CHALLENGES FACING STUDENTS IN ADAPTING TO MATHEMATICS LEARNING IN SECONDARY SCHOOLS IN BUNGOMA SOUTH DISTRICT, KENYA

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A THESIS SUBMITTED IN PARTIAL FULFILLMENT FOR THE DEGREE OF MASTER OF EDUCATION IN THE SCHOOL OF EDUCATION, KENYATTA UNIVERSITY

OCTOBER, 2011
DECLARATION

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

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Date

We confirm that the work reported in this thesis was carried out by the candidate under our supervision as university supervisors

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Date

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Signature
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Department of Educational Communication and Technology
Kenyatta University

Date
DEDICATION
To - my parents; Gabriel Khisa Kakai and Clecencia Makokha Kakai for their financial support.
ACKNOWLEDGEMENT

I thank Almighty God for giving me the courage and strength to pursue this programme to its completion. This work has been made possible by the support of a number of people. It is not possible to mention all of them by name but their assistance is sincerely appreciated. However, I will mention just a few of the people and institutions that I am indebted to.

I am greatly indebted to my devoted supervisors; Professor P.K. Mutunga and Dr. S.M Rukangu for their tireless efforts in critical reading of the work from the beginning of the study to the end.

My heartfelt gratitude goes to my parents Gabriel and Clecencia for their financial assistance, constant prayers and their encouragement. I would also like to extend my thanks to my only course mate in Mathematics Education, Mrs. Florence Ng’ang’a, my sisters, brothers and relatives for their continued moral support and restoration of hope in me when it was fading. Equally appreciated is the teaching and non-teaching staff in Kenyatta University especially the encouragement offered by lecturers and members of the Department of Educational Communication and Technology in the course of my study.

My sincere gratitude is also extended to the District Education Officers, to all head teachers and heads of departments in the schools I visited in the Bungoma South District for their genuine cooperation during the data collection. Last but not least, I thank Mrs. Charity Maina for the neat typing of the report.

God bless you all!
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ABBREVIATIONS AND ACRONYMS

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>NCTM</td>
<td>National Council of Teachers of Mathematics</td>
</tr>
<tr>
<td>K.C.P.E</td>
<td>Kenya Certificate of Primary Education</td>
</tr>
<tr>
<td>K.C.S.E</td>
<td>Kenya Certificate of Secondary Education.</td>
</tr>
<tr>
<td>KNEC</td>
<td>Kenya National Examinations Council</td>
</tr>
<tr>
<td>SMASSE</td>
<td>Strengthening of Mathematics and Science at Secondary Education</td>
</tr>
<tr>
<td>NCEOP</td>
<td>National Committee on Educational Objectives and Policies</td>
</tr>
<tr>
<td>INSET</td>
<td>In-service Training</td>
</tr>
<tr>
<td>MoEST</td>
<td>Ministry of Education Science and Technology</td>
</tr>
<tr>
<td>CCSA</td>
<td>Centre for Curriculum Studies in Africa</td>
</tr>
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</table>
ABSTRACT

This study sought to investigate challenges facing students in adapting to mathematics learning in secondary schools in Bungoma South District, Western province. The insight into the study arose from the recurrent poor performance of mathematics in Kenyan secondary schools. Specifically, the investigation was on the study habits adapted by students, teaching methods used by teachers, students’ and teachers’ attitudes and assessment techniques. This study was guided by five research questions. A cross-sectional descriptive survey design was adopted and carried out in ten secondary schools in Bungoma South District. Two research instruments namely; Mathematics Students Questionnaire (MSQ) and Mathematics Teachers’ Questionnaire (MTQ) were used to collect data. The validity and reliability of the questionnaires were enhanced by a pilot study. The MTQ was administered to 20 teachers while the MSQ was administered to 200 students sampled for the study. Data collected was analyzed using descriptive statistics where percentages and weighted means were used. The findings indicated that study habits that enhanced adaptation to mathematics learning included small group discussions, discussions and personal reading. Provision of frequent feedback by giving assignments, marking and revising immediately as well as encouraging students to interact freely in class by allowing them to participate fully also enhanced learners’ understanding. Similarly, teachers assessed all cognitive domains of learning except creativity, imagination and data interpretation domains. The study also found out that most mathematics teachers were using assessment techniques that denied students all-round mathematics learning as well as restricting their assessment to only cognitive domains. Therefore, to enhance adaptation to mathematics learning, teachers need to be in-serviced on use of various teaching and assessment techniques. In connection to this, the researcher made the following recommendations: 1) Need for teachers to use collaborative teaching that was found to enhance interaction among learners and with teachers consequently students’ adaptation to mathematics learning 2) Teachers to devise ways of making learners enjoy learning mathematics 3) Need for teachers to motivate students to make them adaptable to mathematics learning in secondary schools. 4) Need for teachers to provide immediate feedback by giving assignments, marking and revising immediately to enable learners adapt to mathematics learning.
CHAPTER ONE
INTRODUCTION

1.0 Introduction

This chapter discusses the background to the study, statement of the problem, objectives and significance of the study. It also highlights the assumptions, scope and limitation of the study as well as defining some terms that were used in the study.

1.1 Background to the Study

In Kenya, secondary school education is the bridge between primary and either tertiary or the world of work. Secondary school education builds on the foundations of the basic education acquired at primary school level and orientates students towards further education and work. It also seeks to prepare citizens to be able to participate in the future development of the country. Therefore, the objectives of secondary school education are geared towards providing a continuation from the basic education programme and lay a foundation for further education and training. It therefore intends to; develop attitudes, values, and skills required for socio-economic development in a rapidly changing society and provide opportunities for learners to develop technological skills that are related to the world of work. For this reason, the government of Kenya planned to be industrialized by 2030 (Republic of Kenya, 1982).
The role of mathematics and that of sciences in scientific and technological development of a nation need not to be overemphasized. Due to the perceived role in scientific and technological development, mathematics is a compulsory subject in the primary and secondary school curriculum in Kenya (Republic of Kenya, 1999). In addition, the concepts and principles of mathematics are regarded as useful and applied in the study of other subjects such as Economics, Engineering, Biological Sciences, Medicine, Geography and Management sciences (FAWE, 1998). However, in spite of all these, students’ performance in mathematics examinations has been poor as shown in Table 1.1

