercise of other human rights. Education is one of the inalienable rights of every person and has been recognized as such in both the universal declaration of human rights of 1947 and the universal covenant of economic, social and cultural rights (Orodho, 2005). Indeed education is perceived as a cornerstone of economic growth, social development and the principle means of improving the welfare of individuals (Ibid).

According to Makau (1986) on improving teacher effectiveness in the schools of Kenya, education has been perceived as a major weapon to liberate human kind in two senses: first, to socialize human beings to a level of making him/her work with others and second, to free himself/ herself from foreign bondage. This is particularly important in a developing country like Kenya, Carlen, C. (2002) Meta-

According to the World Bank Development Report of 1993:6, "A household improves rapidly as people escape poverty and low education." This report further states that a nation's income and stability to acquire and apply new scientific knowledge depend on the level of schooling of its population. Schultz and Denision, (1962) show that education contributes directly to the growth and national income by improving skills and productive abilities of labour force. Psacharopoulos and Woodhall (1985) concur with this view and argue that investment in human capital contributes to economic development. Emphasizing the importance of education to the individual Shanker (1993), as quoted by Huta, (2003:14) says: rich people know how they can pass on money to their children, they can pass on land, title deed but there is one great gift that workers can give their children and that is education. That is the best basis for hope that the children will live better lives, be able to move to a job, to a position within their societies that is different and better than the one they enjoy.”

Kenya, like many other developing countries in the world, appreciates the vital role that education plays in equipping its citizens with appropriate knowledge, skills and attitudes to enhance the realization of self-reliance and to work actively towards the maintenance and development of their society (Republic of Kenya, 1988). Consequently, the Kenya Government is devoted to the development and expansion of the education. This is being implemented by the provision of Free Day Secondary Education (FDSE).
Currently, Kenya's education structure is 8.4.4 in which pupils and students are required to spend a minimum of eight years in primary school, four years in secondary school and minimum of four years in university. The secondary cycle forms an important structure of the system and builds on the foundation laid at primary school level. Secondary school level seeks to strengthen the general intellectual skills that are more relevant to many occupations and subsequent education. The Kenya Government has endeavored to increase secondary school's quality and relevance to education.

Performance in national Examinations levels, determines who would transit from one cycle to the next cycle of the education in their systems. Such assessments are therefore very important; researchers have attempted to identify the factors that affect performance of students in the Kenya Certificate of Secondary Education in public secondary schools. Eshiwani, (1983); Njeru and Orodho (2003), identified adequacy of resources both human and physical to determine performance in national examinations. To improve the performance therefore requires improvement in the provision of teaching and learning resources. In addition, adequacy of teaching and learning resources; physical, human and instructional materials have been noted to be of crucial importance in determining the achievement of students in the national examinations (Eshiwani, 1993; Njeru and Orodho, 2003).

Instructional resources are an integral part of learning. Adequacy of instructional resources offers opportunities to the teachers to make learning more effective, lack of instructional resource imposes restriction, which may mean that the learners cannot be taught by methods that would otherwise be most suitable. Mereku, (2003) investigated the extent to which a particular activity based teaching method is employed in teacher’s
classroom practice and how effectively the method has improved performance.

Teacher qualities as measured by their education, knowledge, experience and certification have been linked to higher student achievement in terminal examinations (Scheerens, 1999). In addition, Hice, (1970) on studies in different subject fields that compare teachers with and without preparations found higher ratings result evidence and greater student learning gains for teachers who have formal preparation for teaching.

Teacher education, ability, training and experiences are associated with student achievements in final examinations (Raju, 1973). A study of high school students' examinations performance in various academic disciplines in, found that fully certified teachers have statistically significant positive impact on students test scores relative to teachers who are not certified in their respective subject areas, as teachers who hold a degree in these subjects (Green ward, Hedges and Laine, 1996). Studies conducted in United States on examination performance suggest that student achievement is higher when teachers have a minor or major university degree in the field they teach (Wenglisky, 2000).

Beginning teachers are rarely totally prepared to meet core classroom requirements, including classroom management. Yet, in the context of education reforms experience may not necessarily to translate into better teacher preparedness for certain classroom activities, unless experience teachers have had continued training to upgrade their skills and their knowledge in those areas.

Teaching experience might be expected to make a difference in being prepared to manage classrooms because these area of experience may be particularly problematic for beginning teachers. Jepsen, (2005). Teacher with few years of
teaching experience are less likely than more experience teachers to report being very well prepared to maintain order and discipline in the classroom.

The extent to which teachers feel prepared to implement the state curriculum also vary with newer teachers less likely than more experienced teachers to report being very well prepared for these classroom requirements. Newer teachers did not differ from more experienced teachers in addressing the needs of students with limited English proficiency or from diverse cultural background. Teaching experience affect classroom management. (Jepsen, 2005). However even schools with experience and long-serving teachers also low performance trends.

Eshiwani, (1993) states that school quality of teachers is important in school success in terms of examination performances. The training of teachers has some impact on pupils' performance in examinations. Raju, (1973) revealed that most rural schools lack properly trained teachers and have to accept unqualified teachers who may not be aware of modern trends in teaching methods and curricula. Training equips the teachers with the skills of delivering contents to students more effectively than when teachers have no training. Thus, the higher the professional training, the more effective a teacher should be and the better the performance by students examinations.

Human resource largely determines students' achievements. Mwamwenda and Mwamwenda (1987), on the effects of school's physical facilities and adequacy of teachers had a direct link with performance of pupils. The issue of teacher and student absenteeism is rapidly becoming an important topic area of education policy analysis in both developing and developed countries such as Kenya largely because of its impact on the examination performances. According to Scott and
McCcellan, (1990), of particular importance is the fact that teacher absence might on the transition from one level to the other affect good examination performance. Similarly, a study by (Anikeef, 1954; Dalton, Macenaro, and Nivarro, 2003; Lin and Chen, 2006) on determinants of secondary students’ performance found out that attending classes frequently yields a positive and significant impact on examination performance. Entry marks set for students transiting from primary to secondary education are also crucial determinants in examination performance. Kinad and Reinherz (1986) on the study reported differences between students with high entry and students with low marks in examination performance (ibid). In the same study, it was revealed that those students with high entry marks do score higher grades than students with low marks.

Despite the commitments of parents and community to supplement government efforts contributing in the provision of Free Day of Secondary Education (FDSE) and holding Harambees (self-help initiatives) to raise funds for schools, there has been a challenge in financing secondary education which has been perceived as costly. The immediate consequence of cost sharing policy in education in Kenya since 1988 at the secondary level has been the payment of fees. The fees and other school related costs such as uniforms, textbooks and building facilities have become very expensive for parents to afford. Thus, the dream of many parents to give secondary education to their children is becoming out of reach for most of them, making secondary education a preserve for the rich. However, the demand of education by students from poor households led to government’s preference for day secondary schools.
According to the Sessional Paper No. 6 of 1988 (Republic of Kenya, 1988), more day secondary schools be established. Increasing day schools would be a more cost-effective way of expanding and providing accessibility to secondary education as day schools are cheaper to establish and maintain than boarding schools. The report further indicated that day schools should be established within reasonable walking distance. It also pointed out that every secondary school should have a feeder primary school. This would enable those secondary and primary schools to share classrooms and playing fields in order to reduce the fixed costs of running the two institutions. Sessional Paper No. 6 of 1988 (Republic of Kenya, 1988), also recommended that single and double stream secondary schools should be expanded to become a minimum of three streamed schools. Such expansion would increase enrolment and be more economical in terms of teachers, facilities and other resources.

According to Sessional Paper No. 1 of 2005, the Kenya Government plans to promote the development of public day secondary schools as a means of expanding access and reducing costs to parents. The Kenya Government also plans to provide targeted instrumental materials to needy schools, (Republic of Kenya, 2000).

In academic performance, examination has therefore elicited a great research interest among scholars who have tried to investigate the factors that influence performance Duighan (1986), noted that there are many factors, which influence a students' performance in examinations. Some of these factors are external to the school, while others are internal. Internal factors are as follows:

Adequacy of teaching, learning and physical resources, leadership and decision making, effects of absenteeism on performance, adequacy of teacher
personnel, school culture and climate, teachers' behaviors. External factors are as follows: Academic and professional training of teachers, entry marks used as screening device, parental support and involvement, socio-economic background of students.

In Kenya, the same factors affect students' performance in KCSE examinations (Kibui, 1995). Similarly, it is evident from the research findings that most of the factors mentioned above influence students' performance in examinations in Kakamega County. Hutta (2003) on study examinations found that poor teaching, absenteeism among learners and teachers, irrelevant of the curriculum and inadequacy of the examination system, causes poor performance in examinations. Huta (2003), referring to the examination system in Kenya, re-affirms the crucial role played by examinations when he says that the certificate of primary education examination determines the whole destiny of the child. This is because if the child passes the examination, he/she has a better chance of securing a job where his income would be much higher than for someone with formal education. Likewise, the importance of certificate of primary education is appreciated in Kakamega County since it also determines the whole destiny of the child. Primary education consequently determines the other subsequent levels of education.

1.3 Statement of the Problem

Programs in education produce qualified teachers of mathematics for Secondary Schools. However, the general performance in mathematics among Secondary School students has been poor for many years Kenya National Examination Council, (KNEC, 2006). This has the amplifying effect that Kenya may not achieve goal of industrialization as envisaged in the Vision 2030, for which mathematical
knowledge is necessary. This has raised concern on quality of teachers and their
inputs in the teaching and learning process.

Since teachers have been professionally trained to handle students’ learning problems,
whenever there is unsatisfactory performance, they are the immediate persons
to be criticized. The teacher needs to make instructional judgements, respond
to learning questions and manage the learning environment. Learning preparations
analyze the identification of lessons objectives to be achieved and organization of
learning tasks to be undertaken. Besides it allows for identification of the evaluation
procedures to be applied during and after the lesson. It is the responsibility of the
teacher to create an environment where mathematical and the aforementioned
is achieved with the persistent low performance in mathematic as earlier
mentioned, the teachers' input into teaching of mathematics becomes suspected.
Even schools with experienced and long-serving teachers also show low
performance trends. This raises doubts on the quality of teachers' contributions to the
learning process which should be reflected in instructional planning. No specific
and precise guide to instruction has been used to facilitate students’
understanding of mathematical prior instructional planning on secondary school
students' engagement and understanding of mathematics concepts and skills.

1.4 Purpose of the Study

The purpose of the study was to determine the factors affecting student’s performance
in Mathematics at KCSE level in Secondary schools in Kakamega County.

1.5 Objectives of the study

The study was guided by the following objectives:-

a) To investigate the extent to which instructional methods contributes to the
students' learning and performance in Mathematics at secondary school level.

b) To find out the extent to which attitudes of teachers and students affects the performance in mathematics in Kakamega County.

c) To assess the extent to which teachers experience affect the performance in mathematics at secondary level in Kakamega County.

d) To find out the extent to which teachers' qualification affect the learning and performance in Mathematics in secondary schools in Kakamega County.

e) To investigate the extent to which physical and financial resources affect the performance of mathematics in Kakamega County.

1.6 Research Questions

The study was sought to answer the following: -

1) How does the instructional method influence the performance in mathematics at secondary school levels?

2) How do attitudes of students and teachers towards Mathematics affect the performance at secondary school level?

3) Is teacher experience related to the performance in Mathematic in secondary schools in Kakamega County?

4) Are teachers' qualifications related to the performance in Mathematics at secondary school level in Kakamega County?

5) How do physical and financial resources affect students’ performance in Mathematics in Kakamega County?

1.7 Assumption of the study

The study was based on the following assumptions:-
a) The Kenya Certificate of Secondary Education (KCSE) is adequate measure to compare the examination performance among students in high and low performing schools.

b) The questionnaires and interviews are adequate instruments for collecting the data required for the study.

1.8 Limitations of the study

Due to time and resource constraints, not all secondary schools in Kakamega County were selected for the study. This reduced the accuracy of the determination of the factors that were considered contributing to the student performance in mathematics at KCSE level in secondary schools in Kakamega County. The study was also limited to secondary schools in the performance of mathematics in Kakamega County, only due to scarcity of resources since the respondents will be drawn from the few selected schools in Kakamega County, the students' performance in mathematics from the County will reflected the same situation from other Counties in the whole county a large number of variables will be required to assess the effects of factors contributing to the performance of mathematics in Kakamega County at KCSE level. Ten sampled schools were used in the survey.

1.9 Delimitations of the Study

Private and Primary schools were left out of the study, as some of the factors that affect the performance of mathematics from the two levels was not be the same as those of secondary schools level. Several factors affecting KCSE performance in Mathematics in Public Day Secondary Schools in Kakamega County. This was limited to only a few factors that affect examination performance, in Mathematics at K.C.S.E level, although many factors could affect examination performance in mathematics in public day secondary schools level, in Kakamega County.
The study confined itself to only secondary schools in Kakamega County. The respondents include principals, teachers and students of the sampled public day secondary schools. In addition one QASO was included in the study. The students and teachers that were included in the sample were those in session in the respective institutions by the time of the study. Those who were absent were included in the sample, even if they would have had an interesting input.

1.10 Significance of the Study

The study was to:-

Help the Secondary Schools in the County to take appropriate action towards the performance of mathematics at Secondary School level. Benefit the quality assurance standards officers to take appropriate measures to the problems and this was not only beneficial to the County but also to the entire country.

1.11 Theoretical Framework

This study was subscribed to Brunner's (1996) theory of instruction. In this theory, Brunner points out that a theory of instruction is a prescription of rules for achieving knowledge or skills and providing techniques for measuring or evaluating outcomes. This theory facilitates the researcher with the factors affecting the performance of mathematics in secondary schools in Kenya. Brunner, argues that a theory of instruction is concerned with what one wishes to teach can best be learnt. He specifies four salient features that the theory must embrace. These include: predisposition to learn, a group of knowledge structure, hierarchy and sequencing of (mathematics) content, and ability to reward and reinforce learning effects. These teachers of mathematics needs to be adapted at all these four constituents of learning. To Brunner (1996), with sufficient understanding of the
structure of a field of knowledge more advanced concepts can be taught appropriately at much earlier ages. This is achieved by planning and structuring learning experiences that arise the curiosity of the learner. The theory further emphasizes that the experiences provided should recognize the different levels of the learner's thinking. Brunner says that it is the responsibility of the teacher to identify the concepts that form the basic structure of the subject, in this case factors affecting the performance in mathematics. This theory was chosen because it provides knowledge on how teachers of mathematics can develop cognitive abilities of learners by preparation of instructional products and processes. The theory further guides the teacher in structuring and sequencing of learning, activities, preparation before class instruction includes content familiarization, lesson plan preparation and sourcing of instructional resources.

The mathematics curriculum is organized hierarchically and spirally (Eshiwani, 1993; KNEC, 2006). The teacher therefore used this to make lesson preparations that were identified, the pre-requisite concepts and those that were to come later. This makes the learners to have better understanding of the concepts by integrating them into existing knowledge of the content structure; the teacher therefore to develop a lesson where the concepts are arranged hierarchically. This further enabled the students to understand the concepts and so improve their achievement, attitude and motion sequence of the learning tasks again promoted classroom interactions. Since learning of mathematics is an ongoing process of building on the previous, the sequencing should be well planned to create room for students to be rewarded and feel motivated. This further resulted in more classroom interactions of the students with resources teachers and amongst
themselves. These variables explained are represented in the conceptual framework as shown in figure 1.1.

1.12 Conceptual Framework

A conceptual framework is a model of presentation where researchers represent their relationship between variables in the study and show the relationship graphically or diagrammatically. According to (Orodho, 2009) conceptual framework assists the researcher to quickly see the proposed relationship between variables. Teachers were the main unit of the main study. Simon's (1980) contends that the teacher factor such as experience, professional, academic qualifications and motivation are the input variables that interact and impact good learning to the students. In this study it was conceptualized that the teacher within a school set up was considered a central variable that other variables interact as shown in the figure 1.1. The teachers were expected to be provided with adequate resources and facilities in order to teach the students as required. The administration was expected to perform their managerial tasks as professionals. It could be possible that attitude, academic and professional qualifications contributes to effective teaching of mathematics to a great extend. Academic and professional qualifications largely determined the teacher's ability to group concepts and issues during in service training. The teachers were expected to be provided with adequate resources and facilities in order to teach the students as expected. The administration was expected to perform the managerial tasks as professionals.
According to the conceptual framework above, school examination performance in Mathematics depends on a number of factors: teacher qualification, experience and teachers attributes the rate of teachers and student absenteeism, adequacy of resources and entry grade of pupils. Likewise, this study was related to Tyler's Theory because if the school performance has to improve, the teachers must
understand the objectives of the course.

### 1.13 Operational and Definition of Central Terms

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<tbody>
<tr>
<td><strong>Academic qualifications</strong></td>
<td>This refers to the educational standards achieved by the teachers.</td>
</tr>
<tr>
<td><strong>Day secondary schools</strong></td>
<td>This refers to schools that are established from primary schools such that every primary school has a feeder day secondary school. The students report to school in the morning and return home in the evening.</td>
</tr>
<tr>
<td><strong>Discipline</strong></td>
<td>Obedience of students to school rules and regulations.</td>
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<td><strong>Free Day secondary education</strong></td>
<td>Refers to the government subsidizing fee payment of every secondary school student.</td>
</tr>
<tr>
<td><strong>Harambee</strong></td>
<td>Is a Kiswahili word meaning pulling together. It calls people for communal participation of monetary and services contributions for the development of community projects.</td>
</tr>
<tr>
<td><strong>High performance schools</strong></td>
<td>Schools that attain more than a mean score of 5. Low performance schools - schools that attains less than a mean score of 5. Performance-examination attained at the end of standard eight or Form four.</td>
</tr>
<tr>
<td><strong>Professional qualification</strong></td>
<td>This refers to specialized training that has been received by teachers or head teachers either during in-service or pre-service training.</td>
</tr>
<tr>
<td><strong>Principal</strong></td>
<td>This refers to man or woman charged with responsibility of administration,</td>
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</table>
supervisory and financial management of secondary school.

Public schools : Schools that acquire government assistance such as funding

Pupil teacher ratio : Pupil Teacher ratio- refers to total enrolment in a school divided by the number of teachers in that school

Quality of school administration : This refers to the principal's academic and professional qualifications and the leadership styles.

Secondary Education : Refers to the education received after primary education cycle from form one to four.

Subsidize : This refers to the government supplementing secondary fee payment of the student

Teaching load : Refers to number of lessons taught by a teacher in a week.
CHAPTER TWO  
LITERATURE REVIEW

2.1 Introduction

This literature review was to examine the teaching and learning factors that affect affecting the performance of Mathematics in secondary schools in Kakamega County. It also dwelled on the role of objectives in learning, preparation of learning experiences, teachers' instructional skills and students' attitudes towards mathematics. Finally, it looked at identification and use of suitable instructional sources, assessment and evolution of learning of Mathematics.

2.2 Instructional methods influencing performance in Mathematics

Classroom methodology is likened to school which depends on teacher / pupil ratio. A high school teacher / pupil ratio as 1:50 does not allow much personal attention and low ratio is not better either. However, teaching effectiveness increases with decreased teacher pupil ratio up to a certain point. Teaching style depends upon size of class. The teacher is critical in classroom methodology. He/she has to create the learning environments, specify the nature of learning activities and decide on the suitable learning resource. According to Nyongesa (2004), the difficulties that arise for teachers’ methodology include: teachers inadequate presentation, pace of work, unsuitability of learning resources, topic sequencing and language levels.

The Cockcraft committee (1982), reports about the teaching style and methodology that, Mathematics teaching at all levels should include opportunities for: exposition by the teacher discussion between teacher and students and between the students themselves, appropriate practical activities, consolidation and practice of fundamental skills and routines, problem solving including the application of mathematics to
everyday situations and investigational work. However, the report says that the list of opportunities does not guarantee good methodology. It is the context in which these activities take place, the importance attached to it and the relationship between them that are the real determine factors. Activity based methods of teaching depend significantly on the incorporation of suitable learning resources. The use of resources is critical in ensuring that learners develop an appreciation and enjoyment of Mathematics through a variety of appropriate practical activities. The use of resources and the resulting activities enhance students’ understanding of Mathematical concepts. It is important for the teacher to identify well in advance the resources needed for a particular lesson and develop a clear understanding of the role the teaching/learning resources will play in the lesson. Textbooks, teacher’s guidebooks and the syllabus are crucial in the teaching of Mathematics.