Table 1.1: Candidates Overall Performance in Mathematics for the years 2004-2007

<table>
<thead>
<tr>
<th>Year</th>
<th>Candidature</th>
<th>Mean Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>221,295</td>
<td>37.20</td>
</tr>
<tr>
<td>2005</td>
<td>259,280</td>
<td>31.91</td>
</tr>
<tr>
<td>2006</td>
<td>238,684</td>
<td>38.08</td>
</tr>
<tr>
<td>2007</td>
<td>273,504</td>
<td>39.46</td>
</tr>
</tbody>
</table>


From Table 1.1, the overall mean in mathematics at KCSE in the country showed a slight improvement in the year 2007 compared to the previous years. However, students’ overall performance in mathematics still remains poor. This situation is likely to compromise Kenya’s efforts in achieving its goals of scientific and technological development.
In an attempt to improve the performance in mathematics, many studies have been
done and various recommendations made. Explanations for poor performance in
mathematics in Kenya and other countries have indicated that the following factors
are significant: students’ attitude and characteristics (Eshiwani, 1983; Fuller,
1985); teacher quality and perception (Anderson et.al 1989; Anderson and
Postlewaite, 1989; Durkin, 1989); availability and use of textbooks (Fuller, 1985;
Stodolsky, 1988; Eshiwani 1993); student entry behaviour (Bloom, 1976;
Hanushek, 1989); time allocation (Hussen, 1967; Fisher et, al 1978; Fuller, 1987;
Anderson, 1984; MoEST-KNEC report 2000). Other factors cited are: sex of
student (Maccoby and Jacklin, 1975); Gould, 1981; Stobart et.al, 1992; Kutnick et,
al, 1996); teaching methods and classroom climate (Resnich 1985; Hatano and
Inagake, 1991); class size (Eshiwani, 1983; Lockheed, 1993) and homework
(Pascal et.al 1984; Leone and Richards, 1989; Postlewaite and Wiley, 1992).
While analysis the foregoing studies, Miheso (2002) points out that a common
assumption in all these studies is that enhanced mathematics achievement is
related to the variations in exposure to instruction and provision of educationally
stimulating environments within and outside the school. Therefore, the
information from these studies, has been less in revealing the challenges students
may face in adapting to mathematics learning in secondary schools. This was
considered in this study
While the factors mentioned in the foregoing section are considered to be important, one critical and key factor, which contributes to students’ mastery of mathematical content, seem not to have been fully addressed. This is the link between mathematics content at different levels. The link between mathematics content in this case focuses on how teachers and learners handle the transition period from one level to another when teaching and learning mathematics in secondary schools. The focus was on the possible challenges students may face in adapting to mathematics teaching and learning in secondary schools.

A KCPE mathematics examination paper comprises 50 multiple choice items constructed to cover the whole of primary school syllabus. Each item has 4 choices among which 3 are distracters and only one the key. The correct choice (key) carries 2 marks whereas a wrong choice (distracter) earns zero. This is marked by use of the computer. In preparation for the examination, pupils are vigorously involved in sitting for several papers set by the school teachers, past papers and other papers bought or collected from other schools within the country. It has been argued here that drilling on how to select the key is an art exercised by the teachers, to an extent that working backwards at times from the choices is mastered. The drilling of pupils into making the right choice in the examination is given more prominence than the acquisition of concepts in the subject (Sommerset, 1972). These pupils then progress to secondary school to acquire mathematical ability at a higher level.
At secondary school, the student is faced with a different format of examination. Mathematics examination tests the candidates’ abilities through two papers; paper 1 (121/1) and paper 2 (121/2) each with 24 open ended items. The two papers compliment each other to over the entire syllabus; paper 1 (121/1) tests mainly forms 1 and 2 work while paper 2 (121/2) tests mainly forms 3 and 4 work. In each paper, section 1 has 16 compulsory short items with a total score of 52 marks. Section II has 8 long items each of 8 marks. A candidate is required to answer 6 items with a total of 48 marks. The two papers are equally weighted and each is marked out of one hundred percent. The results from the two papers constitute the final mathematics grade for the candidate at KCSE level (KNEC, 2007).

According to the report by KNEC (2008), candidates’ KCSE poor performance in mathematics was noticed in seventeen (17) questions. These questions were from both paper 1 (121/1) and paper 2 (121/2). The analysis of the year 2007 KCSE mathematics examination papers also revealed that candidates had difficulties in tackling questions that required drawing and construction skills just as has been the case in previous years. This indicates that teachers need to ensure that students are provided with enough practice on these skills. This view led directly to the concern of the study in the sense that challenges students face in adapting to mathematics learning in secondary school could be the reason behind poor
performance in KCSE examination in mathematics despite student ability at primary level.

It has been observed over years that majority of pupils score high grade levels in mathematics in KCPE examination. However, majority of these pupils end up scoring low grades in KCSE examination in four years time. The information in Table 1.2 gives a summary of the performance data of 2023 candidates who were enrolled for KCSE for the years 2005, 2006 and 2007 in selected secondary schools in Bungoma South District with their respective KCPE grades.
Table 1.2 Candidates Performance data

<table>
<thead>
<tr>
<th>KCPE MATHEMATICS GRADES</th>
<th>E</th>
<th>D-</th>
<th>D</th>
<th>D+</th>
<th>C-</th>
<th>C+</th>
<th>B-</th>
<th>B+</th>
<th>A-</th>
<th>A</th>
<th>Total</th>
<th>%</th>
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<td>4</td>
<td>4</td>
<td>11</td>
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<tr>
<td>A-</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>10</td>
<td>1.05</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>B+</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>10</td>
<td>12</td>
<td>1.19</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>B</td>
<td>2</td>
<td>1</td>
<td>4</td>
<td>6</td>
<td>8</td>
<td>30</td>
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<td></td>
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<tr>
<td>B-</td>
<td>1</td>
<td>1</td>
<td>5</td>
<td>11</td>
<td>16</td>
<td>3.06</td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>C+</td>
<td>2</td>
<td>2</td>
<td>11</td>
<td>5</td>
<td>16</td>
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<tr>
<td>C</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>7</td>
<td>17</td>
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</tr>
<tr>
<td>C-</td>
<td>1</td>
<td>1</td>
<td>6</td>
<td>9</td>
<td>12</td>
<td>4.89</td>
<td></td>
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<tr>
<td>D+</td>
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<tr>
<td>D-</td>
<td>7</td>
<td>14</td>
<td>24</td>
<td>55</td>
<td>93</td>
<td>32.82</td>
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<td>E</td>
<td>2</td>
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<td>46</td>
<td>89</td>
<td>200</td>
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<td>102</td>
<td></td>
<td></td>
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</tbody>
</table>

Source: Survey Data, Bungoma South District (2008)

It is observed from Table 1.2 that the two candidates scored grade ‘E’ in mathematics at KCPE examination also attained grade ‘E’ at KCSE examination. Similarly, for grade ‘A’ at KCPE on entry into secondary school, 11 candidates scored grade ‘A plain’, 4 grade ‘A minus’, 11 grade ‘B plus’ and 2 grade ‘E’. Out of 2023 candidates, (77.8%) (24.67%, 12.7%, 11.27%, 10.92%, 5.04%, 4.6% and 8.6%) scored grade ‘C’ to ‘A’ in KCPE mathematics examination. At KCSE four years later, 88.78% scored grades ‘C’ to grade ‘E’. This shows that there is a
higher concentration of performance in upper grades than lower grades at KCPE unlike at KCSE. In addition, for this set of students, the mean grade at KCPE was “C plain” and a “D plain” at KCSE. Although, the content changes at secondary level, why should this be the case when it is the same student? Is it the change of mathematics learning or is it the fault of the teacher and the student? This study contended that the variations could be due to the induction to mathematics learning in secondary schools. This study was set out to investigate issues surrounding students’ adaptation to mathematics learning in secondary schools.

1.2 Statement of the Problem

Mathematics is widely regarded as one of the important subjects because it shapes the mind and prepares students for pure and social sciences. For this reason, it is important that all students have opportunities and necessary support to learn mathematics in depth and with understanding. In Kenya, mathematics is a compulsory subject up to the secondary school level. Indeed, more lessons of mathematics are taught in schools than those of science subjects. However, performance in mathematics among secondary school students has been poor and this has been a major concern for the society. Studies carried out attribute poor performance in mathematics to factors such as poor teaching methods, lack of teaching resources, students’ attitudes towards the subject, weak link between

In response to these problems, the ministry of Education, Science and Technology (MoEST) initiated corrective measures through SMASSE by in-servicing teachers on appropriate teaching techniques that enhance performance. Despite these corrective measures, the KNEC (2008) correctly cites ineffective teaching that leads to inability to master simple and basic concepts as a reason for poor performance in mathematics. This implies that there are other challenges relating to students’ learning of mathematics that have not been addressed at least in Bungoma South District context.

This study contented that factors relating to students’ learning of mathematics could be due to the weak link between primary and secondary (syllabuses) content levels. This weak link could be addressed using certain teachers’ teaching techniques that make secondary school students adaptable to new learning techniques. Again, issues relating to learning techniques and how students are inducted to learning mathematics have not been established through systematic research as possible challenges facing students in secondary schools in Bungoma South District. It is in view of this gap, that the researcher felt that adaptation to mathematics learning techniques in secondary schools might significantly contribute to understanding the causes of poor performance of students in
mathematics. This study therefore focused on establishing the challenges facing students in adapting to mathematics learning in selected secondary schools in Bungoma South District.

1.3 Purpose of the study
The purpose of the study was to identify challenges facing students in adapting to mathematics learning in secondary school. The challenges that are specific to secondary school students in Bungoma south district were identified and recommendations made accordingly.

1.4 Objectives of the study
The objectives of this study were to;

1. Identify learners’ study habits for mathematics in secondary schools in Bungoma South District.

2. Establish the attitudes of students towards mathematics in secondary schools in Bungoma South District.

3. Establish teaching methods used by teachers of mathematics in secondary schools in Bungoma South District,

4. Establish the assessment techniques in use in teaching mathematics in secondary schools in Bungoma South District.

5. Determine attitude of mathematics teachers towards learners of mathematics in secondary schools in Bungoma South District.
1.5 Research Questions

This study attempted to answer the following questions;

1. What study habits do learners of mathematics adapt in secondary schools?
2. What attitudes do students have in adapting to mathematics teaching and learning in secondary school?
3. What teaching methods are used in teaching mathematics in secondary school?
4. What assessment techniques are used in secondary schools to enable students adapt to teaching and learning of mathematics in secondary schools?
5. What attitudes do teachers have towards students’ that enable students to adapt to teaching and learning of mathematics in secondary schools?

1.6 Significance of the Study

The findings in this study provide teachers, students and administrators with the challenges that significantly influence students’ growth and consequently performance in mathematics. The aim of this study is to contribute towards the improved mathematics learning at secondary school level. This study is motivated by the fact that a strong foundation in basic mathematical content and skills will enhance learning of mathematics by the student at different levels. Therefore, the study will be of importance to the teaching of mathematics specifically to the Ministry of Education (MoE) since one of its core mandates is to promote
educational standards in the country. The study intended to reveal the challenges that students face in adapting to mathematics learning in secondary schools Bungoma South District, the Ministry of Education may use the information to design appropriate interventions that will help improve the students’ performance in mathematics. Miheso (2002) noted that most of the previous studies were based on limited outcome measures making it difficult for teachers to implement the findings into classroom practice. This study aimed at making available empirical evidence on challenges for students, teachers and policy makers to enable them make informed decisions. The study is also aimed at giving other researchers an alternative approach of classroom study by providing baseline information.

1.7 Delimitations and Limitation of the study

1.7.1 Delimitations of the study

The study was carried out in secondary schools in Bungoma South District and therefore the findings mainly reflected the situation in this district.

1.7.2 Limitations to the study

The fact that only forms 2 and 3 and not a cross-section of all the tiers in secondary school were considered, the findings of the study will provide a data base for further investigation. Time and financial resources were a limitation but this study optimized these available resources.
1.8 Assumptions of the study

It was assumed in this study that the factors under investigation are important when explaining the challenges facing students in adapting to mathematics learning techniques of mathematics in secondary schools. It was assumed that all teachers are well trained and have good mastery of the subject content. It was also assumed that students in all cases are of similar learning backgrounds and that any differences in learning are a result of classroom experiences in secondary schools. Other assumptions made were that all the teachers and students would cooperate in the provision of data; they would provide true and accurate responses, to the best of their ability, on data collection instruments, and that the sampled schools followed the mathematics syllabus.