Mereku (2003) found out that the general guidelines on the delivery of the curriculum in the syllabus and teacher’s guidebooks recommend that teachers should use investigational or activity methods which are directed towards learning tasks, which encourages inquiry, creativity, manipulative and manual skill. The analysis of the transcribed lesson activities indicated that instructions in the teacher’s guidebooks follow a common pattern classrooms disburse. In this common pattern, the teacher initiates a move for a response from pupils. These were occasionally followed by feedback. The instructions in the teachers guidebooks appear to indicate, though not every clearly, that teachers should make pupils learn through activity and not by passive reception of what is taught and emphasize understanding rather than rote memorization. But the style of lesson presentation in the guidebooks stress teaching strategies associated mainly with the exposition teaching method (Ibid).
The overloaded Mathematics curriculum affects the teachers’ methodology. In an attempt to cover the syllabus, Mathematics is taught theoretically and students are not given time to discover things for themselves. Lack of learning resources and unsupportive head teachers may frustrate teachers (Ibid). Several studies in teaching methods of Mathematics have been carried out. Forrester (2000) investigated the role, implementation and effectiveness of practical activities of learner’s post 16. The study concluded that practical activities enhance the understanding of Mathematics regardless of the learner’s age.

Mereku (2003) investigated the extent to which a particular activity based teaching method is employed in teacher’s classroom practice and not necessarily how effectively the method has improved learners performance. The study used a range of procedures for data collection. These were analysis of moved and discourse patterns in observed lessons and a survey of teaching skills used in teachers classroom practice. The study found out that teachers should use investigation or activity methods which are directed towards learning task that encouraged inquiry, creativity and manipulative and manual skills, Teachers should make pupils learn by activity and not passive reception of what is taught, and emphasize understanding rather than rote memorization.

Too (2006) investigated the use of teaching activities. The study investigated the use of the following activities, questioning, groups, discussions and demonstrations. The study used observation technique to collect data. Teachers were observed in ordinary classroom settings and notes recorded on a specially designed sheet. It is important to note that none of the studies mentioned above investigated the challenges of incorporating learning activities in Mathematics instruction in secondary school. This
study used observation schedules, questionnaires and interview schedules to collect data. Lecture Method is the technique of teaching by means of the spoken word where information is given orally generating and relating understanding in the learners (audience).

Callahan and Clark (1990) define it as a method where the teacher tries verbally to give to the learner knowledge she/he possess but the learner does not. Groene Wegen (1993 concurs by defining it as an oral presentation of a pre-planned set of data, meaning examples, summaries and evaluations, with or without visual support. There are two forms of lecturing: formal and informal. A formal lecture is purely verbal and communication is basically one way, from the speaker to the audience. An informal lecture is a modified form of conventional formal lecture. Communication is two way from the speaker to the listener and from the listener to the speaker. Informal lecture is normally interrupted by questions, comments, suggestions, viewing, observations, demonstrations, etc. Learners are given room to participate in various ways as the lecture progresses. Although a good lecture can be stimulating and challenging high interest level in audience, when given by a competent teacher, it can also be uninspiring and monotonous and tends to make the audience passive. It is not the appropriate method to use when one intents to change he values and attitudes of his/her audience because in a lecture one is expected to accept the facts presented with question. It is important to note that materials taught through lecture are quickly forgotten. MC McLeish, (1968) reported that 40% of the points were recalled immediately after the lecture and only 20% a week later. Given the importance of Mathematics it would be important that the teacher avoid pure lecture making them more informal.
According to Bloom (1960), discussion and group technique is a learning activity where the teacher and learners talk together in order to share opinions, views or information about a topic or a problem. It makes an absolutely fundamental contribution to learning. A genuine discussion must start with some attempt to elicit opinions and knowledge from the learners to treat them seriously and to explore their consequences. In inquiry discussions, the teacher may not state the objectives, instead she/he arranges for the discussion to take place and the whole activity is open ended. The teachers serve as a leader and students carryout the discussion and arrive at a conclusion. Learning is seen as a leader and students carryout the discussion and arrive at a concussion. Learning is seen as the product of creative inquiry and active student participation. Examples of participatory activities, which fall under discussion, are whole class discussion, panels, symposia, roundtables, forums, committees and small groups. In these activities, there are techniques that provide opportunities for the learners to present their ideas, opinions and information and for the expression of differing viewpoints. They are interactive in nature.

Demonstration method is defined by Callahan and Clark in (1990), as where students learn more by seeing than by hearing and demonstration combines seeing and hearing. The steps involved in demonstration includes:- Explanation and demonstration by demonstration, Imitation by observation, Evaluation by demonstration and observation, Re-demonstration if necessary, Observer imitation, Re-evaluation by demonstration and observation. A teacher planning for demonstration should consider the following factors: Demonstrations from the front of the room are frequently of the room are frequently ineffective teacher therefore the teacher should demonstrate to a small group or an individual so that each person can see each step of the operation, Teacher should consider the
use of videotaping demonstration, Demonstration should not be considered a onetime method of presenting materials. It may be necessary to repeat them for students whose performance indicates that they cannot imitate the demonstration.

Callahan and Clark in (1990), investigated that, small groups or syndicate and pair group involves forming groups from the whole class. The group should consist of between 3 to 5 members for syndicate groups and 2 learners for quick reference as pair groups. One can select learners to groups using their abilities, interest, friendship, gender, seating arrangement, ethnicity etc. in syndicate groups different topics are discussed and the finding shared by the rest of the class. During the group work, it should be ascertained that learners discuss/perform with a chairperson leading the discussion and the teacher goes round checking/assisting where possible. After the group work, one should open up the discussion, pulling all points from the secretaries, restricting rephrasing, using correct terminologies and writing the point on the chalkboard. In addition to this, the teacher should also allow time for questions, clarifications and comments ad additional and ask learner to copy the point down; give concluding remarks and give the class follow up activities if necessary. These groups could also be utilized in a wider project wherein groups 5 – 6, the audience could work on a project.

Brainstorming is a technique of generating idea from the learners. It involves posing question or challenge to the learners and either the teacher or the leader of the group taking note of all the possible answers /responses before disclosing and evaluating them. The idea generated makes excellent springboard for discussion and problem solving. A project method has been defined by Callahan and Clark (1990) as of activity, individual or group involved the investigation and problems that is planned.
and carried to conclusion by students under the guidance of the teacher. It focuses on the need of providing opportunities for full involvement of the child in learning by allowing free interaction with situations in real life. As a result, the child develops into a descent worthwhile citizen. The study sought to establish teaching methods in Kakamega County ensuring that teaching and learning resources are put in proper use to achieve the desired outcomes.

2.3 Importance of learning / teaching resources

Use of media is essential in the teacher of Mathematics because: It increases learners’ motivation by creating a conducive atmosphere which is stimulating, interesting and intellectually rewarding. Motivation increases because of the learning resources’ concreteness and appeal. The level of motivation will depend on how the teacher organizes the class for the utilization of the resource, it leads to sharing of ideas, thought, feelings and knowledge. This sharing leads tones persuasion to change his / her attitudes or to adopt desirable responses or actions, It can be tailored to the abilities and needs learners each of which has a preferable way of learning e.g. through sight experience, learning etc for example, media can be used to structure learning experiences for the under achievers, It enhances learning, increases perception, understanding and reinforcement and hence retention of what has been taught.

“According to squanders (1974:23), 11% of what is seen is retained compared to 50% of what is both seen and heard, It adds life and can enrich a lesson by encouraging participation, appealing to the learners varied abilities and ensuring order and continuity of thought, Media enables the learner to acquire and strengthen skills in regarding, observing, listening and communicating ideas, Media can also be used to
present facts, organize knowledge, stimulate, imagination and change attitudes. Instructional media takes learning real because it enables the learner to come in contact with either the real thing she/he is learning, or purely visual materials of the items learnt.”

A number of studies carried out in developing countries reported a more consistent relationship between pupils’ achievements and the availability of textbooks than between achievement and another variables such as class size, teachers’ salaries and boarding facilities. Studies by Schiefelbein and Farnell (1973) in Chile on availability of textbooks and their influence on performance found a positive correlation between textbooks and academic achievement. Availability of textbooks and their influence on performance found a positive correlation between textbooks and academic achievement. This conclusion was also corroborated by Heyneman and Jamison (1974) who found a positive relationship between textbooks and pupil achievement in English in Uganda. Abagi (1997) observed that while teachers were crucial for quality education, their contribution will be incomplete if there are no important inputs such as textbooks. Abagi (Ibid) revealed more expenditure on teachers’ salary between 1992 and 1997 in public schools in Kenya than on teaching/learning resources. Between 1980 and 1995, the World Bank has been investing in Africa especially on instructional inputs, mainly textbooks, teacher education and classrooms with a view to improving performance. Therefore the quality of teachers is a crucial element in the performance of any school. Kibui (1995), in a study that influence the examination performance of public and private primary schools in Nairobi, found that inadequate physical facilities like classrooms may affect teaching and learning environment. For example if children are crowded in their sitting positions; they
find it difficult to write in their books. Teachers are also unable to move round the crowded class. This means that the teacher is not able to reach with ease all children in order to check their individuals work as they sit working in their places.

This study sought to establish the consistence relationship between student’s achievement and availability of text books than between achievements and other variables such as class size and boarding facilities.

Table 2.1: World Bank projects on instructional materials

<table>
<thead>
<tr>
<th>Instructional materials</th>
<th>Classrooms</th>
<th>Teachers</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of projects</td>
<td>53</td>
<td>35</td>
</tr>
<tr>
<td>% of totals (58)</td>
<td>93</td>
<td>60</td>
</tr>
</tbody>
</table>

Source: Improving quality of Primary Education in Africa – World Bank 2002

In research, Mariene, (1986) argues that lack of an adequate budget for the learning resource centres poses major problems to its management. He recommends regular replenishing of stock for efficient service. This calls for sufficient financial support for the acquisition of learning resources. Wilkins (1940) quoted by the World Bank (1990) ascertains that it is not by grandeur nor by the beauty of its buildings and their finishing but a library will attract its readers by solely the richness of collections within its walls. Chalkboard is most useful and versatile of the visual aids at the disposal of a Mathematics instructor. It is irreplaceable and indispensable resource in teaching and learning. According to J.C. Aggarwal (1982), it is the oldest and the best friend of the teacher. Chart is a combination of written or drawn pictorial or graphic material which presents a clear visual summary in tabulated or methodical form. Charts are either teacher made or readymade. Where possible it is recommend
that teachers make their own charts incorporating their personal ideas in preparation of charts. Examples of some charts used in Mathematics are pie charts, graphs, pictorial charts, diagrams, time line and charts. The study sought to establish the level of funding to ensure adequate finance for the learning resources which pose a major problem to school management as it is cited by (Mariene, 1986), who observes that lack of adequate funding for schools poses challenges to the learning process in schools.

Informed people (resource persons) can also by the teacher to supply information on given content area. In choosing the resources, the teacher must be guided by relevance, suitability, accuracy, clarity of the material in relation to the content to be taught. The choice of a resource person should depend on the person’s personality experience and familiarity of the content under discussion. If a guest speaker is to be used then the teacher should plan with the group prior to the presentation. He can hold a preliminary group discussed with the listeners so that he can find out what they want to learn from the speaker. To provide for student participatory Robert Hoppock suggest that group should be given the suggested questions in advance rather than taking class time to develop the entire list.

Although these programmes are not addresses to the classroom audience, the Mathematics teacher can make use of any relevant ones. Keen and dedicated teacher can record the program, replay them to sieve what is of use to the learners. If it is pure Mathematics programme it can be replayed in class. In such a case the teacher can prepare a series of question in advance to know exactly what the learners are required to extract from the programme. This could be identifying certain ideas, writing summaries or comparing. The teacher can also alert the learners about the
programme and the time it will be on air, and then as part of the homework, ask the learners to listen to it. As a follow up, the teacher could ask them questions related to the programme. The programme prepared is specifically Mathematics. When preparing for a radio lesson, Farrant (1980) has given the following suggestions on how to get the most out of the education broadcasting: Get in advance details of the programme to be broadcast, Select the programme that have a positive value for your students, judge how to make the best use of each programme you have selected, whether alive, recorded in full or in part, Make whatever administrative preparation are necessary to obtain the equipment and accommodation need for the lesson, Prepare the students before the broadcast in accordance with any suggestions contained in the printed teacher’s notes, Plan tinting and physical arrangements that the students receive the programmes clearly, Carry out whatever follow up is necessary to derive full benefit from the programme. Effective teaching is influenced by how well a teacher had prepared the lesson before teaching starts. It starts with one’s interaction with the syllabus and its interpretation, the ability to make good schemes, lesson plan and the effective utilization of learning resources, thus in this endeavour a syllabus or the curriculum/content in Mathematics to be taught becomes important. The study sought to establish the level of involvement by the principles and (DQASO) in curriculum supervision to enhance proper planning by teachers for the lessons to be carried out.

In simple term it can be defined as a prescribed course of study in a given subject or level. Burston and Green (1972) defines it as statement of the content of study the amount of knowledge and the selection of knowledge which it is proposed that pupils should acquire.
It defines the goals of education, the objectives of teaching either Mathematic and specific objective of teaching the syllabus. This is important because it gives the teacher purpose and focus in teaching. It specifies the relevant content to be taught for the realization of the above goals and objectives. This is necessary because content is at the core of teaching. Without it there will be no teaching, it suggests a wide range of methods and resources to be for the teaching of the subjects or the achievement of the objectives. This is very essential because it ensures that the learners are actively involved in the lessons through a variety of activities which keeps them motivated and their attention sustained, it specifies what content should be taught at what grade by marching the different of the content with the mental age of the learners. This ensures that what students learn is within their ability and level. Scheme of work is a detailed, logical and sequential plan that interprets the syllabus into units for effective teaching. It can also be defined as a breakdown of the syllabus into manageable units which could be covered in a specific period of time lasting for either a week(s) month(s) or whole year (Nasibi and Kiio, 1995). The study sought to establish the content, and the amount of knowledge and the selection of learning experiences which students acquire and the provision of other suggestions on review and reforms of school curriculum to improve quality of education in the county.

According to Nasibi and Kiio (1995) scheming is essential because of the following:- It makes teaching both systematic and orderly since it ensure that topics in the syllabus are taught in order of difficulty starting with simples to complex. It ensures that every topic in the syllabus is covered, it enables the teacher to budget for time wisely giving room for events and activities which might interfere with the school calendar e.g. public holidays, prize giving day sports day etc, it gives the teacher in
planning a lesson plan, it checks the teacher's peace of teaching, it is useful during transition, when a teacher is transferred, then coming in-coming teacher will easily take over from where she/he had left avoiding repetition or omission. This ensures continuity of learning process, lesson planning. A lesson plan is a work plan showing clearly all activities that are going on to take place during the lesson and order (sequence) in which they are going to follow. Importance of lesson plans, well written lesson plans are useful in many ways, they are used as basis for lesson to be presented, they give the teacher an agenda or outline to follow as teaching takes place. They enable the teacher to be familiar with the teaching content and to visualize the best way of covering it, they serve as a guide/road map to the teacher on the content to be taught in order to avoid vagueness and irrelevancies, they serve as a memory bank, reminding the teacher of the main point to focus on during the lesson. This becomes important in case of a memory lapse, an interruption or distinction, they give the teacher security and confidence, especially to a beginning teacher who can walk into a classroom with the confidence gaining from having a well-developed and organized framework for the day's instruction, they act as an orderly sequence of content and learning activities in a lesson, they involve the teacher's performance by acting as basis for future planning.

A lesson plan is a work plan showing clearly all activities that are going to take place during the lesson and the order (sequence) in which they are going to follow. Well-written lesson plans are useful in many ways. They are as basis for the lesson to be presented. They give the teacher an agenda or outline to follow as the teaching takes place, they enable the teacher to be familiar with the teaching content and to visualize the best way of covering it, they serve as a guide/road map to the teacher on the content to be taught in order to avoid vagueness and irrelevancies, they serve
as a memory bank, remanding the teacher of the main points to focus on during the lesson. This becomes important in case of a memory lapse, an interrupted or a distraction, they give the teacher security and confidence, especially to beginning teacher who can walk into a classroom with the confidence gained from having a well-developed and organized framework for the day's instruction, they act as orderly sequencing of content and learning activities in a lesson, they improve the teacher's performance by acting as a basis for future planning.

Evaluation in Mathematics Education is critical to the success of any teaching and learning programme. Evaluation is generally the process of generating data which is used in assigning value to something and finally making a decision, to accept, improve or reject it (Shiundu and Mulando; 1992). It enables one to determine to what extent, if at all, the objectives of a programme have been achieved (Bishop; 1985). Assessment on the other hand is wider and is the process of gathering and providing information on the learner's performance on a learning task through observing, recording and evaluating performance. Evaluation in Mathematics can serve three purposes: To assess learners’ attainment at the end of the teaching and learning. This has to be assessed in relation to the objectives of the course, to evaluate diagnostically learners' progress and learning difficulties. One has to find out what difficulties the learners experienced during the implementation of the curriculum, to evaluate the effectiveness of Mathematics syllabus. How effective was the programme in influencing the set objectives. The study sought to establish the mode of evaluation, feeling of Kenyan examination systems and other suggestions to review the school curriculum.
There are two types of evaluation: formative and summative. Formative evaluation which refers to continuous evaluation which takes place during the process of teaching and learning. Sulton (1991:3), defining it in relation to learners and learning instruction stated that it is: An ongoing process, conducted both formally and informally, by which information and evidence about a child's learning is absorbed and used to plan the next step, or guide through a given task. Instructional evaluation is very important because it plays a diagnostic role by giving student a sense of adequacy of their progress in learning and in offering feedback in a learning situation. The study sought to establish the effectiveness and efficient mode of formative and summative forms of evaluations, and providing further suggestions on how to improve on two forms of evaluation.

Shiundu and Omulndo (1992; 2000), identify main principles which should guide evaluation, continuity, evaluation has to be continuous at four levels. The first level is at the beginning of the programme to determine the learner's entry behavior. It is referred to as pre-assessment. The second level is continuous assessment during teaching or implementation with a purpose of getting feedback weaknesses in the programme is identified and remedied. The third level is end of programme evaluation which normally comes at the end of the implementation of the programme.

Evaluation has to be comprehensive: this is where a variety of instruments are employed in evaluation to test many variables in assessments all the objectives of the programme have to be evaluated in all domains of learning. Consistency with objectives: the evolution content(items) should be related to the objective the programme had set to achieve, if the development of particular attitude is desirable the evaluation procedure should look for evidence that such attitudes have been
developed (Bishop: 1985). Principles of validity and reliability: the evaluation tool should measure what the evaluator intents to measure (validity) and the results should be consistent when administered under similar conditions at different times (reliability). There is a variety of assessment, evaluation techniques available to the implementer of Mathematics curriculum. They include the following, written tests/quizzes: although quizzes are usually shorter than tests, both instruments are used to measure learning or attitude of learners, oral testing or questioning for immediate feedback, Oral reports on observations made or oral presentations by individuals or groups following a group's project or discussion, Written assignments which can be individually or in groups, Direct observation used to evaluate skills, attitudes and values which have been acquired, Questionnaires for evaluation skills, attitudes and knowledge, Rating scales: these are used to record assessment of the quality of performance or the degree of achievement of an individual whether it is a concept, skill process or attitude. The five point Liked scale to discover the attitude of the students, Interview on what individuals think about certain issues, Checklist for observing certain traits exhibited. It is used to show what extent a student has demonstrated change of attitudes and values or participated in group work or attitude scales find out views the student hold on Mathematics. Direct observation of students to find out if there is any change in behavior. The teacher should look for change in action and behavior that indicate the adoption of new values and attitudes as the student interact in and out of class.

2.4 Funding of Educational Facilities

Ayot and Briggs (1988) assert that the ever-growing demand of education, the resultant expansion of educational system have all led to massive increase in finance on education all over the world. Almost every nation in the world devoted an
increasing share of its resources to education during 1960s and 1970s. By 1974, this had grown to 4.8 percent of Cross National Products (GNP). For the case of Kenya 35% of its Gross National Product went to education as at that time. Notwithstanding the commitments by many nations to increase funding towards education, the budgets could not continue rising for long. This was due to the many economic challenges that the world began to experience especially in the mid 70s. This scenario was captured by Psachoropolous (1985:14) when he states that "Today there is increasing evidence of financial constraints and in many developing countries the proportion of the government budget devoted to education has began to decline". In view of the dwindling financial resources towards education, the World Bank (1980) has emphasized that the shortages in developing countries can only be resolved by either finding additional sources of financial support or reducing wit revenue through greater efficiency. Meerman (1980) in World Bank (1990), suggests that complete reliance on central government finances for development projects is no longer feasible and governments should consider alternative ways of raising funds from the private sector.