1.9 Conceptual Framework

Grouwns and Koehler (1988) identified teacher and student-related factors that affect learning. Student-related factors constituted attitudes and beliefs about mathematics, their confidence in their ability to learn mathematics and their feelings about ability to discover problem solving approaches in mathematics. Teacher-related factors such as his or her knowledge of mathematics content how students learn and teaching techniques of particular content and class. Other significant factors include teachers’ attitudes and beliefs about mathematics and teaching. For instance, some teachers believe that students learn by explicit examples and repetition and other believe that they learn by discovery or
investigation, hence making their teaching approach to teaching of mathematics different. Some of these teacher and student–related factors together with school-related factors such as adequacy of teachers, instructional resources and curriculum implementation used in mathematics class are likely to determine how well students adapt to learning techniques in secondary schools. This information is summarized in Figure 1.1
Problem
Inadequate Mathematics Learning in Secondary Schools

<table>
<thead>
<tr>
<th>Teachers</th>
<th>Students</th>
<th>School</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inappropriate teaching methods</td>
<td>Attitude towards mathematics and teachers</td>
<td>Inadequate teaching and learning resources</td>
</tr>
<tr>
<td>Assessment techniques</td>
<td>Study habits</td>
<td>Inadequate teachers</td>
</tr>
<tr>
<td>Teachers’ attitude towards the learner</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Possible inventions
- In-service teachers on appropriate teaching methods
- Students develop a positive attitude towards mathematics and teachers.
- Teachers provide feedback as well as remedial learning activities for students.

Expected Outcome
- Improved examination results grade
- Improved teaching methods for mathematics
- Improved learning activities in mathematics

Adapted from Grouwns and Koehler (1988)

Figure 1.1: Conceptual Framework
Figure 1.1 shows that learning of mathematics focuses on various activities that take place in the classroom, the teacher and the learner as key participants. The main challenge associated with adaptation to mathematics learning originates from the teacher and student. The mathematics teachers, who are the main curriculum implementers, use particular teaching strategies in the teaching and learning process. The student on the other hand, interact with their teachers and peers during the mathematics lessons. The instructional resources facilitate the teaching of certain mathematical concepts. All these variables are conceptually linked to adaptation to learning techniques of in secondary schools. Thus, if appropriate teaching strategies are used in the teaching and learning process of mathematics, proper foundation for learning of mathematics in secondary school could be realized hence adequate learning of mathematics. It is in this view that the study sought to investigate the challenges facing students in adapting to mathematics learning of mathematics in secondary schools.

1.10: Operational Definition of Terms

**Good performing schools:** Schools with mean score C- and above

**Poor performing schools:** Schools with mean score D+ and below

**Study habits:** Study activities used by students

**Teaching Strategy/technique/methods:** These terms are used interchangeably by various authors to indicate a distinct method of delivering mathematics content.
Inadequate Learning: Results from poor teaching and lack of adaptation to mathematics learning in secondary schools.

I.11: Organization of the Study

The study is organized in five chapters. Chapter one is the introductory chapter covering the background to the problem, statement of the problem, research questions, objectives of the study, significance of the study, scope and delimitations, conceptual framework and definition of terms. Chapter two covers the review of related literature. The third chapter covers the methodology. It describes the sample and sampling techniques, instruments, data collection procedures and how that data was analyzed. Chapter four presents the findings of the study. These include description, analysis, interpretation and discussion of the research findings. The interpretation of the findings with regard to the stated objectives is therefore included in this chapter. Finally, chapter five presents the summary, conclusions made from the study findings and recommendations as well as suggestions for further research.
CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

The review of the literature pertinent to the study is done under the following topics; student opportunity to learn, students’ and teachers’ attitude, methods of teaching mathematics, assessment in mathematics, motivation of students by mathematics teachers, resources in teaching of mathematics and finally a summary of the chapter is given.

2.1 Students opportunity to learn mathematics

According to Askew, Brown, Rhodes, Johnson & William (1997) and Martin, Mullis, Gregory, Hoyle & Shen (2000) opportunity to learn mathematics effectively is dependent upon a wide range of factors, but among the most important are those which are related to activities and practices within the classroom. The above studies focused strongly on the classroom and what happens there. They suggested that within the classroom, it is possible to discern a number of key elements. These include: teaching practices; the nature of student learning activities; the amount and nature of engaged learning time experienced by students; the learning environment and the scope and nature of the feedback given to students.

Peterson (1988) also listed effective teaching practices as: (a) a focus on the meaning and understanding mathematics and on the learning task; (b) encouragement of student autonomy, independence, self-direction and persistence in learning; and (c) teaching of
higher-level cognitive processes and strategies. This indicates that teaching practices are central to understanding what makes effective teaching. Hanna (1987), Brophy and Good (1986) identified successful teaching strategies as requiring an organized approach to teaching where, material was taught until it was mastered. They also argued that in the classroom instruction, three modes exist: (i) giving information; (ii) soliciting information; and (iii) providing feedback. This implies that both the teacher and students should participate in the teaching and learning process. Again, in providing information, an approach which structures the information so that the lesson forms a coherent whole that relates previous work to new material should be adopted. This call for clarity of presentation and good sequencing of information by mathematics teachers to enable learners adapt to learning of the subject.

In addition to good sequencing of information by the teacher, student actions within the classroom have also been identified as key determinants of effective teaching (Cooney, 1985; Pehkonen, 1997, Raymond & Leinenbach, 2000; Reid, 1997; Tomazos, 1997). Therefore, plans for effective teaching of mathematics to support students’ conceptual understanding need to emphasize the need for mathematically challenging and significant tasks (Askew, Brown, Denvir & Rhodes, 2000; Fraivilling, 2001). This view is also supported by Nickerson (1988) and Stigler & Perry (1988) noted that students’ involvement in classroom activities is a major factor affecting student achievement. However, Gore (2000) argues that the classroom environment needs to be supportive of learning as well as setting high expectations, encouraging students to be self-regulating
and articulating the criteria for quality of students’ work. This shows that mathematics 
learning mainly constitutes students’ engagement in the classroom activities. This study 
attempted to explore the kind of engagement learners are given by their teachers in an 
attempt to unearth challenges facing students in adapting to mathematics learning.

Hattie (1992) showed four attributes that stood out as characteristics of effective 
teachers. These included: provision of timely and useful feedback to enhance student 
learning; involve students in challenging tasks relative to the student’s current level of 
achievement; structuring classroom activities to allow an increased probability that 
feedback will occur; and excellent managers of classrooms and they are able to engage 
and teach all students in the class. Although these attributes appear generic, the capacity 
to implement them largely depends on a deep understanding of what is being taught. 
Brophy (1990) noted that effective pedagogy is largely dependent on deep knowledge of 
the content to be learned. This implies that it will be very difficult for teachers to run 
lively and effective mathematics discussions, in which they can respond to and build on 
students’ ideas, and provide timely and appropriate feedback without deep 
understanding of the content being taught and how students should learn it. In order to 
achieve this, mathematics teachers can set up opportunities for mathematical argument 
in their classroom by selecting tasks that have different solutions which allows students 
to grapple with ideas and take up positions and defend them.
2.2 Attitude towards mathematics learning

Le Roux (1994) defines attitude as a positive or negative emotional relationship with or predisposition towards an object, institution or person. This points to another definition, by Becker and Wiggins (1991) who defines attitude as enduring non-verbal features of social and physical world, and they are acquired through experience and exert a directive influence on behavior. These two definitions reveal that an attitude can be understood as an emotion that has an influence on the behavior of human being. Attitude may be expressed verbally for instance “I like mathematics”. Sometimes, it is expressed in varieties of actions like refusing to do homework or not participating in class during lessons.

2.2.1 Students’ Attitude towards Mathematics and their Teachers

Students’ attitudes towards mathematics and their teachers determine results. If the attitude is negative, students are likely to perform poorly and vice versa. Students need to develop a positive attitude towards each other, mathematics as a subject and their teachers in order to enhance the development of a strong foundation for learning of mathematics. Orton (1987) pointed out that some students are blamed for having negative attitude towards mathematics yet most of them are not motivated to change that attitude. Students would therefore have some measures of success in mathematics lessons if they are motivated to develop positive attitude towards it.
Watson (1976) argued that students develop negative attitudes towards mathematics as they move from lower classes to upper classes. He notes that pupils’ attitudes towards mathematics are usually positive in early years of primary schooling but these decreases as they progress to upper classes. This view is supported by Taiwo (1974) who suggests that student’ attitudes towards mathematics decreases as they climb higher because most of them have a general belief that mathematics is a very difficult subject that can only be understood by bright and hardworking students. Rukangu (2000) also supports this view by pointing out that poor performance in mathematics in national examinations could be due to the unproven belief that the subject is difficult. Although Watson, Taiwo and Rukangu seem to give a pointer that student’s performance mathematics changes with their attitude formation. However, these authors do not focus on mathematics learning in secondary which could be affected by attitude formation. This study was set out to investigate learners’ attitude towards mathematics and their teachers in relation to adaptation to mathematics learners.

Bell (1980) also observed that what students learn and how they learn is very closely tied to their attitude about the school and the subjects that are taught. Giles (1961) also pointed out that the image of mathematics has been that of ‘’adult subject’’ such that it becomes very easy for a child to be discouraged right from the start. This implies that if s/he misses the first essential steps, s/he will have great difficulties in catching up, even if this interest is awakened at a later stage. This clearly demonstrates that student’s feelings and perception about mathematics is a major factor affecting his or her
attainment and realization of full potential. Once students are motivated, they develop positive attitudes towards both the subject and the teachers and this will lead to the understanding of what they are taught from the lower levels in secondary schools.

Donavan (1967) stated that it is the attitudes developed by the students which are likely to stimulate or stop further study of mathematics. This shows that it is the attitudes that students develop that are highly involved in the learning and retention of mathematical concepts. Psychologists (Skemp, 1971 and Bruner, 1966) and most educators (Cockcroft Report, 1982 and Taiwo, 1972) are in agreement with Donavan (1967) in that attitudes play important role in the learning process. Teachers and all those involved in the education of children therefore have a responsibility of helping students to develop positive attitude towards mathematics. This study sought to find out teaching techniques that teachers adapting order to help develop positive attitudes towards mathematics.

If students attained attitudes of appreciation of mathematics at different levels in secondary schools, they will enjoy the subject, get satisfaction in understanding it and feel rewarded when they attain mathematical competence. This study, therefore, sought to assess how the students’ attitude towards mathematics and their teachers enhanced their adaptation to the teaching and learning of mathematics in secondary schools.

2.2.2 Mathematics Teachers’ Attitudes towards learners

Attitude focuses as individual's prevailing tendency to respond favorably or unfavorably to an object, person or group of people, institutions or events. Mathematics teachers
have the challenge of promoting practices in which teachers are encouraged to give up a degree of their control over mathematical activity. This allows students to initiate their own techniques to solve problems and grapple with contradictions (National Council of Teachers of Mathematics, 2000). Answering to mathematics reform some scholars (Peressini, Borko, Romagnano, Knuth & Willis, 2004) suggested that teachers have to engage students in rich, meaningful tasks when teaching. This means students’ thinking whether shared orally or in writing, must be used by teachers to guide the classroom in exploration of important mathematical ideas.

However, there are other factors such as the decisions that teachers make, the methods they use, and the attitudes displayed, that are relevant to performance on mathematical tasks that influence the direction and outcome of student performance (Mapolelo, 1998; McLeod, 1988; Schoenfeld, 1985). It is often declared that the attitude of a teacher could influence their actions in the classroom, which becomes critical to student learning. In other words, a teacher’s attitude regarding mathematics and students is relative to attitudes towards the teaching of mathematics, which in turn, has a powerful impact on mathematics learning (Ernest, 1989; Van der Sandt, 2007).

According to Ernest (1994), there should be a shift to a problem solving approach that requires a deeper change that greatly depends on the teacher's beliefs. He further expressed that the practice of teaching mathematics depends on the attitudes and practices that mainly affected by beliefs, emotions, social context and content
knowledge. The study focused on determining mathematics teachers’ attitudes and practices with a focus on adaptation to mathematics learning in secondary schools.

2.3 Methods of Teaching Mathematics

The potential of an education system is directly related to the ability of its teachers (Gitonga, 1990). Hence the more qualified and better trained teachers are, the easier it is to effect curriculum implementation. Gitonga further points out that the success or failure of any innovation in teaching ultimately lies on the receptiveness and flexibility of the classroom teacher. This suggests that mathematics teachers have to be conversant with various teaching methods that are appropriate for any given level of learners in secondary school. Effective teaching requires knowing and understanding learners and pedagogical strategies since students learn mathematics through experiencing what teachers provide. Thus, students’ understanding of mathematics, their ability to use it to solve problems, and their confidence in, and disposition towards mathematics are shaped by the teaching they encounter in school (National Council of Teachers of Mathematics (NCTM), 2000).