In Kenya, the government is the major source for public education. The government's effort is supplemented by local communities who pay in form of direct fees and Harambee contribution. Olembo (1986:29) investigated the methods by which schools are financed. According to the study, most of the finances come from the Ministry of Education. He found out in his study that the amount of money raised from parents and government was inadequate in running school programs and teachers were asking for increased funding. Sessional Paper No. 1 of 1986 reiterates the government's commitment to reduce the share of the Ministry of Education to 30%. The reduction is to be achieved through cost sharing between the government and the local
communities. The 1988 report of the Presidential Working party on education and manpower training (Republic of Kenya, 1988) indicated that gradual reduction in recurrent costs in education would be realized through cost sharing in the financing of education facilities and materials. Since the late 80's household contributions to secondary education has risen considerably. School demands have contributed to escalating cost leading to school dropouts especially debts which impacted negatively on services delivery. Studies carried out by Ministry of Education Science and Technology (MOEST) and United Nations International Children’s Education Fund (UNICEF) in (1994) established that to a greater extent the escalation of school demands are attributable to items not directly contributing to teaching and learning. Such items include expensive school uniforms, sporting equipment, boarding equipment, swimming pools, motor vehicles and expensive school halls. A major opportunity costs meeting non essential is less money being spent on instructional materials.

Olembo, (1986) investigated the methods by which schools are financed. He found out that the amount of money from parents and the government was inadequate in running school programs and teachers were asking for more funding. Sessional paper No.1of 1986 reiterates the government's commitment to reduce the share of the Ministry of Education to 30%. The reduction is to be achieved through cost sharing between the government and the local communities. The 1988 report of the presidential working party on education and manpower training (Republic of Kenya, 1988) indicated that gradual reduction in recurrent costs in education would be realized through cost sharing in the financing of education facilities and materials.
2.5 Student-teacher ratio

Teachers play an important role in the implementation of the curriculum and this particularly impacts on the quality of education offered. New Zealand has two main staffing components; that is, student number at each year level and base components which every school receives regardless of the size and special needs staffing based on the number and severity of special needs students which is calculated as 2.5 teacher hours per week for high needs students, and 5 teacher hours for very high needs students. This is similar to the Kenyan Secondary school staffing model which takes cognizance of the number of subjects taught in a school, the number of streams and the lessons per week. MOE (2009).

Table 2.2: Curriculum Based Establishment (C.B.E)

<table>
<thead>
<tr>
<th>Post</th>
<th>Four class Single stream</th>
<th>Eight classes Double stream</th>
<th>Twelve classes Triple stream and above</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head teacher</td>
<td>10 – 12</td>
<td>8 - 10</td>
<td>6 – 8</td>
</tr>
<tr>
<td>Deputy Head teacher</td>
<td>20 – 24</td>
<td>15 – 18</td>
<td>12 – 15</td>
</tr>
<tr>
<td>HOD- Job Group “N”</td>
<td>-</td>
<td>-</td>
<td>18 – 20</td>
</tr>
<tr>
<td>HOD-Job group “M”</td>
<td>-</td>
<td>-</td>
<td>20 – 24</td>
</tr>
<tr>
<td>Teachers</td>
<td>27</td>
<td>27</td>
<td>27</td>
</tr>
</tbody>
</table>

Source: Ministry of Education 2012

Staff balancing has been a major issue in secondary staffing. According to the Ministry of Education (MOE 2003) there exists overstaffing in urban schools. In regards with the HOD establishments, there are varying trends in all the schools.
Table 2.3: HOD Establishment

<table>
<thead>
<tr>
<th>Job Group</th>
<th>“M”</th>
<th>“L”</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Schools</td>
<td>8</td>
<td>13</td>
<td>21</td>
</tr>
<tr>
<td>Provincial schools with 16 classes and above</td>
<td>6</td>
<td>13</td>
<td>19</td>
</tr>
<tr>
<td>Public schools with 12 – 15 classes</td>
<td>-</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Public schools with 5 – 11 classes</td>
<td>-</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Public schools with 1 – 4 classes</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Source: Ministry of Education 2012

House teachers – Based on population of the school. That is, 1 house teacher for every 320 pupils

Divisor = 27

CBE = Total shortfall + teachers required (T.R) from part 1

\[
27
\]

Shortfall from Establishment

<table>
<thead>
<tr>
<th>Role</th>
<th>Equation</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head teacher</td>
<td>((27 - 6))</td>
<td>21 periods</td>
</tr>
<tr>
<td>Deputy Head teacher</td>
<td>((27 - 12))</td>
<td>13 periods</td>
</tr>
<tr>
<td>Heads of Department – Job group “N”</td>
<td>((27))</td>
<td>Periods</td>
</tr>
<tr>
<td>Heads of department – Job Group “M”</td>
<td>((27-20))</td>
<td>7 Periods</td>
</tr>
<tr>
<td>House Teachers – Job group “M”</td>
<td>((27))</td>
<td>Periods</td>
</tr>
<tr>
<td><strong>Total shortfall</strong></td>
<td></td>
<td>43 periods</td>
</tr>
</tbody>
</table>

Number of teachers required (T.R)

Teachers required from shortfall \[= \frac{\text{Total Shortfall}}{27} = 1.59\]

T.R from part 1 \[= 29.37\]

Total T.R \[= 30.96\]

\[= 31\]
From table 2.5.1 and 2.5.2 student – teacher ratio for the school was 18.1. Staff balancing has been a major issue in secondary staffing. According to the Ministry of Education (MOE 2003) there exists overstaffing in urban schools. This is due to the fact that married teacher’s request to be posted close to their spouses. However, the official policy is to have all public schools staffed with qualified teachers.

According to Okwach and Odipo (1997) there were varying teacher pupil ratio in Kenyan schools depending on whether the schools are urban, rural, public or private. They indicate the ratio of 3.6.1 for rural public, 34.1 for urban public and 25.1 for private primary schools. There is a general belief that a low pupil-teacher ratio results in better pupils achievements in school. This belief is supported by Tindall (1988) who found out that large class sizes contributed to declining performance of students. According to Tindall small pupil teacher ratio was a solution to educational problems in inner city schools.

But this was not always true as proved by Okwach and Odipo (1997) who argued that it is not necessarily a small pupil teacher ratio that matters but how a teacher organizes and motivates his/her class. They propose that savings made from increased class size could be utilized in teacher training or for the acquisition of other educational materials which are crucial for learners’ achievements.

Okwach and Odipo (1997) also indicate that very low or high pupil teacher ratio could lead to inefficiency. That low enrollment could lead to under utilization of teachers and other resources which were characteristic of primary education in Africa. However, the quantity of teachers needs to be supplemented by the quality. Kinyanjui (1979) points out that the caliber of teachers in any school forms an important input which can have tremendous impact on output. Where resources are limited, the
teacher is expected to carry the extra responsibility of supplementing the deficiencies in the system. Sifuna and Karagu (1998) singled out poor distribution of teachers as one of the major problems besetting secondary education. According to Sifuna and Kiragu, the most affected areas are Science and Mathematics.

Maundu (1986) concluded that teacher qualification had a significant effect on pupils’ performance in Science and Mathematics. He links the good performance of extra provincial schools to good quality of teaching given to other inputs. This views seems to be supported by Lockheed et al (1991) who concluded that teacher training levels had a significant effect on pupil achievement, although Thias and Corney (1972) while carrying out cost benefit analysis of education in Kenya found out that at upper secondary, teachers experience had no significant effect on students’ performance.

2.6 Effects of Academic and Professional Training of Teachers on Examination Performance

Good quality teachers should be able to impart knowledge, skills and positive attitudes. The quality of teachers was an important aspect in determining the level of performance and achievement in national examinations. It noted that, in Kenya, quality of teaching staff is often said to be the main determinant in the achievement of students in examinations. The quality of teachers is often judged on the basis of the teachers' academic and professional qualifications. As Nguru (1987) notes, it is not only the professional qualifications, but also their academic qualifications. Professional training is also said to be an important indicator of quality of teachers. Ong'uti (1987) asserted that trained teachers are an assert to institution in which they are instructors. They have learnt the tricks of handling individuals' differences in the
classroom situations.

The training of a teacher equips him/her with the skills of imparting contents to the pupils more effectively. It is true that the higher the professional training in relevant subject, the better the performance of pupils, Raju (1973). The training of teachers has some impact on pupils' performance in examinations. Raju (1973) revealed that most rural schools lack properly trained teachers and have to accept unqualified teachers who may not be aware of modern trend in teaching methods and curricular. Training equips the teachers with the skills of imparting contents to students more effectively. Thus, the higher the professional training, the more effective a teacher should be and the better the performance by students in examinations. In a study on finding the problems of teaching English in Kenya secondary schools, it is noted the problem of untrained teachers as follows: - they find it difficult to present a good model of spoken English themselves and hence to do any effective teaching of oral English, to look at course book critically and to evaluate the materials and methods in terms of their pupils needs and abilities or plan a sound scheme of work that is relevant to their situations.

Raju noted that, teachers who do not possess proper academic qualifications and professional training do not teach their subjects effectively. He argues that, high qualifications make the teachers confident to teach their subjects and in turn serve as a source of inspiration to the students. Raju furthers suggested that a teacher should possess the following:-

- Theoretical knowledge about human behavior.
- Demonstrate teaching skills that can facilitate learning
• Possess knowledge of the subject matters.

Republic of Kenya (1964), as quoted by Hutta (2003), notes that, teachers are a component of the school. He viewed performance as being caused by teachers since it is the teacher who matters most in a child's life in school. This clearly depicts that, if the teachers lack appropriate qualifications, self confidence will be low and may lack enthusiasm due to lack competence and inadequate knowledge of the subject, which then leads to poor performance.

Eshiwani (1993) noted that, school quality is heavily dependent on the quality of staff, their motivation and the leadership experience. This however explains the differences in performance between schools with similar levels of physical provision. Lewis as quoted by Eshiwani observes that: - teachers morale professional support, and awareness of education possibilities through adequate pre-and in-service training are critical determinants of curricula quality over and above that level of physical support that can be sustainable across an educational system as a whole not that found in the most well provided location schools quality can only improve through changes in teachers behaviour. Initiatives in the areas which support teachers and boosts morale providing access to information and advice, assist them to develop professional association and create peer group pressure and recognition of performance have the potential for wide spread impact and the responsibilities of extensive multiplier effect. Mechanism for much more attention to enhancing the professionals that implies, amongst greater proportions of existing teachers cadres and new entrants, is an important key to sustain changes. Professional training and staff development programme therefore impart on teachers’ effectiveness and influence students’ performance in their exams.
There has been no recent research done in the Kenyan context to establish the influence of academic, professional training, training on students’ academic performance on which these study sought to establish.

2.7 Attitudes of learners towards learning mathematics

A large proportion of studies about attitude do not provide a clear definition of the word attitude. According to McLeod (1992) attitude towards mathematics is just a positive or negative emotional disposition towards mathematics. If learners have a negative attitude towards a subject or a topic, the performance may be affected greatly. Daskalogian and Simpson (2000) define attitude towards mathematics as a pattern of beliefs and emotions associated with mathematics. Attitude are acquired through experiences in our environment and learned in much the same way as skills and habits. As pupils develop through the different phases of schooling they become increasingly aware of mathematics as a subject and this awareness clearly affects the growth of their attitudes to mathematics (Bishop and Nickson, 1983).

This is particularly evident during the transition from primary to secondary level. Negative attitude towards mathematics can affect student's performance in the topic no matter how clear the terms and symbols are. Most researchers have shown that student attitude have a powerful influence on learning. Gerstein (1964) asserts that expectation of future performance and affects actual performance. Carter and Yackel (1989) argue that mathematics anxiety is an appropriate response when certain beliefs are present. For instance if an individual believes that mathematics is a collection of rules and procedures, then success in mathematics is determined by one’s ability to memorize the rules and procedures and produce them at appropriate
moments in the problem solving process (Iddo and Lynda, 1994).

Gill (1994) in her article "shedding some New Light on old Truths" indicates that middle school and high school girls have positive attitudes towards school but negative attitudes towards mathematics. There may be a tendency of students performing poorly in a given subject or topic if they hold the negative belief about the subject or topic. This study intends to shed light on the extent to which students' attitudes towards probability affects performance in the topic.

Teaching of Mathematics in Secondary schools is not without difficulties. Teachers have to deal with their own attitude, they are beset with problems that frustrate their efforts to teach effectively and efficiently. Some teachers put in extra effort to improve Mathematic instruction and thus performance, but when national exam results are released, performance is poor. This discourages them. Students who have already developed a negative attitude towards Mathematics may cause the teacher to be discouraged too. Unemployment has forced some people into the teaching profession. Such teachers, who are not in the profession by choice, are not committed. People who are not good at doing things will inevitably experience failure and those who are competent will experience success (Nafungo, 2004). Lack of sufficient teachers meant that few are overworked and thus they have no time to prepare adequately.

Students attitude towards Mathematics lessons perceives it as a subject which is difficult and hate are common opinions among students that reflect their negative attitudes towards mathematics. Apart from these opinions, other action tendencies that reflect negative attitudes in Mathematics include, coming to class late, sleeping during the lesson and refusing to participate lesson. Students like any other person
need approval, feeling of importance, security and independence. When these needs are met, a student is likely to develop an interest in any activity (Nafungo, 2004). Students care more about how much a teacher towards you they look for more negative things in you, but if they are positive they look for more positive things in you (Ibid). Teachers are the most important agents that can influence students’ attitude towards Mathematics. Too much theoretical teaching of mathematics makes the subject appear too abstract and boring. Negative verbal commend from teachers towards students, ability in Mathematics, discourages them (Ibid). Practical activities when adopted in mathematics instruction, motivates student. However, some fear doing a lot of work.

In the discipline of Mathematics, individual concepts and relationships can be quite abstract, and at times can even represent a bit of a mystery to students, often students need to spend some time deducing and explaining these relationships to internalize those (Frank, 1988). In the field of Mathematics education, research on attitude has been motivated by the belief that “attitude” plays a crucial role in learning Mathematics (Neale, 1969). Teachers attribute students’ difficulties with Mathematics to their attitude towards the subject nearly always (Polo and Zan, 2005). The causes of a negative attitude are generally ascribed to students’ characteristics and behaviours, thus hiding the teacher’s responsibility in building a view of Mathematics that elicits refusal, in the lack of interest and effort by students, in the image of the self that students construct (Hannula, 2003). Even when Mathematics is perceived as useful, this perception is not necessarily associated with a positive emotional disposition (Hannula and Philipou, 2005).
Amato (2001) argues that the development of positive attitudes to Mathematics is dependent on the type of teaching. Negative attitudes can be generated by a mismatch which occurs when the teacher teaches instrumentally, and the student tries to understand relationally. Researchers believe that teacher’s attitudes to Mathematics in some way influence their students’ attitudes and Mathematical learning (Rehich and Way, 1994). In my view, I agree with his finding. Teachers attitudes are said to affect their approach to teaching and the classroom (Goulding, 2002). Teachers are said to rely on memories of themselves as school students to shape their teaching practices (Ball 1994). Teachers model their attitudes and beliefs during their teaching. The most direct influence of teachers’ negative attitudes to Mathematics on their students learning appears to be allocation (Bromme and Brophy, 1986). Such teachers have been found to allocate more instruction time to subject matter areas that they enjoy, and less to areas that they dislike. It is important to note that none of the studies mentioned above investigated the experiences of incorporating learning activities that included: problem solving activities, playing games and group project work. These activities take a constructivist approach to teaching and learning, which result to various instructional experiences. The study used observation schedules, questionnaires and interview schedule to collect data. Teachers attitudes towards their work and interaction with students significantly influence students academic achievements. According to Aaronson, (2003), students taught by teachers with positive attitudes towards their work who are friendly to students, significantly enhance achievements. The study by Aaronson, (2003) was done in America and there exist a knowledge gap in understanding the Kenyan situation. This study sought to find out the effect of students’ person attributes on academic performance of students in Kenya.
2.8 School Administration on KCSE Performance

The success of development and provision of quality and excellent results in national examinations depends on the quality of school administration, that is, head teachers. The better the quality, the better the performance of students. Other scholars have agreed on this principle, (Wilkins, 1979).

According to Eshiwani (1983), the quality of school administration is related to the achievement of pupils in examinations. He further noted that schools, which perform consistently well, tended to have sound and efficient leadership. Efficient principals will be able to organize the learning process for the pupils and motivate the teachers hence making them to work as a team. On the study carried by Duighan (1986), on effective schooling, identifies school leadership as crucial, factors in the success of a school. He enumerates activities that constitute effective leadership by the school principal to include- setting an orderly atmosphere creating climate of high expectations and staff students, encouraging collegial and collaborating relationship and building commitment among students and staff to the school goals.

Raju (1973) on school administration notes that the administrative role of the head teachers is directing, controlling and management of all matters pertaining to educational enhancement in the school. Kathuri (1986) examined the relationship between the schools and pupils performance. He viewed the aspects of administration such as staff meetings, the amount of time the principal allocated to various aspects of his responsibilities. He further looked at the principal's opinion on matters that are related to school discipline and quality of a good teacher. He noted that a strong correlation existed between the quality of
administration in a particular school and performance of that school in national examinations. He further pointed out that the morale among teachers and students will be influenced by effective administration. A school where morale prevails is likely to have less disciplinary problems among teachers and consequently among pupils. Teachers in such schools are likely to be more committed, hence, putting their effort in teaching and learning process better performance in national examinations.

Principals are faced with certain problems in their administrative roles which hinder them from carrying out their duties effectively. Gathinji (1990), while examining administrative problems faced by head teachers found that they face problems such as lack of sufficient teaching and learning resources, lack of time to deal with day-today affairs of the school accounting and auditing, raising and obtaining adequate funds to finance school programmes, ensuring that teachers are committed and dedicated to their work and lack of administrative experience due to lack of pre-service in educational administration. This makes the principal to concentrate too much on issues affecting him and forgetting the performance of the students.

Administrative problems also affect performance. It will be indicated that the style of leadership of most head teachers will cause administrative problems in schools. The effectiveness of the administrative structure depends on leadership style. It will be further noted that the personal problems of principles will also be responsible for their administrative problems which affect their relationship with teachers and students. This will lead to lack of proper co-ordination in schools. It will be the duty of the principal to facilitate curriculum instruction. If they do it well their institutions will be
seen to be successful. Meagley (1964), revealed that: - the more successful school administrators are surrounded themselves with corps of well-prepared specialists.

The principal should be able to create a spirit of teamwork so as to work well with his/ her colleagues' teachers. He/she distributes instructional duties fairly according to the abilities and experience. He should always treat her colleagues without favor. This will therefore improve the school performance. He further reaffirms that, the principal should always check teachers schemes of work, daily lesson plan and students' performance. The principal should visit the classroom to see how teachers facilitate their lessons. As Calahan (1971), in Mworia (1993) watching a teacher present a lesson of which he himself is proud of will give the chairman a good estimate of the teacher's potential for excellence.

A good principal should spend some time with her/his students. This will enhance understanding between his/her students. Meagley (1964), argued that: - the principal who prefers to talk with pupils in the corridors rather than to shout at them has the basis for building a strong working relationship with pupils. He further states that by examining the factors that contribute to poor performance in national examinations, the head teachers' administrative style determines the type of teaching and learning resources in a school. He also pointed out that; the head teacher's poor administrative styles are purly responsible for poor performance.

2.9 Teacher’s length of teaching experience and pupil achievement in mathematics

Most experienced teachers having interacted with subject matter and divers' classroom experiences for a longer time are likely to have a positive impact on student achievement. (Cooney, 2000). Ryan (1970) observes that in the first year of teaching, we witness the sad counterpoise of two sets of attitudes on how the
teacher should act. The students are looking strong personalities and leadership. The beginning teacher however seeks a more gentle leadership style. For some few teachers, this works for legions it fails. This impact negatively on the teacher performance and consequently learner achievement. In an analysis of mathematics achievement and drop out in a sample of California high schools Fetler (2001) found that schools whose dropout rates were high, had more new teachers than did schools with low dropout rates.