The education commissions reports of Gachathi (1976) and Mackay (1981), suggested that teaching should be learner-centred so that learning becomes more relevant to the learner. Gachathi further recommends that schools should teach basic computational skills for problem solving. This emphasizes need for the learners’ active participation in the classroom activities. This also implies that the teachers’ role is to offer opportunities
that will lead to student-centred activities in class, which could enhance performance in mathematics. Such opportunities could be realized if teachers used teaching methods that encourage students’ participation in class. This study sought to establish the teaching methods that are used by teachers in an attempt to enhance performance by making students adaptable to mathematics learning.

Welch (1978:6) recorded his experience as follows; “In all the mathematics classes that I visited, the sequence of activities was the same. First, answers were given for the previous day assignment. The more difficult problems were worked. A brief explanation was given of the new material and the problem assigned for the next day. The reminder of the lesson was devoted to working on homework while the teacher moved round the room answering questions.” This experience by Welch (1978) could be depicting the current teaching processes of mathematics. Although Welch’s study was done in developed countries, it is likely that similar experiences exist in developing countries. This implies that students’ learning largely depends on teaching process which points at the teaching methods used by teachers.

It is also important to note that there is no single particular teaching-learning strategy that gives optimum learning conditions to all students (Centre for Curriculum Studies in Africa, 1987). In expository methods, the teacher controls the passing of information and therefore remains active throughout the teaching and learning processes while the students act as passive listeners. On the other hand, in heuristic methods, the teacher
plays a minimal role in exposing the new learning material and allows the students to find out, collect, get or create new materials to discover the concept being learnt. Sidhu (1991) argues that it would be impossible to adapt to extreme form of expository or heuristic methods. This is because extremes are either teacher-centered or learner-centred thus; need to strike a balance between the two strategies. As we move from expository to heuristic methods, the students’ participation in teaching and learning processes increases. Consequently, this creates opportunities for learners to adapt to mathematics learning with varied content. The current study intended to establish the extent to which teachers dominate the lesson since this could be a possible challenge students’ adaptation to mathematics learning in secondary school.

Similarly, Miheko (2002) points out that teaching mathematics well involves creating, enriching, maintaining and adapting instruction to move towards mathematical goals while capturing and sustaining as well as engaging students in building mathematical understanding. She further notes that teachers have a wide range of instructional strategies at their discretion, which, often differ in terms of the amount of teacher direction, the number and type of students being taught at any given time. This implies that the choice of any of these strategies depends on their purpose in teaching, their understanding of teaching-learning processes and considerations of cost effectiveness. Mathematics teachers therefore need to be more cautious when choosing teaching strategies to ensure a clear and harmonious link between syllabus contents. This link enables students to settle down fast and adapt to mathematics learning at different levels
in secondary schools. It was therefore, an important exercise to establish the teaching methods used to enable learners adapt to mathematics learning in secondary schools at different levels.

Cohen (1976) recommended the use of small groups as a method of teaching. He emphasizes that collaborative efforts by learners allow problem solving to continue when an individual member encounters a difficult situation. In this case, the teacher provides external monitoring for individuals in a group and a less restrictive social environment in which students are enabled to pursue various mathematical techniques and ideas. Although Cohen advocates for groupings in mathematics, he does not point out study habits arising from this method that will enable adaptation to mathematics. Further studies have indicated that demonstrations, lecture games, examples and discussion methods are mostly employed for teaching mathematics in the classroom (Ochola, 1985 and K.I.E, 1985). However, these studies did not establish learning techniques associated with these methods that enhanced learning processes at different levels in secondary school thus the need for this study.

2.4 Assessment techniques in Mathematics

Assessment and evaluation are essential components in mathematics education. They help in monitoring students’ readiness for new learning, gives teachers feedback on the success for their strategies and approaches and help to plan new learning (Kihara, 2002). Evaluation encompasses diagnostic assessment practices that enable teachers to discover
difficulties in individual learners. Assessment is expected to focus on what students are able to do and how they think about mathematics. Skills assessed should incorporate ability to communicate findings, to present an argument and exploit an intuitive approach to a problem (Ministry of Education, 2000). This further emphasizes that the need for assessment to be an integral part to the teaching and learning process. Whether or not mathematics teachers consider assessment as an integral part of teaching and learning process was subject to exploration in this study.

Assessment should also be undertaken to provide students and parents with an indication of a students’ progress. In his paper on assessment in the teaching of mathematics, Grimison (1993) says “with an attempt to change some traditional teaching practices, problems have emerged concerning the restructuring of assessment in Australian mathematics education. The increased emphasis on problem solving and group work has meant that traditional forms of assessment are inadequate”. This means, modern and improved teaching methods in mathematics education are a prerequisite to quality achievement on assessment in mathematics.

Davies (2004) points out that assessment should illustrate the partnership that exists between teaching and learning process rather than collecting data on performance. This keeps the student informed about the learning objectives they are working towards. Assessment should involve multiple techniques including written, oral and demonstration formats as well as group and class activities. Assessment should also
include guiding students to self-assessment of their learning, involving parents and students in discussions of progress, and students showing evidence of their learning to stakeholders. Whether teachers in Bungoma South District used these varied techniques in assessment was subject to exploration in this study.

Diagnostic assessment, typically given at the beginning of an instructional unit or school year, will determine students' prior knowledge, strengths, weaknesses, and skill level. It helps the teacher to adjust the curriculum or provide for remediation. According to Tomlinson and McTighe (2006) these type of assessment can also help to identify misconceptions, interests or learning style preferences and help with planning for differentiated instruction. This assessment might take the forms of skill-checks, knowledge surveys, non-graded pre-tests, interest or learning preference checks, and checks for misconceptions. Thus, pretests help to isolate the things that students already know as well as the things they will need to teach them (Popham, 2003). This implies that pretest evaluative approach can contribute meaningfully to how teachers determine their own instructional impact. It was therefore worth establishing if mathematics teachers made use of this mode of assessment to enable the students settle down and adapt to learning techniques of mathematics in secondary schools.

The purpose of diagnostic assessment is not just to assess, but rather to use test results to improve learning (Black & Wiliam, 1998). Thus, progress monitoring with individual students or an entire class makes sense. An implementation involves determining a student's current level of performance and setting goals for learning that will take place
over time. This means that the student’s academic performance is measured on a regular basis (weekly or monthly). Progress toward meeting the student’s goals is measured by comparing expected and actual rates of learning. Based on these measurements, teaching is adjusted as needed. Thus, the student’s progression of achievement is monitored and instructional techniques are adjusted to meet the individual students learning needs. The study was therefore set out to determine if teachers use this mode of assessment to enhance learning of mathematics in secondary schools.