A comprehensive analysis by Greenwald, Hedges and Laine (1996) of 60 studies found a positive relationship between years of teacher experience and student test scores. Similarly, the UTD Texas schools project data showed that students of experienced teachers attained significantly higher levels of achievement than did students of new teachers i.e. those with one to three years of experience (Rivkin, Hanshek and Kain, 2005). Given this scenario, the researcher intends to find out the relationship between teaching experience and achievement in mathematics.

Table 2.4: Teacher qualification and achievement of pupils in mathematics

<table>
<thead>
<tr>
<th>Grade</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>Graduate</td>
<td>67.4</td>
<td>32.6</td>
<td>69.3</td>
<td>30.7</td>
</tr>
<tr>
<td>Approved</td>
<td>65.8</td>
<td>34.2</td>
<td>65.7</td>
<td>34.3</td>
</tr>
<tr>
<td>SI/DIP</td>
<td>63.1</td>
<td>36.9</td>
<td>45.7</td>
<td>54.3</td>
</tr>
<tr>
<td>P1</td>
<td>57.3</td>
<td>42.7</td>
<td>58.2</td>
<td>41.8</td>
</tr>
<tr>
<td>P2</td>
<td>55.9</td>
<td>44.1</td>
<td>57.3</td>
<td>42.7</td>
</tr>
<tr>
<td>P3</td>
<td>45.7</td>
<td>54.3</td>
<td>45.8</td>
<td>54.2</td>
</tr>
<tr>
<td>Total</td>
<td>57.5</td>
<td>42.5</td>
<td>58.7</td>
<td>41.3</td>
</tr>
<tr>
<td>Untrained</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>KCE/KCSE</td>
<td>61.1</td>
<td>33.9</td>
<td>72.7</td>
<td>27.3</td>
</tr>
<tr>
<td>KJSE</td>
<td>73.9</td>
<td>26.1</td>
<td>75.7</td>
<td>24.3</td>
</tr>
<tr>
<td>CPE/others</td>
<td>61.8</td>
<td>38.2</td>
<td>61.5</td>
<td>38.5</td>
</tr>
<tr>
<td>Total</td>
<td>67.2</td>
<td>32.8</td>
<td>73.0</td>
<td>23.0</td>
</tr>
<tr>
<td>Grand total</td>
<td>57.8</td>
<td>42.2</td>
<td>58.8</td>
<td>41.2</td>
</tr>
<tr>
<td>Total No</td>
<td>178,900</td>
<td>178,622</td>
<td>180,860</td>
<td>178,037</td>
</tr>
</tbody>
</table>

There are several levels of primary school teacher certification in Kenya. They include P3, P2, P1, SI/DIP, approved teacher and graduates. Because of the increased demand for teachers there are some unqualified teachers too. The Table above shows percentage of primary school teachers in the Republic of Kenya by gender between 2010 - 2013.

From the above table:-

a) There has been a steady increase in the number of male trained teachers from 57.5% in 2000 to 58.5% in 2003 while that of trained female teachers has remained slightly above 41% over the same period.

b) The population of untrained teachers in primary schools has been declining steadily since 2000.

Increased proportion of trained teachers and improved teacher to pupil ratios are attempts by the Ministry of Education to provide quality education (Republic of Kenya, 1999). Although the policy of the Ministry of Education is to maintain a low pupil-teacher ratio as a measure of maintaining quality education, that appears too expensive to sustain (Republic of Kenya, 1999).

Muller and Alexander (2004) in a study on teacher certification and middle school mathematics achievement in Texas found that students taught by certified teachers scored better on the Texas state mathematics achievement test than those taught by uncertified teachers. A study that examined the mathematics achievement of elementary learners also found that students taught by new uncertified teachers did significantly worse on achievement tests than did those taught by new, certified teachers (Laczko-Kerr & Berlier 2002). Likewise, Darling-Hammond (1999) found a significant positive association between achievement and teacher
certification, she also found significant negative association between achievement and the presence of a high proportion of new or uncertified teachers in the school. An analysis that synthesizes findings from a group of studies showed that teachers with pedagogical training performed better than those who entered teaching without such training (Greenwald, Hedges and Laine, 1996). There is therefore a need to establish the effect of training of teachers on students’ achievements which will help the government to justify huge expenditure on training. Teachers’ experience which is determine by the training that teachers go through and the duration of their teaching significantly determines their efficiency in teaching. Teaching experience affect classroom management (Jespsen, 2005). Teachers with few years of teaching experience are less likely to teach effectively. The study by Jepsen, (2005) was not done in Kenya and thus a knowledge gap still existed in understanding the effect of teachers’ experience on students’ performance in Kenya which this study seek to establish.

2.10 Summary

From the literature review, it was observed that most scholars have identified factors that affect examination performances in schools in developed countries. Factors such as academic and professional training of teachers, instructional methods, student-teacher attitude, and experience of teacher are an example of such factors. Mathematics performance among secondary school students' in Kakamega County is below average. Thus the need to identify the factors that affect performance of students in Mathematics in Secondary Schools. It is because of this view that the researcher was to examine the performance of Mathematics among secondary school students' in Kakamega County on a number of factors that will avail.
CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction
The purpose of the study was to determine the factors that affect the students’ KCSE performance in Mathematics in public secondary schools in Kakamega County. This chapter describes the procedures, ethical considerations and strategies used in the study. Different subsections focused on the research design, study locale, study population, the sample and sampling procedures, research instruments, piloting and data collection procedures.

3.2 Research Design
The research study used survey design to investigate the utilization of resources that influence students’ performance in Mathematics at KCSE level in secondary schools in Kakamega County. Survey method aims at obtaining data, which can be analyzed, patterns extracted and comparison of such data to be made. Similarly, survey design is used in this study because it enabled the researcher to collect data from a sample of informants that will be used to examine the resources that influence the performance of mathematics in Secondary Schools in this County, basing on a number of parameters. According to Orodho (2009), survey design is intended to collect data by interviewing or administering a questionnaire to a sample of individuals. Survey design was used in this study because it enabled the researcher to collect information from a sample of students, teachers, head teachers and District Quality Assurance and Standards Officer (DQASO) in Kakamega County by use of questionnaires, interview guides and observation schedules.
3.3 Location of the Study

This study was conducted in Kakamega County, which is one of the 47 Counties in the country. Kakamega County borders Vihiga County to the East and South East, Bungoma County to the West, and Nandi County to the North. Kakamega County is divided into six educational divisions namely; Municipality, Lurambi, Kabras, Navakholo, Ikolomani, Idakho. Population in Kakamega District is high and evenly distributed in rural settlement patterns. Ministry of Education Kakamega County, MOE (2012)

Figure 3.1: Map of Kenya showing all the counties including Kakamega County
Kakamega County was selected for the study because it is one of the worst in terms of student’s performance in mathematics in the county. The County was selected for the study because of its dismal performance in mathematics. This has raised great concern among the parents, stakeholders, the religious organizations and political class who hails in this County. The concerns that were raised in this county were used for discussions of finding the long lasting solutions in alleviating the poor performance of mathematics in this County. The performance in this subject is below bar as compared to the index performance of other schools and counties within the Country, ministry of education Kakamega County, (MOE, 2012).

3.4 Study Population

Best and Kahn (1999) and Orodho (2012) content that, the target population is any group of individuals who have one or more characteristics in common that are of interest to the researcher. Public day secondary schools in Kakamega County was of interest to the researcher for their continued dismal performance in mathematics at form 4 levels. The targeted population of the study were 15 principals, 60 teachers, 450 form four students in the 15 sampled schools and one County quality assurance and standards officer.

3.5 Sample and Sampling Procedure

Slavin (1984), observes that due to limitations of time, funds and energy, a study can be carried out from a carefully selected sample to represent the entire population. The selected sample in Kakamega County composed of mixed secondary schools. However, only Public day secondary schools that had enrolled candidates for Kenya Certificate of Secondary Education (KCSE) in the years (2012) were selected.
The schools that were included were the five top and five bottom secondary schools based on KCSE examination performance in mathematics in (2012). These categories of schools were selected since the researcher was to examine the factors affecting the performance in mathematics in Kakamega County basing on a number of parameters such as entry behaviour, attitudes, motivation, academic qualification of the teacher, professional qualification and the instructional materials. The performance of mathematics in public Secondary Schools was necessary since the researcher was to determine the resources that affect its performance in K.C.S.E in the County.

The 15 schools comprised of 10 percent of the target population of 150 public schools. According to Gay (1992), for a survey design sample of at least 10% is a justifiable representation of the total population. The 10% of 150 public schools and their principals were selected. The researcher also sampled 10% of the population of teachers and students of the nine-day schools based on Ary, Jacob and Razaviah (1972) who observed that for a survey design a sample of 10 percent is also justifiable for data collection. Ten percent of the 600 teachers and 4,500 students were also included in the sample. The determination of sample size is shown in Table 3.1.

<table>
<thead>
<tr>
<th>Category</th>
<th>Population (N)</th>
<th>Sample (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schools</td>
<td>150</td>
<td>15</td>
</tr>
<tr>
<td>Principals</td>
<td>150</td>
<td>15</td>
</tr>
<tr>
<td>Teachers</td>
<td>600</td>
<td>60</td>
</tr>
<tr>
<td>Students</td>
<td>4,500</td>
<td>450</td>
</tr>
<tr>
<td>QASO</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>5401</strong></td>
<td><strong>541</strong></td>
</tr>
</tbody>
</table>
For the purpose of the study, the identified 5 strata include; boarding schools for (boys) and (girls) schools, mixed day secondary school, and day secondary schools for both girls and boys comprising of 3 boys boarding and 3 for the girls, 4 day secondary schools for girls and boys, 5 boys mixed schools. The researcher selected 15 schools from 150 secondary schools from the target population. These translated to 10% of the total schools in the county. According to Mugenda and Mugenda, (1999), for descriptive studies, 10% of the accessible population is an enough sample to be used. Each stratum was represented as follows:

- Boarding schools for - 3
- Boarding schools for girls - 3
- Day secondary schools for boys - 2
- Day secondary schools for girls - 2
- Mixed day schools - 5

i) Schools

The study targeted (150) public secondary schools in Kakamega County. Due to the fact that the population from the sample drawn is not homogenous, stratified sampling was used to obtain a representation of (15) sampled schools. According to Krathwol, (1993) the researcher will classify the units in the sampling frame into strata on basis of a characteristics that if not properly represented in the sample, it may bias the inferences the researcher makes.

ii) Principles

Stratified sampling was used to select principals from sampled schools to be included in the study. In stratified random sampling, the population was first divided into two or more exclusive segments called strata based on categories of one complete stratified sample (Orodho, 2009). All principals from the 15 sample schools under the
study were included. One county quality assurance and standards was included in the sample.

iii) Students

The sample included 30 students from 15 sample schools. 10% of the total population in each school was sampled. The 15 schools have a population of 4500 form four students.

iv) Teachers

Stratified sampling was used to select teachers from sample schools to be included in the study. The sample included 5 teachers from each stratum. 10% of the total population of teachers in each school was sampled. The 15 schools have a population of 600 teachers, out of these 60 teachers were sampled for the study.

3.6 Research Instruments

The researcher adopted Questionnaires and an interview guide to collect data from the principals, teachers, students and DQASO on factors affecting the performance in Mathematics in public schools in Kakamega County. The researcher used observation schedule to supplement information which was obtained through questionnaire.

3.6.1 Questionnaires

Best and Kahn (1999,) and Orodho (2009) content that questionnaires enable the person administering them to explain the purpose of the study and to explain the meaning of the items that may not be clear. Questionnaires are used to obtain important information about the population, Mugenda and Mugenda (1999). The study used questionnaires because they can ensure anonymity, permit use of standardized questions, and they have uniform procedures, provide time for
subject to think about responses and are easy to score. Questionnaires were used in the study because they are easier to complete and the researcher will easily detect a trend just by glancing at the responses (Orodho, 2012).

i) Principals' Questionnaires

The questionnaires for principals (Appendix B) was used to collect data on the principals’ gender and their schools types, effects of teachers preparedness in the students performance, effects of teachers experience in the performance of mathematics, teachers qualifications and training, effects of increased enrolment on the quality of education, effects of student-teacher ratio in mathematics performance, effects of adequacy of teaching and learning resources in the performance of mathematics and strategies to the improvement of performance in mathematics in Kakamega County.

ii) Teachers' questionnaires

The questionnaires for teachers (appendix C) was used to gather information on the teachers’ gender, types of their respective schools, teacher qualification and training of teachers, duration by length of time in their present positions, effects of teacher preparedness on performance, effects of teachers classroom management on performance, the use of teaching and learning aids in classroom situation, teachers preparation and use of professional documents in teaching, effects of teacher’s personal character and attitudes on student’s performance, teachers attitude towards incorporating learning activities, effects of teachers experience in the performance of mathematics, level of agreements on effects of teachers experience on the student’s academic performance, effects of students-textbook ratio on performance, effects of adequate teaching and learning resources in performance and strategies of improving performance in
iii) **Students' Questionnaires**

The questionnaires for students (Appendix D) was used to gather information on students' gender, type of their respective schools, type of instructional methods used by their teachers, effects of availability and adequacy of teaching and learning materials on performance, effects of teachers good morals on students performance, effects of teachers personal attributes on students performance, various aspect of personal character of teachers on students performance, students attitudes towards learning activities, effects of syllabus coverage on students performance, effects of curriculum supervision on students performance, effects class size on students performance, effects fees payment on students performance and strategies of improving performance in mathematics.

### 3.6.2 District Quality Assurance and Standards Officer Interview Guide

DQASO interview guide (Appendix E) was used to provide in-depth data e.g. qualitative data, which was not possible to get using a questionnaire. Interview guides was used to make it possible to obtain the data required to meet the specific objectives of the study, Mugenda (1999). DQASO interview guide was used to gather information on gender, effects of increased enrolments on students performance and strategies of improving performance in mathematics.

### 3.6.3 Researchers' Observation Schedule

The observation schedule (Appendix E) was from one of the research instruments. It was used to supplement information, which was obtained through the questionnaire. This was included examining and recording data on the adequacy of teaching, learning and physical resources in the sampled schools.
Kothari and Pals (1993) note that observations are much better in overcoming the weaknesses of self reported evidence. The authors add that the technique enables the researcher to collect direct information about human behavior. The areas to be observed were adequacy of teaching - learning and physical resources.

3.7 Validity and Reliability of the Research instruments

This section presents validity and reliability of the research instruments.

3.7.1 Validity of the Instruments

Orodho (2005) defines validity as the degree to which results obtained from the analysis of the data actually represent the phenomenon under study. Validity therefore checks if the research instruments are doing what they were intended to do. Two instruments i.e. questionnaires and interview guides were submitted to the supervisors in the Department of Educational Management, Policy and Curriculum studies. The experts scrutinized the details of these instruments and gave their opinion in view of reviewing or adopting them for pilot study. Two schools had similar characteristics with the rest of the schools that were studied. Pilot study helped to make clarification and improved the content for use in the instruments that were administered for study. At the same time, the study helped the researcher attain a good art of conducting interviews.

3.7.2 Reliability of the Instruments

Reliability is the consistency of the instruments in measuring what it is intended to measure (Wiersma, 1985). It’s a measure of degree to which a research instrument yields consistent results after repeated trials. Mugenda and Mugenda (1999). The researcher used the split-half technique in investigating the reliability of the instruments. According to Mugenda and Mugenda (1999), this technique administers
an instrument once to two groups of subjects. The research instruments were therefore administered to sixty identical respondents made up of 30 male and 30 female teachers. The scored items were then randomly divided into two groups. The completed questionnaires were scored and analyzed. Spearman rank order correlation coefficient was calculated using the formula:

\[ r = 1 - \frac{6\sum (D)^2}{N(N^2 - 1)} \]

Where
- \( r \) is the Spearman rank order correlation
- \( \sum \) is the summation of subjects
- \( N \) is the number of subjects
- \( D \) is the deviations of the subjects between odds and even

The coefficient obtained was used to determine the reliability index of co-efficiency by subjecting it to Spearman Brown Prophecy formulae. A split-half coefficient of 0.78 was obtained and considered substantially high enough to determine the reliability of research instruments.

Split-half Coefficient, \( r' = \frac{2r}{1+r} = 0.78 \)

Where \( r \) is Correlation Coefficient

According to Orodho (2005), a coefficient correlation (r) of about 0.75 and above should be considered high enough to judge an instrument as reliable. The researchers' value was 0.78 and the instruments were adopted for data collection.

### 3.8 Data Collection Procedure

The researcher sought an introduction letter from the Department of Educational Management, Policy and Curriculum Studies in Kenyatta University to carry out the study. Once obtained, the researcher acquired a research permit from the Ministry
of Education (MoE). The permit legally allowed the researcher to conduct the study. The researcher then visited the selected schools and distributed the questionnaires to principals, teachers and students. The researcher interviewed the DQASO in her office on the agreed date. The researcher used observation schedule to collect data from the principals, teachers, students and DQASO.

3.9 Research Clearance and Ethical Conservation

The procedure for data collection involved getting a research permit from the National Council for Science and Technology to undertake research on: “Factors that affect student’s Performance in Mathematics at KCSE level in Secondary Schools in Kakamega County, Kenya”. This procedure of getting clearance was followed all through the field work period by getting permission from the County Director of Education and School Management before distributing questionnaires. During the research process, the participants were assured of confidentiality and the researcher and research assistants safeguarded the information obtained.

3.10 Data Analysis

The data obtained from respondents were recorded in readiness for analysis. Kerlinger, (1973) defines analysis as categorization, ordering manipulating and summarizing data to obtain answers to research questions. Quantitative data collected by using a questionnaire was analyzed by the use of descriptive statics using the statistical (SPSS) and presented through percentages, means, standard deviations and frequencies. The information was displayed by use of bar charts, tables and pie charts in Rose – form. Thus was done by tallying up response, computing percentages of variations in responses as well as describing and interpreting the data in line with the studying objectives and assumptions through use of SPSS.
The data collected using interview guidelines which is qualitative in nature, was analysed using conceptual content analysis which is the best suited method of analysis. Conceptual contents analysis is defined by Creswell, (2003) as a technique for making inferences by systematically and objectively identifying specific characteristics of messages and using the same approach to relate trends. According to Mugenda and Mugenda, (2003) the main purpose of content analysis is to study the existing information in order to determine the factors that explain in specific phenomenon.

According to Kothari, (2004), content analysis uses as a set of categorization for making valid and replicable inferences from the data to their content. The study also used inferential statistics (correlation and regression analysis) to analyse the relationship of physical factors, financial and school-based factors on the performance of mathematics.

CHAPTER FOUR

63
4.1 Introduction

The purpose of the study was to determine the factors that affect the performance in Mathematics at KCSE level in secondary schools in Kakamega County.

In the Chapter, data is represented, analyzed and discussed as regards the factors affecting students’ performance in Mathematics at KCSE level in Secondary School in Kakamega County as guided by the objectives of the study and research questions.

The study sought information from students, teachers and principals using questionnaires and interviewed DQASO using an interview guide and observation schedule.

Data analysis was done using frequencies and percentages and then the analyzed data was presented in form of tables and figures. Finally, findings of the study were discussed in the light of the literature related to the factors affecting the performance of students in Mathematics at KCSE level in Secondary schools in Kakamega County.

Data analysis, presentation of study findings and discussion were guided by the following objectives:

a) To investigate the extent to which instructional methods contributes to the students’ learning and performance in Mathematics at secondary school level.

b) To find out the extent to which attitudes affects the performance in mathematics in Kakamega County.

c) To assess the extent to which teachers experience affects the performance in mathematics at secondary level in Kakamega County.

d) To find out the extent to which teachers’ qualification affect the learning and
performance in Mathematics in secondary schools in Kakamega County.

e) To investigate the extent to which physical and financial resources affect students’ performance in Mathematics in Kakamega County.

4.2 Demographic Characteristics of the Samples

This section presents some of the demographic aspects of the respondents, especially those that have a great bearing on the interpretation of data collected on the various objectives of the study. Accordingly, the main demographic features of the respondents featured in this section include: Gender of both the students and the teacher, Number of years of service for teachers in the current station, categories of schools, names of departments and nature of the school, length of time served as a principle as well as in the current station.

4.2.1 Distribution of respondents by Gender

During the data collection, the researcher aimed at establishing gender parity in the distribution of students, teachers, principals and DQASO. This was because the respondents were purposively sampled to have equal gender representation. The data from 15 schools were analysed. Information obtained were administered through questionnaires in which the respondents were asked to indicate their gender. The results are presented in Table 4.1.
### Table 4.1: Distribution of respondents by Gender

<table>
<thead>
<tr>
<th>Respondents</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>%</td>
</tr>
<tr>
<td>Students</td>
<td>300</td>
<td>66.7</td>
</tr>
<tr>
<td>Teachers</td>
<td>32</td>
<td>53.3</td>
</tr>
<tr>
<td>Principals</td>
<td>9</td>
<td>60</td>
</tr>
<tr>
<td>DQASO</td>
<td>1</td>
<td>100</td>
</tr>
</tbody>
</table>

From Table 4.1 above, indicates gender parity in the distribution for the students. This is because the students were purposively sampled to have equal gender representation. However, for those that were not necessarily sampled by gender, the gender distribution shows significant differences such that the male teachers comprised 53.3% while the female teachers comprised of 46.7%. The situation of the principals was perhaps more fascinating. Out of the fifteen principals that participated in the study, 9(60%) of them were males while 6(40%) were females. Regarding students, out of 450 students of 66.7% were male while 33.3% were female. As for the DQASO, there was only one such officer and who happened to be a female.

### 4.2.2 Distribution of the sampled schools by type

The study sought information from the principals, teachers and students on the distribution of the sampled schools by type. This was necessary to provide a good scenery for understanding the effect of qualitative expansion of secondary schools on education in the county. The data obtained were administered through questionnaires given to the principals, teachers and students. The respondents were asked to indicate the type of their schools. The results are indicated in Figure 4.1.
Figure 4.1: Distribution of the sampled schools by their type

Figure 4.1, indicate the distribution of schools representing a variety of schools in Kakamega County in terms of their type. Analysis of the responses collected for this question indicated that 13.6% of the schools were boys boarding while 48.6% were mixed day. The girl’s boarding constituted 37.8%. These types of schools are well represented in significant proportions. These provided good scenery for understanding the effects of the qualitative expansion of secondary schools in education in Kakamega County.

4.2.3 Distribution of Teachers by duration in their position

The researcher focused on establishing the distribution of teachers by their duration in their present positions. This was necessary because it meant that most of teachers had been in the school long enough to be able to commend on the quantitative and qualitative trends in the provision of education in schools. The information was obtained from teachers questionnaires. They were asked to indicate the length of time for which they have been their present positions. The results are indicated in figure 4.2.
From the Figure 4.2, in the responses, the majority of teachers indicated that they had been teachers between 3-4 years and this category constituted 44% of the respondents. This group was followed by the category that are served as teachers for 5-6 years which constituted 25%. Those who served above 6 years also constituted 25%. The least category comprised of 6% who had served as teachers for only 1-2 years. This was very useful in itself because it meant that most of the teachers had been in those schools for a period long enough to be able to comment on the quantitative and qualitative trends in the provision of education in those schools. This means that through their experience they are able to tell when proper teaching is taking place by use of knowledge, skills and learning experiences. Experience teachers would plan well in advance to cover the syllabus content adequately.
4.3 Instructional methods and performance in Mathematics

4.3.1 Teachers use of participatory methods of teaching

This section focused on instructional methods and performance in mathematics. This was necessary to establish whether the teachers in public secondary schools in the county applied participatory methods of teaching rather than lecture methods which are instrumental in enhancing student’s performance. Students were asked using questionnaires whether the teachers involve them in learning activities. The results are presented in Figure 4.3.

**Figure 4.3 Students response on whether teachers use participatory methods of teaching mathematics in their schools**

![Bar chart showing 67% Yes and 33% No for teachers using participatory methods in teaching mathematics.]

From the results in Figure 4.3 majority of the students 67% reported that teachers engage them in participatory methods. This illustrated that majority of the teachers in public secondary schools in Kakamega County involved students in learning activities rather than lecture methods which are instrumental in enhancing the performance in the County. The findings are in collaboration with Jepsen (2005) who argued that
teachers classroom management, were necessary to maintain order and discipline in the classroom, implement new methods of teaching e.g. participatory methods.

4.3.2 Use of teaching and learning aids by the teachers

The researcher further sought to establish from the students whether teachers used teaching and learning aids during mathematics lessons. This was necessary so as to demonstrate mathematics concept to enhance a better understanding of the subject. Students were asked to indicate using questionnaires whether the teachers used teaching learning aids in mathematic lessons. The results are represented in Figure 4.4.

Figure 4.4: The use of teaching learning aids by the teachers in classroom situations

According to the findings in Figure 4.4, 252 (56%) of the student indicated that teachers never used teaching learning aids in classroom learning situations to explain concepts and topics while 198 (44%) confirm that teachers use teaching learning aids while teaching in class. The results depict that majority of the teachers
in public secondary schools in Kakamega County rarely used teaching learning aids to demonstrate mathematics concept to enhance a better understanding of the subject by the students. The findings are not in line with the study of Cockcraft committee (1982), which reports about the teaching style and methodology that, Mathematics teaching at all levels should include opportunities for, exposition by the teacher discussion between teacher and students and between the students themselves, appropriate practical activities, consolidation and practice of fundamental skills and routines, problem solving including the application of mathematics to everyday situations and investigational work.
4.3.3 Effects of teachers preparedness on academic performance of students in mathematics

4.3.4 Views on the effects of teachers preparedness in mathematics performance

This section sought to establish teachers and principals views on the effects of teachers preparedness in the performance of the mathematics. This was necessary to increase the quality of teaching and to enhance the teachers required skills in the classroom management to meet the complex and changing demands they face in classroom teaching. The respondents were asked to indicate using questionnaires, their views on the effect of teachers preparedness in the performance of the subject. The results are indicated in Table 4.2.

Table 4.2: Effects of teacher preparedness on Mathematics performance

<table>
<thead>
<tr>
<th></th>
<th>Teachers</th>
<th></th>
<th></th>
<th>Principals</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td>Percentage</td>
<td>Frequency</td>
<td>Percentage</td>
<td></td>
</tr>
<tr>
<td>Great extent</td>
<td>28</td>
<td>46.7</td>
<td>9</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>Moderate extent</td>
<td>24</td>
<td>40</td>
<td>5</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>Little extent</td>
<td>8</td>
<td>13.3</td>
<td>1</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Not at all</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>60</strong></td>
<td><strong>100</strong></td>
<td><strong>15</strong></td>
<td><strong>100</strong></td>
<td></td>
</tr>
</tbody>
</table>

From the Table 4.2, 60% of the principals posited that teacher's preparedness influence the performance of mathematics in their schools to a great extent and 30% to a moderate extent. Similarly 46.7% of the teachers indicated that teachers preparedness influence the subject performance to a moderate extent. This depicts that to increase the quality of teaching, the teachers require skills in the classroom.
management to meet the often complex and changing demands they face in their classrooms. The findings concur with Kremer (2003) who indicated that the class management has been identified as a major influence on teacher performance, a key source of teacher job related stress, in general an essential prerequisite for student learning (Kremer, 2003).

4.3.5 Effects of teachers classroom management on the academic performance in mathematics

The researcher aimed at establishing teachers preparedness on various classroom contexts. The information was obtained from the teachers and principals using questionnaires. This was necessary to enable the teachers prepare so as to maintain order and discipline, to implement, new methods of teaching so as to enhance better students performance. The results are indicated in Table 4.3.

Table 4.3: effects of classroom management on academic performance in mathematics

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>STD Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintain order and discipline</td>
<td>4.5714</td>
<td>0.77326</td>
</tr>
<tr>
<td>Implement new methods of teaching</td>
<td>4.5306</td>
<td>0.78915</td>
</tr>
<tr>
<td>Implement county curriculum and</td>
<td>4.2755</td>
<td>0.58821</td>
</tr>
<tr>
<td>performance standards Use of student performance assessment</td>
<td>4.3776</td>
<td>0.68138</td>
</tr>
<tr>
<td>techniques</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4.3, indicate on how teachers and principals are prepared with compelling classroom contexts. The researcher established that they were prepared to maintain order and discipline in classrooms, implement new methods of teaching, use of
student performance assessment techniques, implement the curriculum, improve performance standards as shown by the subject mean scores of 4.5714, 4.5306, 4.3776 and 4.2755 respectively. This depicts that the teacher's ability to maintain order and discipline in the classroom, implement new methods of teaching are key aspects of teacher classroom management that help teachers in offering quality education of mathematics to the student. The findings are in collaboration with Yator, (2003) who observed that discipline of students is crucial if any institution has to perform, he further argued that discipline plays a vital as far as performance is concerned.

4.3.6 Teacher’s preparation and use of professional documents in teaching

The Kenya Institute of Education, KIE (2002) notes the professional records which should be prepared and used alongside the syllabus. These are schemes of work, lesson plans, lesson notes, record of work covered and students’ progress records. Teachers were asked how often they prepared and used professional records in the teaching of Mathematics. The expected responses were always, sometimes and never. Table 4.4 shows their responses.

<table>
<thead>
<tr>
<th>Professional Record</th>
<th>Always</th>
<th>Sometimes</th>
<th>Never</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f</td>
<td>%</td>
<td>f</td>
<td>%</td>
</tr>
<tr>
<td>Schemes of work</td>
<td>42</td>
<td>70</td>
<td>18</td>
<td>30</td>
</tr>
<tr>
<td>Lesson plan</td>
<td>6</td>
<td>10</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>Lesson Notes</td>
<td>24</td>
<td>40</td>
<td>30</td>
<td>50</td>
</tr>
<tr>
<td>Record of work</td>
<td>42</td>
<td>70</td>
<td>18</td>
<td>30</td>
</tr>
<tr>
<td>Students’ Progress Record</td>
<td>36</td>
<td>60</td>
<td>24</td>
<td>40</td>
</tr>
<tr>
<td>Average</td>
<td>30</td>
<td>50</td>
<td>19</td>
<td>32</td>
</tr>
</tbody>
</table>

Table 4.4: Teachers’ preparation and use of professional documents in teaching
From Table 4.4, it can be seen that the five critical professional documents are not prepared and used as expected. The responses reveal that 80% of the teachers rarely prepare nor use lesson plans. When they were asked for the lessons, 80% of them responded that the scheme of work together with the lesson notes were sufficient while 70% said they lacked time to prepare it due to the large workload they had. Only 40% of the teachers always prepare and use lesson notes. On average, half of the teachers always prepare and use professional records while 18% never. In my view, this explains why the Mathematics instruction is devoid of critical learning activities. Views from schools principals suggested that, for the performance of mathematics to improve, school management and county quality and standards officers should provide effective curriculum supervision to enhance quality of education. Their views concurs with Kimosop, (2002) who argued that the function of supervision is to access, maintain, and improve quality of teaching and learning activities so that the intended goals of education be more effectively achieved.

4.3.7 Effects of teachers good morals in motivating students in mathematics performance

The study sought the information from the students on the effects of teachers good morals in motivating students in performance. Students were requested to indicate whether teachers moral conducts motivate them in their performance. This was necessary because teacher’s good conduct and incentives are key elements in influencing student’s academic performance. The results are indicated in Figure 4.5.
From the findings in Figure 4.5, the majority of the students 51% reported that the teachers good conduct motivate them in their performance in the subject. On the other hand 49% of the students indicated that teachers’ good conduct never motivated them in their performance. This depicts that teachers' good conduct and incentives are key elements in influencing the students’ academic performance in mathematics as they act as good models to maintain good discipline in schools. This concurs with Aaronso, (2003) who observed that students taught by teachers with positive attitudes towards their work and who are friendly significantly enhance achievements.

4.3.8 Effects of personal character and attitude of teachers towards performance in mathematics

The study inquired from the student on whether the personal character and attitude of teachers affects the academic performance of the student in the subject. The study sought these information from students through questionnaires. This was necessary because personal character and attitudes of teachers affect the performance of the students. The results are indicated in Table 4.5.
Table 4.5: Effects of personal character and attitude of teachers on mathematics performance

<table>
<thead>
<tr>
<th></th>
<th>Teachers (Frequency)</th>
<th>Teachers (Percentage)</th>
<th>Principal (Frequency)</th>
<th>Principal (Percentage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>20</td>
<td>33.3</td>
<td>6</td>
<td>40</td>
</tr>
<tr>
<td>No</td>
<td>40</td>
<td>67.7</td>
<td>9</td>
<td>60</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>60</strong></td>
<td><strong>100</strong></td>
<td><strong>15</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

From Table 4.5 majority of the teachers 67.7% indicated that personal characters and attitude of teachers' influenced the students' performance. Similarly the majority of the principals argued that the personal character and attitude of teachers influenced the students' performance in the schools. Findings showed that personal characters and attitude of teachers is a significant human resource factor that influenced the quality of education offered to the students in schools. The findings concurs with Rehich and way, (1994) who asserts that teachers attitude towards mathematics influence students attitudes towards leanings. Teachers attitudes are said to affect the approach to teaching and classroom contexts, Goulding, (2002).

4.3.9 Various aspects of personal attributes of teachers

The study sought to explore various personal attributes of teachers. Data was collected using questionnaires where students were asked to indicate on how various aspects of personal attributes of teachers influence their performance. This was necessary because various aspects of teachers such as being friendly approachable and age influence students performance. The results are indicated in Table 4.6.
From Table 4.6, the findings of the younger teachers are more helpful and friendly to the students than the older teachers, where the statements on personal attributes on teachers which were rated 66% and 58% respectively. Other aspects included, many teachers are approachable when seeking assistance from them. The sex of the teachers does not affect the interaction with the students as shown by 50% and 33% respectively. Hannula, (2003) asserts that negative attitudes of students are generally ascribed to students’ characteristics and behavior, thus hiding the teachers’ responsibility to mould student’s character. This findings concur with Aaronson, (2003) who posited that taught by high qualified teachers have significance in their performance.

### 4.3.10 Attitude towards incorporating learning activities in Mathematics lessons

There was need to establish the teachers’ attitude towards incorporating learning activities during Mathematics lessons. The objective’s items included: Whether teaching was the teacher’s first career choice or not, whether they were comfortable with their Mathematics workload or not and frequency of displaying certain attitudinal characteristics of the Mathematics teacher. The results are represented in Table 4.7.
The results of Table 4.7 suggests that on Average 59% of the teachers always showed a positive attitude towards learning activities. The percentage of teachers who never showed a positive attitude towards learning activities was 5.5% .During the Mathematics lessons, it was observed that the teachers’ attitude and expression towards learning activities was good. However, Nafungo (2004) notes that the overloaded Mathematics curriculum affects the teachers’ methodology. In an
attempt to cover the syllabus, Mathematics is taught theoretically and students are not given time to discover things for themselves. This makes the learning of Mathematics boring. When students fail to enjoy Mathematics lessons, they develop a negative attitude towards the subject. This eventually leads to low achievement in the subject.

4.3.11 Students’ attitude towards Mathematics activities
Attitude determines 80% of a person’s achievement (Maxwell, 1993). For most students, learning activities are the most effective means by which understanding of Mathematics can develop. However, there was need to establish the students’ attitude towards engaging in learning activities in Mathematics lessons. Two items that guided this objective were attitudinal characteristics displayed by students towards Mathematics lessons and factors influencing students’ attitude towards Mathematics. Students display certain attitudinal characteristics towards Mathematics lessons. The attitudinal characteristics used in this item were adapted from (Trowbridge, et. al, 2004). The expected responses were always, sometimes and never. Table 4.8 shows the students’ and teachers’ responses. The results are indicated in Table 4.8
Table 4.8: students attitudes towards learning mathematics activities

<table>
<thead>
<tr>
<th>Attitudinal characteristics</th>
<th>Always Teachers</th>
<th>Always students</th>
<th>Sometimes teachers</th>
<th>Sometimes students</th>
<th>Never teachers</th>
<th>Never students</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ask questions during Maths lessons</td>
<td>36 60</td>
<td>189 42</td>
<td>24 40</td>
<td>248 55</td>
<td>-</td>
<td>-</td>
<td>13 3</td>
</tr>
<tr>
<td>Enjoy being engaged in learning activities e.g. playing games and group project work</td>
<td>12 20</td>
<td>220 49</td>
<td>48 80</td>
<td>198 44</td>
<td>-</td>
<td>-</td>
<td>32 7</td>
</tr>
<tr>
<td>In case of difficulty consults the mathematics teacher</td>
<td>36 60</td>
<td>189 42</td>
<td>18 30</td>
<td>252 56</td>
<td>6 10</td>
<td>9 2</td>
<td>450 15</td>
</tr>
<tr>
<td>Finish Maths assignment on time</td>
<td>12 20</td>
<td>189 42</td>
<td>8 50</td>
<td>234 52</td>
<td>18 30</td>
<td>27 6</td>
<td>450 15</td>
</tr>
<tr>
<td>Hand in all Maths assignment for marking</td>
<td>12 20</td>
<td>212 47</td>
<td>36 60</td>
<td>220 49</td>
<td>12 20</td>
<td>18 4</td>
<td>450 15</td>
</tr>
</tbody>
</table>

Results in Table 4.8 indicate that 51% of the students felt that they do not always enjoy being engaged in learning activities like problem solving, playing games and group work. On the other hand, 80% of teachers thought their students do not always enjoy being engaged in learning activities. On average 45% of students responded that they always finish Mathematics assignment on time and hand over for marking, only 20% of their teachers confirmed the response. In addition, 40% of both students and teachers said that students always displayed a positive attitude towards Mathematics lessons. The result disagree with the Forrester, (2000) observed, that there is no doubt
that learners of all levels, especially in the early years in secondary education, enjoy learning activities in the classroom.

4.4 Teachers response on the effects of experience in mathematics performance

The study sought to establish the extent to which the teachers experience affect performance in secondary schools. The study sought information from the teachers and principals, on the effect of teachers experience in performance of mathematics. The respondents were requested to indicate their responses. This was necessary because teachers experience was an important human factor that should be taken into consideration while implementing the strategies to enhance performance. The results are indicated in Table 4.9.

Table 4.9: Teachers response on effects of teachers experience on mathematics performance

<table>
<thead>
<tr>
<th></th>
<th>Teachers</th>
<th></th>
<th>Principals</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td>Percentage</td>
<td>Frequency</td>
<td>Percentage</td>
</tr>
<tr>
<td>Great extend</td>
<td>44</td>
<td>73.3</td>
<td>15</td>
<td>100</td>
</tr>
<tr>
<td>Moderate extend</td>
<td>16</td>
<td>26.7</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Little extend</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Not at all</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>60</strong></td>
<td><strong>100</strong></td>
<td><strong>15</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

According to Table 4.9, the majority of the teachers 73.3% were of the view that teachers experience affects performance of mathematics to a great extent, while 100% of the principals also approved that teachers experience affects the academic performance in the subject, This illustrates that teachers experience is an important human factor that should be taken into consideration while implementing the strategies to enhance the performance in the subject. This findings concurs with the
(Cooney, 2000), Ryan (1970) who observed that in the first year of teaching, we witness the sad counterpoise of two sets of attitudes on how the teacher should act. The students are looking strong personalities and leadership. The beginning teacher however seeks a more gentle leadership style. For some few teachers, this works for legions it fails. This impact negatively on the teacher performance and consequently learner achievement. In an analysis of mathematics achievement and drop out in a sample of California high schools Fetler, (2001) observed, that schools whose dropout rates were high, had more new teachers than did schools with low dropout rates.

4.4.1 Level of agreement on the effects of teachers' level of experience on academic performance in mathematics

The study sought to establish from teachers the level of agreement on the effects of teachers’ level of experience on academic performance on mathematics. The information was obtained from teachers using questionnaires. Teachers were asked to indicate their level of agreement on effect of teachers experience in performance. This was important because teachers experience is accumulated with the duration of their service in their carrier. The results are indicated in Table 4.10

<table>
<thead>
<tr>
<th>Statement</th>
<th>Mean</th>
<th>STD Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beginning teachers rarely prepared to meet classrooms requirements</td>
<td>4.0102</td>
<td>0.94700</td>
</tr>
<tr>
<td>Experiences may not necessarily translate into better teacher classroom preparedness</td>
<td>3.6939</td>
<td>1.05916</td>
</tr>
<tr>
<td>Teachers with few years of teaching experience are less likely than more experienced teachers to maintain order and discipline in classroom</td>
<td>3.8878</td>
<td>0.81079</td>
</tr>
</tbody>
</table>
From Table 4.10 On the extent that various statements on the effects of teacher level of experience on the performance of mathematics in the county, "beginning teachers are rarely prepared to meet the core classroom requirements including classroom management" was the most significant statement as shown by a mean of 4.0102. Other important statements included that teachers with few years of teaching experience are less likely than more experienced teachers to maintain order and discipline in the classroom environment and that experience may not necessarily translate into better teacher preparedness for certain classroom activities as shown by the mean score of 3.8878 and 3.6939 respectively. These findings concurs with, (Jepsen 2005), who illustrates that teachers experience is accumulated with the duration that teachers have spent while in teaching carrier. Thus teachers with few years of teaching experience are less likely than more experienced teachers to report being very well prepared to maintain order and discipline in classroom situation.