Another form is formative assessment which is seen as assessment for learning. Burns et al. (n.d.) indicate that formative assessments provide immediate evidence of student learning and can be used to help improve the quality of instruction and to monitor progress in achieving learning outcomes. This type of assessment therefore forms an essential component of classroom work and its development can raise standards of achievement (Black & Wiliam, 1998). Formative assessment includes both formal and informal methods, such as quizzes, oral questioning, observations, draft work, think-alouds, peer response groups, portfolio reviews and discussions (Tomlinson & McTighe, 2006). Homework also falls into the category of formative assessment because it typically supports learning in one of four ways: pre-learning, checking for understanding, practice and processing (Vatterott, 2009). The study investigated whether teachers utilize this form of assessment.

Black and Wiliam (1998) points out that feedback during formative assessment to any pupil should be about the particular qualities of his or her work, with advice on what he
or she can do to improve and should avoid comparisons with other pupils. Self-assessment by pupils is an essential component in formative assessment, which involves three components: students must recognize the desired goal, have evidence about their present position and some understanding of a way to close the gap between the two. Formative assessment can be productive if learners are trained in self-assessment so that they can understand the main purposes of their learning and thereby grasp what they need to do to achieve. The study therefore, sought to establish if teachers incorporated self-assessment in formative assessment.

As stated earlier, the intent of formative assessment is to support learning, therefore, students should know where they are going in terms of learning targets they are supposed to master, where they are now, and how they can close any gap. Vatterott (2009) states that viewing homework as formative feedback changes the teachers’ perspectives on the scoring of homework. This is because scoring becomes not only unnecessary for feedback, but possibly even harmful to the student’s continued motivation to learn. This means with this new perspective, incomplete homework is not punished with failing scores but is viewed as a symptom of a learning problem that requires investigation, diagnosis, and support. However, it is important to note that formative assessment will not necessarily lead to improved student learning or teacher quality without appropriate follow-up corrective activities after the assessments. These activities have three essential characteristics. They present concepts differently, engage students differently in learning, and provide students with successful learning experiences. For example, an initial group activity might be replaced by an individual
activity, or vice versa. Corrective activities can be done with the teacher, with a student's friend or by the student working alone. As learning styles vary, providing several types of such activities to give students some choice will reinforce learning. These corrective activities should be done during class time to ensure those who need them the most will take part. Whether or not this was incorporated in the teaching and learning process was also subject to exploration by the study.

**2.5 Motivating Students by Mathematics Teachers**

Motivation can be defined as the forces that account for the arousal, selection, direction, and continuation of behavior (Ames & Ames, 1990). Nevertheless these authors indicated that many teachers have at least two major misconceptions about motivation that prevent them from using this concept with maximum effectiveness. One misconception is that some students are unmotivated. Strictly speaking, that is not an accurate statement. It is therefore important to note that long as a student chooses goals and spends a certain amount of effort to achieve them; he/she is, by definition, motivated. However, what teachers really mean is that students are not motivated to behave in the way teachers would like them to behave. The second misconception is that one person can directly motivate another. This view is inaccurate because motivation comes from within a person. Teachers should only create the circumstances that influence students to learn mathematics.

Many factors determine whether the students in classes will be motivated or not motivated to learn mathematics yet no single theoretical interpretation of motivation
explains all aspects of student interest or lack of it. Different theoretical interpretations do, however, shed light on why some students in a given learning situation are more likely to want to learn mathematics than others. Furthermore, each theoretical interpretation can serve as the basis for the development of techniques for motivating students in the classroom. For instance, a student would like mathematics just because he/she wants to be a doctor, pilot or lecturer (intrinsic) or because the teacher is good and his or her teaching methods are interesting (extrinsic). Unless students are motivated, it becomes difficult for the teacher to manage the class, communicate effectively with the student and apply effective class control measures. In the end, it becomes difficult for students to adapt mathematics learning effectively.

Wasiche (2006) notes that the initial step in encouraging students to like mathematics is to keep them motivated by knowing their internal motivators, such as interests and aspirations: external motivators such as peer influence and encouragement from the teacher. These sentiments are echoed by Borich (1992) who points out that teachers can use these motivators to personalize teaching thus motivating students to learn. Alderman (1990) also, notes that linking success to one’s effort is critical for the development of motivation in students. This indicates that teachers are responsible for students’ performance and therefore, should make an effort to acquire a sound understanding of some techniques that can motivate students. It is therefore fundamental that students are motivated to maximize the efforts in mathematics. This study was set out to find out motivational techniques that are likely to enhance adaptation to mathematics learning techniques in secondary schools.
Bessom (1980) on his comment about an effective teacher, points out that those teachers need not assume that their acceptance of the roles and duties relating to teaching will evoke automatic acceptance by the learners of their role as teachers. Teachers therefore, need to motivate their learners so that they are encouraged to participate in the teaching and learning process. Thus, for learners to adapt to mathematics learning techniques, teachers’ teaching methods need to encourage students to feel free to express their feelings and ideas during the teaching-learning process. Whether the teachers of mathematics in Bungoma south District do this or not was subject to exploration by the study.

2.6 Resources in Teaching of Mathematics

Sidhu (1991) pointed out that most students regard mathematics as “a dry” and difficult subject. This has led to students taking little interest in mathematics and hence the use of appropriate instructional resources at every step is very crucial. This means the subject can be” softened” when appropriate instructional resources are used during the lesson. The use of resources gives rise to certain teaching and learning techniques that enhance students’ learning of mathematics. Such techniques may include illustrations using a diagram, analysis of mathematical structures or reading text questions. This means that mathematics teachers should be adequately informed of new instructional materials as well as their roles and how to incorporate them in their lessons. Whether the teachers of mathematics in Bungoma South District used resources or not was subject to exploration by the study.
Instructional resources need to be relevant in order to complete and enrich the teaching and learning process. This is because instructional aids may be inadequate or unsuitable in engaging the learners in teaching and learning process. Some studies (Riungu, 1988 and Kirembu, 1991) have revealed that in cases where instructional resources such as textbooks were adequate and combined with other teaching aids, students interacted better in the teaching and learning process and hence performed better in mathematics. This study intended to establish how the instructional resources used during the lesson, enhanced learners’ adaptation to mathematics learning techniques.