4.5 Teacher Training, Qualifications and Availability in Secondary Schools in Kakamega County

One of the main objectives of the study was to establish the situation of teacher training, their qualifications and their availability in school. This section discusses the findings on this issue.

4.5.1 Teacher Qualifications

In the principals' questionnaire, the respondents were asked to indicate the qualifications of the teachers using in their respective schools. This was necessary because teacher qualification affect students performance. The results are indicated in Figure 4.7.
The findings indicated in Figure 4.6 reveals that majority of the teachers 80% are qualified with BED, while 5% are untrained teachers. It was notable that teachers qualified with Diploma certificates have 7%. The remaining categories of teacher qualification were in total less than 10%. Most of the principals responded approving that academic teacher qualification influence Mathematics. This findings on performance and teacher qualification concur with Muller and Alexander and Middle school Mathematics achievement found out that students taught by certified qualified teachers scored better in Mathematics achievement tests than those taught by uncertified teachers. The same view are held by Laczko-Kerr & Berlier (2002) and Darlug –Hammod (1999) who found out a positive association between achievement and teacher qualification.
4.5.2 Teacher training

In the principals' questionnaire, the respondents were asked to indicate the number of times their teachers attend in-service courses. This was necessary because training of teachers equips them with necessary teaching skills to impart the content to the learners. Their responses are as indicated in Figure 4.7.

Figure 4.7: Teachers' Frequency of Attendance of In-service

In the Figure 4.7, it is indicated that half of the teachers attended in-service course between 1 to 2 times in a year while 12.5% attended in-service over three times a year. However, it is notable that 37.5% of the teachers had not attended any in-service courses. Information given by the principals concerning teacher training was also triangulated by information from the interview with the DQASO. In this interview, it was noted that the DQASOs opinion on teacher training in Kenya was that training is adequate for the students who get to the university through the joint admissions board. However, to the DQASO noted the teachers who train at the university in the parallel programmes are 'not well prepared' since to him, 'this training has been commercialized' and is not imparting the necessary teaching skills. This being the
case, the researcher sought to establish whether, given this situation, there were any in-service programmes in the County. On this issue, the DQASO was categorical that the County does not have any institutionalized in-service courses. However, he pointed out that there are instead some center like those for SMASSE which provide in-service courses for mathematics and science teachers. Accordingly, it was highly hoped that these centers will later be changed into in-service center.

The findings indicated in Figure 4.8 concur with Ongu’iti (1987) who asserted that trained teachers are an important asset to institutions in which they are instructors. He further argues that they have learnt the tricks of handling individuals differences in the classroom situations since they are equipped with skills of imparting the content to the learners more effectively. Raju, (1973) concurs with DQASO views that higher professional training in relevant subjects, the better the performance of students.

4.6 Availability and Suitability of Teaching and Learning Materials

This section sought to establish from the students, using questionnaires the availability or even the adequacy as well as the suitability of the teaching and learning materials in the secondary schools in Kakamega County. This was necessary because availability of textbooks for students have a positive correlation with students achievements. The findings are therefore presented in subsections to ensure an exhaustive discussion of the issues.

4.6.1 Availability of Teaching and Learning Materials

Here the main question was whether the teaching and learning materials were available, and perhaps, if they are, then what are the sources of these materials. In other words, who provides these materials? And are the available materials
adequate? To begin with, the students were asked whether they had adequate Mathematics textbooks. Their responses are presented in the Table 4.11.

**Figure 4.8: Possession of Mathematics Textbooks**

![Pie chart showing 50% Yes and 50% No responses](image)

From Figure 4.8, the responses of the students sampled for the study indicated that half of the students have adequate textbooks while half of them do not. This being the case, the students were asked to indicate the ratio in which they share these textbooks since some of them said they were not adequate. They responded as presented in the Figure 4.9.

**Figure 4.9: Ratio of Mathematics Books to Students**

![Bar chart showing different ratios of books to students](image)
From the Figure 4.9, one can see that whereas the recommended ratio is that of 1:2, only 233 (51.8%) of the sampled students indicated having the Mathematics textbooks shared in that ratio. Otherwise, 104(23.2%) indicated sharing them in the ratio of 1:3 while 113(25%) indicated sharing them in the ratio of 1:4. This tells how clearly the textbooks are not adequate given that almost half of the student respondents share these books in a ratio below the recommended one. The findings indicated in Figure 4.8 on the adequacy of Mathematics textbooks does not concur with Schieflbein and Farnell, (1973) who argues that availability of textbooks and their influence on performance, have a positive correlation between textbook and achievement since half of students do not argue that students share the recommended student – textbook ratio while half of the students affirms the ratio shared correct.

Figure 4.9 reveals that about 49% of students indicate that student textbook ratio is not adequate. The findings which contradicts with Abgai, (1997) who observes that while teachers were crucial for quality education their contributions will be incomplete if there are no important inputs such as textbooks.

4.6.2 Coverage of syllabus

Another dimension of adequacy of the Mathematics textbooks is in terms of whether they cover the content of teaching to their satisfaction. This aspect is important since if the books do not cover the syllabus content satisfactorily, it would then mean that the teachers have to source for more books since what is available is not sufficient in terms of the syllabus coverage needs. Accordingly, the students were asked to indicate the extent to which the books they have cover the syllabus to their satisfaction. Their responses are as indicated in the Figure 4.10.
The distribution of the responses in Figure 4.10, on this question show that three quarters of the sampled students 441 (98%) find the books adequate in terms of coverage of the syllabus while 9 (2%) indicated that they were shallow in coverage of the content. It is however interesting to note that one student respondent indicated that Mathematics textbooks were too detailed. In an interview with the DQASO however, it was revealed that the well established schools in the County are the ones that have adequate teaching and learning materials while those that are not well equipped with these teaching and learning materials are the upcoming ones.

At this point, the researcher sought to establish the sources of these teaching and learning materials. The student respondents were therefore asked to indicate who provides the textbooks. Findings on this question indicated, that all of them unanimously said that the school is the one that provided all Mathematics the textbooks. This presents a scenario where other stakeholders have taken a back seat in terms of playing out their various roles in the provision of education and have left everything to the school or government for that matter. Perhaps if the other
stakeholders such as parents, NGOs, the church and well wishers came in their different ways, these materials would be adequate in all the schools.

4.6.3 Use of Teaching and Learning Materials

It is one thing to have the teaching and learning materials and another thing all together to have them put to good use. Accordingly, the student respondents were asked to indicate whether their teachers often use teaching aids in class. Their responses are as presented in Figure 4.11.

**Figure 4.11: Frequency of teachers using teaching aids**

![Pie chart showing frequency of teachers using teaching aids](image)

The findings presented in Figure 4.11 paint a picture of a situation where the teachers do not quite make use of the teaching aids adequately. This is evidenced by the fact that 129 (28.6%) of the student respondents reported that their teachers use these teaching aids sometimes while 235 (50%) of them reported that their teachers rarely use these materials. It is worthy of noting that 96 (21.4%) indicated that their teachers have never used the teaching aids. It has always been argued that effective teaching proceeds not such abstractly, but by way of using teaching aids such as real objects, charts and so on, otherwise, it turns out to be rote learning. The situation in Kakamega County is therefore one where the teachers are not taking advantage of the services of
teaching aids in working towards effective teaching which is an indicator of quality education. Instead, perhaps because of increased enrolments, they resort to rote teaching and learning possibly to cover the syllabus since the inspection requires them to complete the syllabus at specified times.

The findings indicated in Figure 4.12 shows that 50% of the teachers do not use teaching aids when teaching. The findings contradicts with that of Squanders (1974) who observes that 11% of what is seen is retained compared to 50% of what is both seen and heard, it adds life and can enrich a lesson by encouraging participation, appealing to learners varied and abilities ensuring order and continuity.

4.6.4 Functional Library

Just like having teaching and learning materials does not always mean using them, so is their usability. In other words, whereas schools may have certain teaching and learning facilities, they may be there in principle but are either not usable or are not functional. The student respondents were therefore asked to indicate whether their schools have functional libraries. To begin with, they were asked whether their schools have a library and if they do, the students to state whether the library is well equipped. Their responses are as indicated in Figure 4.12.

**Figure 4.12: Possession of Functional Library**

![Pie chart showing 52% Yes and 48% No for possession of functional libraries.](image-url)
The findings in Figure 4.12 on this issue show that 217 (48.2%) indicated having a functional library, meaning, a library that is stocked and which serves the purposes of lending and borrowing. However, a majority 233 (52.8%) clarified that they did not have a functional library as such. In other words, most of the schools do not appear to have functional libraries. Again this is one area where there is some need for stakeholder involvement in the provision of such services. The results from Figure 4.13 shows that 51.8% of the students indicated that their schools do not have functional libraries. These findings contradicts with Wilkins (1940) ascertains that it is not by grandeur nor by the beauty of its buildings and their finishing that a library will attract its readers but by the rich collections within its walls.

Table 4.11 gives a summative picture of all the issues related to teaching and learning materials in Kakamega County.

<table>
<thead>
<tr>
<th>Availability of teaching / Learning</th>
<th>1UN</th>
<th>2SD</th>
<th>3D</th>
<th>4A</th>
<th>5SA</th>
</tr>
</thead>
<tbody>
<tr>
<td>The school has enough textbooks, teacher’s guide reference books, charts and stationary</td>
<td>2.7</td>
<td>32.4</td>
<td>56.8</td>
<td>5.4</td>
<td>2.7</td>
</tr>
<tr>
<td>The school had adequate laboratory chemicals and other equipment</td>
<td>-</td>
<td>2.8</td>
<td>52.8</td>
<td>41.7</td>
<td>2.8</td>
</tr>
<tr>
<td>Teachers have been in-serviced on how to use teaching learning materials</td>
<td>-</td>
<td>8.1</td>
<td>8.1</td>
<td>83.8</td>
<td>-</td>
</tr>
<tr>
<td>KIE approved text books have well detailed and organized content</td>
<td>-</td>
<td>89.2</td>
<td>-</td>
<td>5.4</td>
<td>5.4</td>
</tr>
<tr>
<td>All KIE approved books are appropriate</td>
<td>-</td>
<td>81.1</td>
<td>5.4</td>
<td>10.8</td>
<td>2.7</td>
</tr>
<tr>
<td>KIE approved books with poor content coverage</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>82.3</td>
<td>17.7</td>
</tr>
<tr>
<td>There should be a common course book for each subject for all schools</td>
<td>10.8</td>
<td>29.7</td>
<td>51.4</td>
<td>2.7</td>
<td>5.4</td>
</tr>
<tr>
<td>There are functional teacher’s resource centers in the county</td>
<td>5.4</td>
<td>24.3</td>
<td>24.3</td>
<td>40.5</td>
<td>5.4</td>
</tr>
</tbody>
</table>
From Table 4.11, we can see that the general idea about adequacy of textbooks and teaching aids is that they are not adequate. These findings also concur with those from the students. The facilities such as the library are also ill equipped. The teachers have however reportedly been in-serviced on how to use teaching materials even though, as the students noted, they do not often use them. The Kenya Institute of Education (KIE) approved Mathematics textbooks are generally seen as not adequate while there is a general feeling that there should be a common course book for the subject for all schools. It is also generally notable that there are functional teacher's resource centers in the County. One general pattern that is emerging is that it is evident that most of these facilities are available in some of the schools in Kakamega County. However, the functionality of these facilities is still wanting. This is because not many of these facilities are fully equipped and this makes them not function as they should. And as a result of all this the majority of the students constituting 51% indicated that this situation is affecting their performance negatively. In other words, the increased enrolments have stretched the existing facilities to the level that they cannot serve all the students adequately and as well, there seems that focus has gone into some short term issues like buying books and other learning/teaching aids other than stocking the library.

4.6.5 **Supervision of Curriculum Implementation**

This section focuses on the issue of Mathematics content coverage as well as the supervision of the entire range of activities that constitute teaching and learning in the schools. To begin with, the students were asked to indicate whether classroom teachers check their assignments. In their responses all the students affirmed that the teachers do check their assignments. The students were further asked to indicate the
frequency at which their teachers check their assignments. Their responses were as shown in Figure 4.13.

**Figure 4.13: Frequency of teachers checking assignments**

According to the distribution in Figure 4.13, it is clear that only a small percentage of students 17.9% reported that their teachers always check their assignments and notes. However, a majority of the students 75% reported that their teachers sometimes check their assignments while 7.1% of the students maintained that rarely do their teachers check their assignments. Other than teachers checking their assignments, the students were asked whether their teachers miss lessons and if they do, students were to indicate whether these teachers make attempts to recover the missed lessons later. Findings to the question as to whether the teachers miss lessons indicated that an overwhelming majority of the students 96.4% answered it in the affirmative while a minority of 3.6% indicated that their teachers do not miss any lessons. However, asked whether these teachers make attempts of recovering the missed classes, they responded as indicated in Figure 4.14.
The findings presented in Figure 4.14 indicate that the majority of the students 96% hold that it is only some of the teachers who miss lessons that make an attempt to recover them. This is a situation that is supposed to be addressed by the DQASO on their visits. However, the interview with DQASO revealed that whereas they are supposed to be inspecting secondary schools after every 3 years and once a term in primary school, this does not happen because, of 'inadequate officers, communication and transport' which he says they constitute a big problem. It is also notable here that 2 students remained noncommittal on this question since they did not respond to this question. The students were then asked to state whether the teachers or principals inspect the actual teaching in class.

The findings indicate that all the student respondents unanimously said that the teachers and principals do not inspect the actual class teaching. In the absence of impromptu inspection, teachers are left to do it their way. The function of supervision is to assess, maintain and improve quality of teaching and learning activities so that the intended goals of education might be more effectively achieved (Kimosop, 2002).
The results from Table 4.11 and Figure 4.14 indicates a small percentage of 17.9% reported that their teachers always check their assignment. However majority of the students 96% reported that their teachers sometimes check their assignments. The findings does not concur with a manual for the head teachers of secondary schools in Kenya (1987) which spells out the duty of head teachers and teachers for checking the teaching and standards by referring to schemes of work, lesson notes, lesson plans, record of work and pupils exercise, books to ascertain quality performance of the students in the subject.

4.6.6 Effects of increased enrolment on quality of education

The study sought the information from the principals and DQASO using questionnaires, on the effects of increased enrolment of quality of education in the county. The respondents were requested to indicate using questionnaires whether increased enrolment of students affect performance in mathematics. This was necessary because learning and physical facilities are key elements in enhancing performance of students. The results are presented in Figure 4.15

Figure 4.15: Effect of increased enrolment on quality of education
From Figure 4.1, one important observation one makes on these findings is that an overwhelming majority constituting 75% of the principals; sampled population do not see the poor or rather unsatisfactory quality of Mathematics education in Kakamega County as brought about by increased enrolment in secondary schools. This is important because contrary to the basic assumption of this study that the rather poor education quality in secondary schools in Kakamega County is caused by the increased enrolment, these findings have indicated otherwise.

In other words, according the principals in the sampled schools Kakamega County, this is just a perception of the public and which does not have any empirical basis. However, in an interview with the DQASO, he felt that increased enrolment has led to the rather low quality of Mathematics education as indicated below:

R: Has increased enrolment in secondary schools affected quality of Mathematics education?

DQASO: Yes, this is mainly due to understaffing particularly in upcoming schools.

A keen reading of what the DQASO is saying reveals that it is not necessarily the increased enrolment that has led to poor quality of education but rather, the fact that the provision of other related services such as teachers has not kept pace with this increment in enrolment. In other words, the provision of such services has not been proportionate to the increment in enrolment. It is in this perspective that one would also understand the inadequacy of many other factors. The other factors mentioned for being responsible for this poor quality of Maths teaching include; lack of resources to enable teachers to attend an in-service course at least once a year, lack of facilities such as well equipped libraries, reduced frequency of inspection in schools, the tendency for teachers to adopt a carefree attitude and not having commitment to their
work, teachers' non use of teaching aids and lack of continuous professional
development on the part of teachers. The findings from Figure 4.15, are not in
collaboration with Kibui, (1995) who observes that inadequate physical facilities such
as classroom may affect teaching and learning environment, hence lowering the
performance of students.

4.6.7 Class Size

The research aimed at establishing the class size in the sampled schools. This
information was obtained from the students’ questionnaire and the teachers in charge
of examinations. According to the respondents, the average class size was made up
of 39 students. It also became necessary to establish from students whether they
were learning in congested classrooms and the results were as shown in Table
4.12.

Table 4.12: Percentage of students indicating congestion in the classroom

<table>
<thead>
<tr>
<th>Responses</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Congested</td>
<td>390</td>
<td>86.7</td>
</tr>
<tr>
<td>Uncongested</td>
<td>60</td>
<td>13.3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>450</strong></td>
<td><strong>100.00</strong></td>
</tr>
</tbody>
</table>

From Table 4.12 majority of the students (86.7) indicated that they learn from
congested classrooms while 13.3% did not learn from congested classrooms. As to
whether congestion affected learning in classrooms the teachers in charge of
examinations had the responses as indicated in Table 4.13.
Table 4.13: Responses of teachers on whether congestion affected learning activities

<table>
<thead>
<tr>
<th>Mode</th>
<th>Frequency</th>
<th>Percentage</th>
<th>Degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>42</td>
<td>70</td>
<td>263</td>
</tr>
<tr>
<td>No</td>
<td>18</td>
<td>30</td>
<td>97</td>
</tr>
<tr>
<td>Total</td>
<td>60</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

From Table 4.13, the teachers in charge of examinations indicated that congestion in classrooms negatively affected learning activities (70%). It is only 30% of the teachers who felt that congestion in classes had no effect on learning activities. However a significant proportion of the teachers in charge of examination (27%) were of the alternative opinion. The results from Table 4.13, 86.7% of the students indicate that students learn in congested classes. 70% of the teachers in-charge of examination from Table 4.14 agrees that congestion negatively affects learning activities. This findings concur with Tindall (1988) who found out that larger size classes contributes to declining performance of students. He observes that small pupil teacher ratio was in solution.

4.6.8 Student-teacher Ratio and Mathematics Performance

The research aimed at establishing the student-teacher ratio in sampled schools and then determining whether there was any correlation between the student-teacher ratio and the performance. The data of the 31 schools was analyzed according to the category of schools. There were 8 boys and girls boarding secondary schools, and 7 mixed day secondary schools which were tabulated and analyzed. Information on student teacher ratio was obtained from the principals’ questionnaire which contained items on the school total enrolment and the number of teachers in the
school (total enrolment) by the number of teachers in the particular school. The base year was 2008. The school performance index for KCSE for 2012 was also recorded as indicated in Table 4.14.

Table 4.14: Student-teacher ratio and Mathematics Performance in County Schools

<table>
<thead>
<tr>
<th>School</th>
<th>Size</th>
<th>No. of Teachers</th>
<th>Students-teacher ratio</th>
<th>Performance by school mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>423</td>
<td>29</td>
<td>15:1</td>
<td>7.9</td>
</tr>
<tr>
<td>B</td>
<td>720</td>
<td>37</td>
<td>19:1</td>
<td>7.62</td>
</tr>
<tr>
<td>C</td>
<td>830</td>
<td>39</td>
<td>21:1</td>
<td>7.38</td>
</tr>
<tr>
<td>D</td>
<td>680</td>
<td>31</td>
<td>22:1</td>
<td>6.80</td>
</tr>
<tr>
<td>E</td>
<td>308</td>
<td>10</td>
<td>34:1</td>
<td>6.50</td>
</tr>
<tr>
<td>F</td>
<td>650</td>
<td>28</td>
<td>23:1</td>
<td>6.20</td>
</tr>
<tr>
<td>G</td>
<td>540</td>
<td>24</td>
<td>22:1</td>
<td>5.42</td>
</tr>
<tr>
<td>H</td>
<td>260</td>
<td>10</td>
<td>26:1</td>
<td>4.52</td>
</tr>
</tbody>
</table>

Source: Field data (2012)

The results were as summarized in Table 4.14. It is depicted in the table that the school with the least student-teacher ratio had the best performance. Generally the results in the table imply that a lower student-teacher ratio leads to high performance. However, student-teacher ratio seemed not to directly affect Mathematics performance as the norm was converse to some of the schools which had a higher student-teacher ratio but performed better than those with a lower student–teacher ratio.

From Table 4.14, school A with the lowest student-teacher ratio of 15:1 had the highest mean score, while school 8 with the second highest student ratio is 26:1 had the lowest performance of 4.52. Data in this table 4.14 was not subjected to person correlation as it did not meet the minimum criteria. Both County and District schools
were combined to meet to requirement. The findings from Table 4.14 reveals that schools with the least student-teacher ratio had the better performance, such as the school with student-teacher of 15:1 which had a school mean of 7.9 as compared with a school with a ratio of student – teacher of 26:1 which had a school mean of 4.52. These findings concur with Okwach and Odipo (1997) who argues that very low or high student – teacher ratio would be inefficiency, where low enrolment leads to under utilization of teachers and other resources.

4.6.9 Student-textbook Ratio in Mathematics

The research aimed at establishing the student-textbook ratio in sampled schools and then determining whether there was any correlation between the student-textbook ratio and the performance. The data of the 31 schools was analyzed according to the category of schools. There were 8 boys and girls boarding secondary schools, and 7 mixed day secondary schools which were tabulated and analyzed. Information on student-textbook ratio was obtained from the teachers questionnaire which contained items on the total number of mathematics reference books available in school. Mathematics is one of the compulsory subjects at KCSE. It thus became necessary to analyze data from the students are indicated in Table 4.15.

Table 4.15: Student Text Book Ratio in Mathematics

<table>
<thead>
<tr>
<th>Book Ratio</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>One for each student</td>
<td>7</td>
<td>11.7</td>
</tr>
<tr>
<td>One for two students</td>
<td>18</td>
<td>30</td>
</tr>
<tr>
<td>One for three students</td>
<td>35</td>
<td>58.3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>60</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>
Table 4.15 shows that majority (58.3%) of students have student-textbook ratio of one for three students in Mathematics. While for a student-textbook ratio of one for two students had 30% in Mathematics. Only 11.7% students had one course book each for Mathematics.

Table 4.16: Trend in student textbook ratio

<table>
<thead>
<tr>
<th>Years</th>
<th>One per book</th>
<th>Two per book</th>
<th>Three per book</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>6.9</td>
<td>41.6</td>
<td>51.5</td>
</tr>
<tr>
<td>2008</td>
<td>8.8</td>
<td>23.1</td>
<td>68.1</td>
</tr>
<tr>
<td>2009</td>
<td>8.6</td>
<td>22.6</td>
<td>68.8</td>
</tr>
<tr>
<td>2010</td>
<td>9.7</td>
<td>35.3</td>
<td>55.0</td>
</tr>
<tr>
<td>2011</td>
<td>6.5</td>
<td>33.7</td>
<td>59.8</td>
</tr>
<tr>
<td>2012</td>
<td>8.6</td>
<td>22.6</td>
<td>68.8</td>
</tr>
</tbody>
</table>

From the Table 4.16, we can infer that the majority of the students shared one book among three students in all the years. The trend was as follows: 51.5% for 2007, 68.1% for 2008, 68.8% for 2009, 55% for 2010, 59.8% for 2011 and 68.8% for 2012, we can also note that the lowest percentage of students was one textbook per student which was as follows: 6.9% for 2007, 8.8% for 2008, 8.6% for 2009, 9.7% for 2010, 6.5% for 2011 and 8.6% for 2012. The findings from Table 4.15 and 4.16 indicates that majority of the students do not have the recommended students ratio of one for two students. This students text book ratio does not corroborate with the studies carried out by Schiefelbein and Farnell (1973) in Chile where they argue that availability of textbooks and their performance found a positive correlation between textbooks and academic achievement. The same view were held by Heyneman and Jamison (1974) who argues that while teachers and crucial for quality of education,
their contribution will be incomplete if there are no important inputs such as textbooks.

4.6.10 Effect of rate of fees payment on students performance

The researcher sought information from the students using questionnaires, on the rate of fees payment in the schools. This was necessary because school demands have contributed to escalating costs which leads to school dropouts, hence affecting students performance negatively.

Table 4.17: Frequency, Number and percentage indicating rate of fees payment in the schools

<table>
<thead>
<tr>
<th>Mode</th>
<th>Frequency</th>
<th>%</th>
<th>Degrees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below 50%</td>
<td>130</td>
<td>29</td>
<td>104</td>
</tr>
<tr>
<td>Above 50%</td>
<td>293</td>
<td>65</td>
<td>234</td>
</tr>
<tr>
<td>Over 75%</td>
<td>27</td>
<td>6</td>
<td>22</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>450</strong></td>
<td><strong>100</strong></td>
<td><strong>360</strong></td>
</tr>
</tbody>
</table>

Table 4.17 shows that majority of the students indicates that, schools have fees payment rate of above 50% and below 75%. 29% of schools collect less than 50% of fees meaning that such schools have a serious funding problem. Only 60% of the schools collect over 75% of fees. This definitely affects performance since most of the school inputs can only be made available when there is adequate funding. A school with adequate finances will purchase laboratory equipment, textbooks and academic excursions. The findings from Table 4.18 indicate that majority of the students 45.6% are often sent home for fees 41.1% are rarely. According to results indicated in Table 4.17 regarding fees payments, shows that over 50% of students frequently make fee
payment. These findings concur with MOEST and UNICEF (1994) who observe that school demands have contributed to escalating costs which lends to school dropouts, which negatively influence the performance.

**Table 4.18: Availability and adequacy of key teaching, learning and physical resource in low performance schools**

<table>
<thead>
<tr>
<th>Observation / Learning Resources</th>
<th>Available</th>
<th>Adequate</th>
<th>Not Adequate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f</td>
<td>%</td>
<td>f</td>
</tr>
<tr>
<td>Classrooms</td>
<td>3</td>
<td>75</td>
<td>0</td>
</tr>
<tr>
<td>Desks</td>
<td>4</td>
<td>80</td>
<td>0</td>
</tr>
<tr>
<td>Chalk boards</td>
<td>5</td>
<td>100</td>
<td>5</td>
</tr>
<tr>
<td>Textbooks</td>
<td>4</td>
<td>80</td>
<td>0</td>
</tr>
<tr>
<td>Exercise books</td>
<td>3</td>
<td>75</td>
<td>0</td>
</tr>
<tr>
<td>Teaching Aids</td>
<td>3</td>
<td>75</td>
<td>0</td>
</tr>
<tr>
<td>Library</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

The data in Table 4.18 reveal that although in all the low performance sampled schools, the teaching and learning resources were available, they were however inadequate. Such resources include classrooms, textbooks. The inadequacy of such key teaching, learning and physical resources may explain why these schools perform dismally in Mathematics at secondary level. To exacerbate the problem of the inadequacy of physical resources in the sampled schools is the notable absence of libraries, which have essential resources in the improvement of Mathematics performance.
4.6.11 Effects of Adequacy of Teaching and Learning Resources on Mathematics performance in secondary schools

This study sought information from students, principals and teachers on effect of adequacy of teaching and learning resources on Mathematics performance at secondary school in Kakamega County. From the study findings, the DQASO, principals and teachers concurred with the fact that adequacy of teaching and learning resources, have an effect on the Mathematics performance in high and low performance secondary schools. The study also sought to establish from principals, teachers and students whether learning materials were adequate in their schools. This was necessary because adequacy of learning/teaching material is critical in enhancing students performance since they are used to reinforce previous learning, model for problem solving and explains concepts. The information gathered is presented in Table 4.19:

<table>
<thead>
<tr>
<th>Responses</th>
<th>Principals</th>
<th>Teacher</th>
<th>Students</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f</td>
<td>%</td>
<td>f</td>
</tr>
<tr>
<td>Adequate</td>
<td>12</td>
<td>80</td>
<td>46</td>
</tr>
<tr>
<td>Not Adequate</td>
<td>3</td>
<td>20</td>
<td>14</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>100</td>
<td>60</td>
</tr>
</tbody>
</table>

The data analyzed in Table 4.19 reveals that learning materials are adequate with 80 % of principals, 77 % of teachers and 84 % of students confirming the situation in Mathematics performance in secondary schools. High performance schools records good performances in Mathematics as revealed in Table 4.19. The findings from
Table 4.19 concur of the principals, teachers and students with Grant and Searl (1997) who observes the use and adequacy of learning resources is critical in ensuring that learners develop an appreciation and enjoyment of Mathematics by doing Mathematics through a variety of appropriate practical activities. They further observes that the use of resources and the resulting activities enhance students understanding of Mathematics concepts. They are used to reinforce previous learning, model problem solving and explains concepts.

4.7 Strategies to improve Mathematics performance at secondary school level

This study sought information from DQASO principals, teachers and students using questionnaires and interview schedule for DQASO, on strategies of improving Mathematics performance at secondary school level. This was necessary because employing teacher with high academic and professional training, improved learning and performance among students. The results are indicated in Table 4.20.

Table 4.20: Strategies for Improvement of Mathematics Performance

<table>
<thead>
<tr>
<th>Strategies</th>
<th>Principals</th>
<th>Teacher</th>
<th>Students</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f</td>
<td>%</td>
<td>f</td>
</tr>
<tr>
<td>Employ teachers with high academic and</td>
<td>3</td>
<td>20</td>
<td>12</td>
</tr>
<tr>
<td>professional training</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increase learning, teaching resources</td>
<td>3</td>
<td>20</td>
<td>19</td>
</tr>
<tr>
<td>Curb teachers and students absenteeism</td>
<td>3</td>
<td>20</td>
<td>5</td>
</tr>
<tr>
<td>Parents to give students enough time to study at home</td>
<td>3</td>
<td>20</td>
<td>5</td>
</tr>
<tr>
<td>Admit students with high entry marks</td>
<td>3</td>
<td>20</td>
<td>19</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>100</td>
<td>60</td>
</tr>
</tbody>
</table>
From the information in Table 4.20, all the respondents noted that employing teachers with higher academic and professional training, increased learning and teaching resources, curbing both students and teachers absenteeism and admitting students with higher entry marks were important factors that can improve Mathematics performances. However, there were conflicting opinions from the principals, teachers and students on the above mentioned factors were more important than others in the improvement in Mathematics Performance.
CHAPTER FIVE
SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The chapter discusses the summary, discussions, conclusion, implications of the findings and recommendations based on the findings. The purpose of the study was to determine the factors that influence Mathematics performance in Secondary Schools in Kakamega County. This chapter gives a summary of the findings, conclusions and recommendations drawn from the findings in connection with the factors affecting performance of students in Mathematics in Secondary school of Kakamega County.

5.2 Summary of the Findings

The study sought for some demographic characteristics of the sample population by gender of students, teachers and Principals, level of education or qualifications of teachers and head teachers and length of time teachers have served in the position. However, of prime importance were the findings of the study as per the objectives of the study. A summary of the findings are therefore as presented below:

As regards teacher qualifications/training, all the teachers had the minimum requirements for a secondary school teacher. In addition, half of the teachers attended in-service course between 1 to 2 times in a year while 12.5% attended in-service over three times a year. Up to 37.5% of the teachers had not attended any in-service courses. There were some impressions through the interviews held with DQASO that the teachers who train at the university in the parallel programmes are 'not well prepared' as the regular ones since, to the officer, 'this training has been commercialized' and is not imparting the necessary teaching skills.
With regards to teacher availability, and in view of the various views given concerning the adequacy of the teachers, the study concluded that there are not enough teachers in the sampled schools in Kakamega County. At the same time, in terms of availability and suitability of teaching and learning materials, half of the students have adequate textbooks while half of them do not. The few books there are shared in the ratio of 1:3 while 25% share them in the ratio of 1:4. The books were found adequate in terms of coverage of the syllabus while 13 (23.2%) found it to be shallow in coverage of the content. However, the well established schools in the divisions are the ones that have adequate teaching and learning materials while those that are not well equipped with these teaching and learning materials are the upcoming ones.

The teachers do not quite make use of the teaching aids adequately since only 28.6% of the student respondents reported that their teachers use these materials sometimes while 50% reported that their teachers rarely used them with 21.4% indicating that their teachers have never used the teaching aids.

In terms of suitability of the teaching and learning materials, the study established that 73.2% confirmed having a library in their schools while 26.8% indicated that they did not have a laboratory. However, the study further wanted to find out whether these libraries were well equipped. At the same time 75% of the student respondents’ schools had that are well equipped libraries while the rest attend schools which either do not have libraries or they have them but are not well equipped. At the same time, 48.2% indicated having a functional library while 51.8% indicated that they did not have a functional library as such.
In terms of supervision of curriculum implementation, only 17.9% of the students reported that their teachers always check their assignments but the majority of the students, 75%, reported that it is only sometimes that their teachers their assignments while 7.1% of the students maintained that rarely do their teachers check their assignments. In terms of syllabus coverage, Heads of Departments (HODs), reported that majority of the schools 97.4%, complete the syllabus before examinations while a minority of only one respondent indicated that they cover only up to 80%.

It was established that students’ lack of mastery of prerequisite skills cause difficult in the new topic. It should be noted that the syllabus is developed in such a way that knowledge and skills acquired at one level becomes a prerequisite for the next level. The topics are taught in a spiral manner, whereby facts and skills are repeated at subsequent intervals, but each time at a broader and deeper perspective for enhanced understanding (KIE, 2002). The concepts are thus developed from the stage of exploration to complete mastery or from the intuitive level to the analytical level. That the teachers pace of covering the topics did not allow them bring to the level of students, the abstract concepts in some of the topics. Algebra is an example of such topics, in which Mathematics may be considered as a language. It was also found out that, teachers rarely incorporated learning activities in Mathematics lessons.

Furthermore, it was found that only half of the Mathematics teachers always exercised the characteristics of an effective teacher as it relates to Mathematics curriculum (Table 4.5 teachers characteristics as it relates to Mathematics Curriculum). In addition, it was found that half of the teachers prepare and use the critical professional records in the teaching of Mathematics. It was established that lesson plans and lesson notes were the professional records that were rarely
prepared and used, because teachers felt they didn’t have time to prepare, due to
the large workload they had. This explains why learning / teaching activities were
rarely used in Mathematics instruction.

The other objective was to find out the influence of use of learning resources on
incorporation of learning activities. It was found that the Mathematics course book
used in secondary Mathematics syllabus was the second Mathematics published by
Kenya Literature Bureau (KLB). Teachers preferred this title because they thought
concepts in it were well explained, that it had adequate and appropriate examples and
exercises.

Concerning the Mathematics course book to student ratio was good. However,
teachers seemed not keen to ensure that the activities in the course book were carried
out. Besides the text book, common teaching/learning resources were rarely used in
Mathematics lessons. As such, teaching/learning activities were rarely integrated in
the Mathematics lesson.

The other scenario was to establish the teachers and students incorporating learning
activities in Mathematics lessons. From the results of the findings, it can be inferred
that teachers attitude towards the teaching of the Mathematics was good inspite of the
various shortcomings that are associated with the teaching of Mathematics in the
secondary schools. The study found that a high percentage of teachers never wanted
the teaching career. A high percentage of them said they were overloaded such that
they could not prepare professional documents like the lesson plan. Further it was
found that half of the students perceived Mathematics teachers as having a
positive attitude towards learning activities in Mathematics.
As regards students’ performance, the study established the student’s, attitudes towards engaging in learning activities in Mathematics lessons. Less than half the students enjoyed engaging in learning activities. Concerning the possible resources influencing students’ perception towards Mathematics lessons, it was found that fellow students, another resource that strongly influenced students’ attitude towards Mathematics is teachers’ relationship to students. This finding is supported by the assertion that students care more about how much a teacher relates to them than how much the teacher knows. If they have a negative attitude towards you, they look for more negative things in you, but if they are positive, they look for more positive things in you. (Nafungo, 2004). In the same vein, Yara(2009) confirmed that teachers’ attitudes towards the teaching of Mathematics plays a crucial role in shaping the attitudes of students towards the learning of Mathematics. Teachers’ attitude towards Mathematics influence students’ attitude towards Mathematics as well as their achievement. Students’ positive attitude towards Mathematics could be enhanced by; teachers’ enthusiasm, resourcefulness, helpful behavior, thorough knowledge of the subject matter and their making Mathematics quite interesting. Teaching methods and strategies, and the abstract nature of some topics in Mathematics were also mentioned as resources influencing students’ attitude towards Mathematics. It was established that the influence of insufficient teaching / learning resources on students’ attitude towards Mathematics lessons was very minimal.

5.3 Conclusions

This study investigated the experiences of incorporating learning activities during Mathematics instruction in secondary schools in Kenya. This was in relation to teachers’ and students’ experiences of incorporating learning activities in Mathematics. The study concludes that teachers in Kenyan secondary school rarely
that majority of the Mathematics teachers were ineffective and inefficient in their teaching methods and strategies, they hardly prepared and used critical professional records like the lesson notes and lesson plans. Teachers mainly taught by guiding students through examples and giving them exercises in a particular textbook adopted as the course book. Besides the textbook, common instructional resources like charts, real objects, models and nets of solids were rarely used during Mathematics lessons. In addition, some teachers had a poor attitude towards incorporating learning activities during Mathematics lessons, while many students displayed a negative attitude towards Mathematics lessons, mainly as a result of influence from their peers and teacher related factors.

5.4 Recommendations

Based on the above findings and conclusions, the study posited the following recommendations:

i) The government should reduce the maximum number of lessons per week for teachers. This would afford them adequate time to prepare and deliver the content effectively and efficiently.

ii) The government should encourage mounting of in-service training and education on pedagogy and attitude change in Mathematics at sub County levels for practicing teachers.

iii) The school management should examine teacher-student relationship which is a key factor in influencing students performance.

iv) The Government and other educational stakeholders should provide secondary schools in the County with sufficient capital, learning materials and human resources which should be distributed to schools in good time, based on each school population of students to avoid learning and teaching disruptions.
5.5 Recommendations for further research

Owing to the findings and conclusions reached, the study suggests the following areas for further research:

i) A research study to be conducted to establish why many teachers in secondary schools rarely incorporate, varied teaching and learning activities in their teaching methods, which is key in motivating learners interests.

ii) A research study to be conducted to establish why experience may not necessarily be a factor influencing students’ performance, since even schools with experience with long serving teachers also show low performance trends.
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Journal for Research in Mathematics Education, 14(1), 19-29


APPENDICES

APPENDIX A:

LETTER OF INTRODUCTION

Wanyonyi Protus Wekesa
Kenyatta University
Department of
Educational Management
Policy and curriculum studies
P.O Box 43844
Nairobi.

Dear Respondent,

I am a postgraduate student from Kenyatta University currently undertaking research on the following topic: Utilization of resources that influence students’ performance in Mathematics at K.C.S.E level in Secondary schools in Kakamega County, Kenya.

You were identified as one of the subjects who were to provide information for this study.

You are kindly requested to provide information needed to successful completion of this study. Any information you gave was not only strictly kept confidential but anonymous and was utilized only for the academic purposes for which it was intended.

Yours faithfully,

Protus W. Wanyonyi
E55/CE/22784/2010
APPENDIX B

PRINCIPAL’S QUESTIONNAIRE ON FACTORS THAT AFFECT KCSE PERFORMANCE IN SECONDARY SCHOOLS IN KAKAMEGA COUNTY

This questionnaire is designed to seek information on factors affecting KCSE performance in Secondary Schools in Kakamega County. You are kindly requested to answer all the questions honestly. The information you gave was treated with confidentiality and used only for compiling this study report.

Please put a tick (✓) to provide information as may be applicable.

1. Gender
   - Male
   - Female

2. What is your highest academic qualification?
   - KCSE/ KACE
   - Bachelors Degree
   - Diploma
   - Master’s Degree

3. What is your professional qualification?
   - BED
   - MED
   - P.G.D.E
   - Dip.Ed
   - Untrained

   a) Does your school have enough teachers based on curriculum establishment?
      - Yes
      - No

   b) If No does it affect KCSE performance?
      - Yes
      - No
4. a) List the methods frequently used in asserting the students performance in your school
   CATs □ Class Assignment □ Terminal □
   b) How often is this done?
   Daily □ Weekly □ Termly □
   Fortnight □ Monthly □

5. a) What is the commitment level of your teachers?
   High □ Moderate □ Termly □
   b) If low, what are the causes?
   Too many lessons □
   Low entry marks for the students □
   Inadequate teaching and learning resources □
   c) In your view do these affect performance?
   Yes □ No □

6. a) Are there any incentives given to teachers during tuition holiday to motivate them to work harder?
   Yes □ No □
   b) If yes, list the type of incentives given if any
   Trips for teachers □ Given Tokens □ Promotions □
c) Does this assist in the improvement of KCSE performance?
   Yes ☐    No ☐

7. a) Which school learning/teaching facilities do you have in your school?
   ________________________________________________________________
   ________________________________________________________________

b) Who provides the textbooks and other instructional materials?
   From Parents ☐   From the Sponsor ☐   From the Government ☐
   From the community ☐   NGOs ☐

c) Are there adequate textbooks and other Instructional materials in your school?
   Adequate ☐   Inadequate ☐

d) If adequate does it affect KCSE Performance?
   Yes ☐   No ☐

8. In your view what strategies could be adopted to improve KCSE performance in
   public day school?
   Increase students in school for longer period time ☐
   Retain students in school for longer period time ☐
   Parents and guardians to allocate students time for study ☐

11. Increased enrolment has led to poor education quality in your school.
   Yes ☐   No ☐
12. How many times do your teachers attend service courses a year?

- Between 1 – 2 times
- Over 3 times
- None

The following statements relate to the indicators of quality education. Please indicate to what extent they are applicable in your school. Please react to the following five points Likert scale appropriately against the matrix questions.

Beside each of the statements, please indicate with a tick.

Key: SA – Strongly Agree – 5 A- Agree -4 D - Disagree – 3 SD-Strongly

<table>
<thead>
<tr>
<th>Availability and training of teachers</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>The school has enough teachers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All teachers are trained</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>There is regular in service of teachers</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>All subject have adequate and trained teachers</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>There is continuous professional development of teachers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teachers are satisfied with their jobs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Diploma teachers have better masterly of content than graduation</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Adequacy of teaching / Learning Materials</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>The school has enough textbooks teacher’s guide</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>reference books, maps, charts and stationery</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The school has adequate laboratory chemicals and</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
other equipment

Teachers have been in-serviced on how to use teaching learning materials

KIE approved text books have well detailed and organized contend

All KIE approved books with poor contend coverage

There should be a specific course book for each subject for all schools

There are teacher’s resource centre in the division

<table>
<thead>
<tr>
<th>Teaching Method</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SA</td>
<td>A</td>
<td>D</td>
<td>SD</td>
<td>UN</td>
</tr>
</tbody>
</table>

Teachers use student centered method of teaching

Methodology taught during training is inadequate

In-service help teachers use acquire methods of teaching emerging issues

Most teachers have difficulties in teaching some topics

Most teachers use this method because classes are large

Teachers use teaching strategies which do not inspire learners
<table>
<thead>
<tr>
<th>Curriculum Evaluation</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SA</td>
<td>A</td>
<td>D</td>
<td>SD</td>
<td>UN</td>
</tr>
</tbody>
</table>

KCSE is adequate to test four years of teaching and learning

Teachers do not teach areas not tests by KNEC

Teachers use table of specification in setting school based tests

Teachers give and mark assignments regularly

Teachers set teachers friendly examinations easy to mark

Our KCSE results show quality grades in the last five years

K.C.S.E should be crapped to give way for continuous assessment

<table>
<thead>
<tr>
<th>Curriculum Supervision</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SA</td>
<td>A</td>
<td>D</td>
<td>SD</td>
<td>UN</td>
</tr>
</tbody>
</table>

Teachers prepare scheme of work, lesson plans, lesson notes, record of work as required

HODs are involved in curriculum supervision

Principals observe teaching in classes regularly

Quality assurance and standards officer frequently inspect schools and advise teachers

When teachers miss lessons they recover later

The principal is rarely out of school
13. Indicate the type of your school?

Boys boarding  [  ]

Girls boarding  [  ]

Mixed day  [  ]

14. How often do your teachers prepare professional documents in your school.

Always  [  ]

Sometimes  [  ]

Rarely  [  ]

From your answer given in question (a) above, what effects does it have on their teaching?
_______________________________________________________________
_______________________________________________________________

15. How do your teachers interact with your students

Excellent  [  ]

Good  [  ]

Fairly good  [  ]

No interaction  [  ]

If yes state their effects on students performance.
_______________________________________________________________
_______________________________________________________________

16. List the effects of teachers preparedness in mathematics performance.
_______________________________________________________________
_______________________________________________________________

132
17. Does teachers’ character and attitudes affect students’ performance?

Yes [ ]

No [ ]

If yes, briefly explain the effects on students’ performance.

________________________________________________________________________

________________________________________________________________________

18. Do teachers teaching experience have an effect on student’s performance?

Yes [ ]

No [ ]

If yes, briefly state their effects.

________________________________________________________________________

________________________________________________________________________

19. What is the level of student’s enrolment in school.

50 – 100 [ ]

100 – 500 [ ]

500 – 1000 [ ]

Above 1000 [ ]

20. What effects do school enrolment have on student’s performance?

________________________________________________________________________

________________________________________________________________________

21. What is the ratio of student-teacher in your school?

15 – 1 [ ]

20 – 1 [ ]

26 – 1 [ ]
22. Does this ratio affect students performance?

Yes [ ]

No [ ]

If yes, state how it affect the performance of in your school.

____________________________________________________________________________________

____________________________________________________________________________________

23. Do you have teaching/learning strategies aimed at improving academic performance in school?

Yes [ ]

No [ ]

If yes, what effects does it have on academic performance of students.

____________________________________________________________________________________

____________________________________________________________________________________
APPENDIX C

TEACHERS QUESTIONNAIRE ON FACTORS AFFECTING KCSE PERFORMANCE IN THE SECONDARY SCHOOLS IN KAKAMEGA COUNTY

This questionnaire is designed to seek information on factors affecting in KCSE performance in Secondary Schools in Kakamega County. You are kindly requested to answer all the questions honestly. The information you give will be treated with confidentiality and used only for compiling as may be applicable.

1. Gender
   Male ☐ Female ☐

2. What is your highest academic qualification?
   KCSE/KACE ☐ Bachelor's Degree ☐
   Diploma ☐ Masters Degree ☐

3. What is your professional qualification?
   MED ☐ P.G.D.E ☐
   Dip.Ed ☐ Untrained ☐

4. a) Are there any incentives given to teachers during tuition holiday to motivate them to work harder?
   Yes ☐ No ☐

   b) If yes, list the type of incentives given if any
   Trips for teachers ☐ Given Tokens ☐ Promotions ☐
c) Does this assist in the improvement of KCSE performance?
   
   Yes □        No □

5. Do you have the following facilities in your school?

   Laboratory and equipments
   
   Yes □        No □

   Library
   
   Yes □        No □

6. a) Who provide the textbooks and other instructional materials?

   From Parents □        From the sponsor □

   From the Government □        From the Community □        NGOs □

   b) Are there adequate textbooks and other instructional materials in your school?

   Adequate □        Inadequate □

   c) If inadequate, does this affect KCSE performance?

   Yes □        No □

7. Indicate the type of your school?

   Boys boarding  [ ]

   Girls boarding  [ ]

   Mixed day  [ ]
8. How often do your teachers prepare professional documents in your school.

   Always [   ]
   Sometimes [  ]
   Rarely [    ]

From your answer given in question (a) above, what effects does it have on their teaching?

____________________________________________________________________________
____________________________________________________________________________

9. How do your teachers interact with your students

   Excellent [     ]
   Good [       ]
   Fairly good [    ]
   No interaction [   ]

If yes state their effects on students performance.

____________________________________________________________________________
____________________________________________________________________________

10. List the effects of teachers preparedness in mathematics performance.

____________________________________________________________________________
____________________________________________________________________________

11. Does teachers’ character and attitudes affects students performance?

   Yes [     ]
   No [      ]

If yes, briefly explain the effects on students performance.

____________________________________________________________________________
____________________________________________________________________________
12. Do teachers teaching experience have effect on student’s performance?

Yes [ ]

No [ ]

If yes, briefly state their effects.

_____________________________________________________________

_____________________________________________________________

13. What is the level of student enrolment in your school.

50 – 100 [ ]

100 – 500 [ ]

500 – 1000 [ ]

Above 1000 [ ]

14. What effects do school enrolment have on student’s performance?

_____________________________________________________________

_____________________________________________________________

15. What is the ratio of student-teacher in your school?

15 – 1 [ ]

20 – 1 [ ]

26 – 1 [ ]

16. Does this ratio affect students performance?

Yes [ ]

No [ ]

If yes, state how it affect the performance of in your school.

_____________________________________________________________

_____________________________________________________________
17. Do you have teaching/learning strategies aimed at improving academic performance in school?
   Yes [ ]
   No [ ]

   If yes, what effects does it have on academic performance of students.
   _______________________________________________________________
   _______________________________________________________________

18. List strategies used to improve the performance of mathematics in your school?
   _______________________________________________________________
   _______________________________________________________________

19. For how long have you stayed in your current position?
   a) 1-2 years [ ]
   b) 3-4 years [ ]
   c) 5-6 years [ ]
   d) Above 6 years[ ]

20. Do your students learn in congested classrooms in your school?
   Yes [ ]
   No [ ]

   If yes, what effects does it have on academic performance of students?
   _______________________________________________________________
   _______________________________________________________________

Thank you for your co-operation.
APPENDIX D

STUDENTS QUESTIONNAIRE

This questionnaire is designed to seek information on factors affecting performance in KCSE in Secondary Schools in Kakamega County. You are kindly requested to answer all the questions honestly. The information you give will be treated with confidentiality and used for only compiling this study report. This is not a test and hence there is no wrong or right answer. What is required is your honesty response(s).

1. Gender
   Male ☐ Female ☐

2. a) Are learning resources in your school adequate?
   Yes [ ] No [ ]
   b) If no does it affect your KCSE performance?
   Yes ☐ No ☐

5. What learning facilities are available at home that helps you to study?
   Electricity ☐ Table and chairs ☐ Study room ☐

6. a) Give reasons that make you absent from school
   Sickness ☐ Lack of school fees ☐ To assist parent at home ☐
7. In your view, what strategies could be adopted to improve KCSE performance in public day schools?

Increase learning and teaching facilities [     ]
Retain students in school for longer period time [     ]
Parents and guardians to allocate students time for study [     ]

8. Indicate the type of your school?

Boys boarding [     ]
Girls boarding [     ]
Mixed day [     ]

9. How often do your teachers prepare professional documents in your school.

Always [     ]
Sometimes [     ]
Rarely [     ]

From your answer given in question (a) above, what effects does it have on their teaching?

________________________________________________________________________________________
________________________________________________________________________________________

10. How do your teachers interact with you class.

Excellent [     ]
Good [     ]
Fairly good [     ]
No interaction [     ]
If yes state their effects on students performance.

________________________________________________________________________

________________________________________________________________________

11. List the effects of teachers preparedness in mathematics performance.

________________________________________________________________________

________________________________________________________________________

12. Does teachers’ character and attitudes affect your academic performance in class?
   Yes [ ]
   No [ ]

   If yes, briefly explain the effects on your performance.

________________________________________________________________________

________________________________________________________________________

13. Do teachers teaching experience have effect on your performance?
   Yes [ ]
   No [ ]

   If yes, briefly state their effects.

________________________________________________________________________

________________________________________________________________________

14. What is the level of student enrolment in your school.
   50 – 100 [ ]
   100 – 500 [ ]
   500 – 1000 [ ]
   Above 1000 [ ]
15. What effects do school enrolment have on student’s performance?

________________________________________________________________________
________________________________________________________________________

16. What is the ratio of student-teacher in your school?

15 – 1 [ ]
20 – 1 [ ]
26 – 1 [ ]

17. Does this ratio affect students performance?

Yes [ ]
No [ ]

If yes, state how it affect the performance of in your school.
________________________________________________________________________
________________________________________________________________________

18. Do you have teaching/learning strategies aimed at improving academic performance in school?

Yes [ ]
No [ ]

If yes, what effects does it have on academic on your performance.
________________________________________________________________________
________________________________________________________________________

19. List strategies used improve the performance of mathematics in your school?

________________________________________________________________________
________________________________________________________________________

20. Do you learn in congested classrooms in your school?

Yes [ ]
No [ ]

If yes, what effects does it have on academic on your performance?
_______________________________________________________________
_______________________________________________________________

21. List the effects of teachers preparedness in classroom teaching.
_______________________________________________________________
_______________________________________________________________

22. What are the effects of adequacy of teaching and learning resources in performance in mathematics in your school?
_______________________________________________________________
_______________________________________________________________

23. What are the effects of teaching/learning resources in mathematics performance?
_______________________________________________________________
_______________________________________________________________

24. Do teachers in your school frequently prepare professional records?
_______________________________________________________________
_______________________________________________________________
If yes, what effects do professional documents have on performance?
_______________________________________________________________
_______________________________________________________________

25. List the kind of teaching methods teachers use in class.
_______________________________________________________________

26. How do teachers’ moral conduct affect your performance?
27. Do you have enough mathematics text books in your school?
   Yes [ ]
   No [ ]
   If No. what effects do they have on your performance?
   ________________________________________________________________
   ________________________________________________________________

28. Do you have a function library in your school?
   Yes [ ]
   No [ ]
   If Yes what effects do they have on your performance?
   ________________________________________________________________
   ________________________________________________________________

29. What is the source of learning materials in your school?
   ________________________________________________________________
   ________________________________________________________________

Thank you for your co-operation.
APPENDIX E

DISTRICT QUALITY AND STANDARDS OFFICER (DQASO)

QUESTIONNAIRE

This questionnaire is designed to seek information on factors affecting performance in KCSE in Secondary Schools in Kakamega County. You are kindly requested to answer all the questions honestly. The information you give will be treated with confidentiality and used for the purpose of compiling this report. This is not a test and hence there is no wrong or right answer. What is required is your honesty response(s).

1. Gender

   Male [ ]  Female [ ]

2. In your view what strategies could be adopted to improve KCSE performance in public day school?

   Increase learning and teaching facilities [ ]
   Retain students in school for longer period time [ ]
   Parents and guardians allocate students time for study [ ]

3. How many times do you inspect secondary school in Kakamega County?

   Once [ ]  Twice [ ]  Thrice [ ]

4. Do all teachers prepare schemes of work and records of work in the schools you inspect?

   Yes [ ]  No [ ]
5. What is your opinion on secondary teacher training in Kenya?

6. Curriculum based establishment has led to some teachers being overworked. What is your opinion?

7. Has increased enrolment in secondary schools affected quality of education? Give your opinion.

8. Do you have programmed in service programs in your county?
   Yes ☐ No ☐

9. What measures are being put in place to improve quality of education?

10. The Ministry introduced Internal Assessment at school level has this been implemented in your school? Are they aware?
   ☐ ☐ ☐

11. How often do you offer management course for principals
   Once ☐ Twice ☐ Thrice ☐

Thank you for your co-operation
APPENDIX F

OBSERVATION SCHEDULE

a) Adequacy of Key Teaching, Learning and Physical Resources in High Performance Schools

<table>
<thead>
<tr>
<th>Resources</th>
<th>Availability</th>
<th>Adequate</th>
<th>Inadequate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classrooms</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Desks</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chalk Boards</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exercise Books</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teaching Aids</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Library</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laboratory</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

b) Adequacy of Key Training, Learning and Physical Resources in Low Performance Schools

<table>
<thead>
<tr>
<th>Resources</th>
<th>Availability</th>
<th>Adequate</th>
<th>Inadequate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classrooms</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Desks</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chalk Boards</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Exercise Books</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teaching Aids</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Library</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laboratory</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**APPENDIX G**

**LIST OF PARTICIPANTS**

<table>
<thead>
<tr>
<th>Category</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Principals</td>
<td>15</td>
</tr>
<tr>
<td>Teachers</td>
<td>60</td>
</tr>
<tr>
<td>Students</td>
<td>450</td>
</tr>
<tr>
<td>QASO</td>
<td>1</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>526</strong></td>
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</tbody>
</table>
APPENDIX H

BUDGET

<table>
<thead>
<tr>
<th>a) Items (Stationary)</th>
<th>Quality</th>
<th>Cost in Kshs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pens</td>
<td>6 dozens @ 12</td>
<td>72.00</td>
</tr>
<tr>
<td>Pencils</td>
<td>3 @ 20</td>
<td>60.00</td>
</tr>
<tr>
<td>Rubber</td>
<td>2,220.00</td>
<td>40.00</td>
</tr>
<tr>
<td>Flash disk</td>
<td>2 @ 1500</td>
<td>3,000.00</td>
</tr>
<tr>
<td>Paper</td>
<td>8 rims @ 500</td>
<td>4000.00</td>
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<tr>
<td><strong>Sub Total</strong></td>
<td></td>
<td><strong>7,172.00</strong></td>
</tr>
</tbody>
</table>

| b) Traveling Expenses                     |               |             |
| Transport to schools and back home for 20 days | 20 @ 200      | 4,000.00    |
| Administering Questionnaires              |               | 5,000.00    |
| Lunch @ 400 per day for 60 days           |               | 4,000.00    |
| **Sub Total**                             |               | **44,000.00**|

| c) Secretarial Services                   |               |             |
| Research proposal, typing, printing and binding |          | 10,000.00   |
| Researching, typing, printing and binding the final report | | 15,000.00   |
| Photocopying Questionnaires               |               | 2,000.00    |
| **Sub total**                             |               | **27,000.00**|

| d) Communication services                 |               |             |
| **Sub total**                             |               | **7,000.00** |

| e) Miscellaneous expenses                 |               |             |
| **Sub total**                             |               | **10,000.00**|

| **Grand Total**                           |               | **87,172.00**|
### APPENDIX I

### WORK PLAN FOR THE STUDY

<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>Developing a research topic and literature review</td>
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</tr>
<tr>
<td>Writing the research proposal, developing tools for data collection and preparing for research proposal seminar</td>
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<tr>
<td>Field framework/conducting interviews</td>
<td></td>
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<tr>
<td>Data entry, interpretation and analysis</td>
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<tr>
<td>Compiling of the final draft</td>
<td></td>
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<tr>
<td>Presentation of findings/final submission</td>
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</tbody>
</table>
APPENDIX J: LETTER OF AUTHORIZATION

REPUBLIC OF KENYA

NATIONAL COUNCIL FOR SCIENCE AND TECHNOLOGY

Telephone: 254-020-2213471, 2241349, 254-020-2673550
Mobile: 0713 788 787, 0735 404 245
Fax: 254-020-2213215
When replying please quote
secretary@ncst.go.ke

Date:
21st August, 2013

Our Ref: NCST/RCD/14/013/1415

Protus Wekesa Wanyonyi
Kenyatta University
P.O.Box 43844-00100
Nairobi.

RE: RESEARCH AUTHORIZATION

Following your application dated 30th July, 2013 for authority to carry out research on “Utilization of resources that influence students’ performance in mathematics at secondary level in Kakamega County, Kenya,” I am pleased to inform you that you have been authorized to undertake research in Kakamega County for a period ending 30th September, 2013.

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

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

Said Hussein
FOR: SECRETARY/CEO

Copy to:

The County Commissioner
The County Director of Education
Kakamega County.

*The National Council for Science and Technology is Committed to the Promotion of Science and Technology for National Development*
APPENDIX K: RESEARCH PERMIT

THIS IS TO CERTIFY THAT:

Prof./Dr./Mr./Mrs./Miss/Institution
Protus Wekesa Wanyonyi
of (Address) Kenyatta University
P.O Box 43844-00100, Nairobi

has been permitted to conduct research in

Location
District
Kakamega
Kakamega County

on the topic: Utilization of resources that influence students’ performance in mathematics at secondary level in Kakamega County, Kenya.

Date of issue
21st August, 2013

Fee received
KSH. 1000

for a period ending: 30th September, 2013.

Applicant’s Signature

For Secretary
National Council for Science & Technology

REPUBLIC OF KENYA

National Commission for Science, Technology and Innovation

RESEARCH CLEARANCE PERMIT

Serial No.
0033

CONDITIONS: see back page

1. You must report to the County Commissioner and the County Education Officer of the area before embarking on your research. Failure to do that may lead to the cancellation of your permit.

2. Government Officers will not be interviewed without prior appointment.

3. No questionnaire will be used unless it has been approved.

4. Excavation, filming and collection of biological specimens are subject to further permission from the relevant Government Ministries.

5. You are required to submit at least two (2) hard copies and one (1) soft copy of your final report.

6. The Government of Kenya reserves the right to modify the conditions of this permit including its cancellation without notice.