2.8 Chapter Summary

This chapter has provided the literature review on the factors that can influence adaptation to mathematics learning techniques in secondary schools. The researcher has discussed teacher-related, student-related and school-related factors. The findings of this study are likely to enrich the existing field of mathematics education. This is because the study focused on issues relating to mathematics learning as possible challenges facing students in secondary schools. Other researchers have studied factors such as attitudes of teachers and students, teaching methods, teaching resources, assessment and study habits. However, their focus has been on how these factors affect performance of students in mathematics but not their adaptation to mathematics teaching and learning in secondary schools.
CHAPTER THREE

METHODOLOGY

3.0 Introduction

This study explored challenges that were considered likely to influence students in adapting to mathematics learning in secondary schools. Specifically, the study investigated students-related factors such as attitudes, study habits and frequencies used in practicing mathematical skills. These factors were considered in relation to student’s ability to adapt to mathematics learning in secondary school. The main teacher-related factors that were investigated in the study were teaching methods and attitudes. The study sought to find out how secondary school mathematics teachers make learners adaptable to mathematics learning in secondary schools. This chapter, therefore, discusses the processes undertaken to achieve the goal of study by considering the design and methods used in the study.

3.1 Study Design

The study design selected was cross-sectional descriptive survey method. This method was chosen because it enables one to describe and interpret what prevails, or conditions and relationships as they are with the intent of employing data to justify current conditions and practices or improve them (Koul, 1984). The design was appropriate because it enabled the researcher to obtain students’ and teachers’ opinion about mathematics learning in secondary school. This method also enables the researcher to
obtain quantitative data regarding adaptation to mathematics learning in secondary schools. The study was carried out in four stages as follows:

- Stage one included the preparation of the proposal and development of research instruments.
- Stage two was piloting of the research instruments so that they could be improved and validated.
- Stage three involved the actual data collection from the sampled secondary schools in Bungoma South District using validated instruments.
- The last stage was concerned with the analysis of the data collected from which conclusions and recommendations were made. These stages are summarized in Figure 3.1
The Problem Formulation

Target Population
- Mathematics teachers and their students in Bungoma South District

Sample Selection Techniques
- Random sampling
- Purposive Sampling

Sample

Respondents
Selected forms 2 and 3 mathematics teachers and their students from stratified randomly selected secondary schools in Bungoma South District.

Piloting

Data Collection

Data Analysis

Presentation of Data, Conclusion and Recommendations

Development of instruments
- MTQ
- MSQ

Revised Instruments

Source: Adapted from Cohen & Manion (1994)
3.2 Location of the Study

The study was conducted in Bungoma South District, Western Province of Kenya. The choice of the district was determined by familiarity of the locality, which made it easy to develop immediate rapport with the respondents, hence making data collection less cumbersome. Singleton (1993) stated that the ideal setting is one that is related to the researchers’ interest, easily accessible and that which allows the development of immediate rapport. Further it was chosen for research because of its poor performance in mathematics at KCSE in western province as shown in Table 1.2 of this report.

3.3 Target Population

According to the Ministry of Education (MoE) records for the year 2008 shows that there are 49 secondary schools in Bungoma South District. In this study, the researcher collected data from two levels, students in form two and form three and mathematics teachers in secondary schools Bungoma South District. In the first level, the target population comprised students who were drawn from the 49 secondary schools in the district.

3.4 Sampling Techniques

Sample units
In this study, the main sources of information regarding teaching and learning of mathematics were considered to be:

i. Forms 2 and 3 mathematics students were chosen because they were considered to have settled down and adapted to and formed attitudes towards mathematics
teaching and learning in secondary schools. Form 1 students had just been in
school for one month and one of the major considerations affecting adaptation to
mathematics teaching and learning being students’ attitude towards mathematics
and their teachers, the researcher reasonably assumed that their attitude was still
in formation. Form 4 mathematics students were not chosen because they were
preparing for KCSE examination therefore their learning geared towards passing
examination.

ii. Public and private secondary schools in Bungoma south district.

iii. Secondary school mathematics teachers in sampled schools and classes. A
mathematics teacher is instrumental to the implementation of the school
mathematics curriculum and accountable to the students’ different learning
techniques of the subject in secondary school. The teaching techniques they use,
their attitudes are important for effective teaching and understanding of the
mathematics.

**Sampling Techniques**

The challenges facing students in adapting to mathematics learning in secondary schools
vary with school, students and teachers characteristics. The schools were first stratified
into two groups; good performing and poor performing schools. The sample schools
were selected using “lucky-dip” type of simple random sampling technique from each
stratum to avoid any bias.
The selection of mathematics teachers followed the purposive sampling. This is because the study’s focus was on forms 2 and 3 mathematics teachers only. Cohen and Manion (1989) pointed out that although purposive sampling techniques yields a non-profitable sample, it is usefully acceptable in empirical surveys. Only one stream per form (class) was randomly chosen from sample schools with more than one stream.

The sample for students was selected using random sampling technique. The names of the pupils in each class register were written each on a piece of paper. The papers were folded and shaken in a closed container from which the required number in each school was picked. This allowed every student in forms 2 and 3 in each sample school a chance of being selected as a respondent.

**Sample size**

The sample comprised 10 secondary schools. This was about 20% of the total population of the secondary schools in Bungoma South District. Ary et.al (1972) observes that in descriptive research, 10% to 20% of the total population is acceptable. Therefore, 10 (about 20%) secondary schools were selected for the purpose of this study. From each school, 20 pupils were randomly chosen for the study. Two mathematics teachers in each sampled schools filled the questionnaire. At total of 20 teachers and 200 students filled the MTQ and MSQ respectively. The distribution in number for actual data collection is shown in Table 3.1
### Table 3.2: Sampling Grid

<table>
<thead>
<tr>
<th>School Category</th>
<th>Number of schools</th>
<th>Sample schools</th>
<th>Sample students</th>
<th>Sample Teachers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good performing</td>
<td>13</td>
<td>3</td>
<td>60</td>
<td>6</td>
</tr>
<tr>
<td>Poor performing</td>
<td>36</td>
<td>7</td>
<td>140</td>
<td>14</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>49</strong></td>
<td><strong>10</strong></td>
<td><strong>200</strong></td>
<td><strong>20</strong></td>
</tr>
</tbody>
</table>

#### 3.5 Research Instruments

Data were collected using the following instruments:

**a) Mathematics Teachers’ Questionnaire (MTQ)**

It was designed to find out the factors which the teachers felt influence learners’ adaptation to mathematics learning techniques in secondary schools. It was also used to provide information about resources, learning activities, attitude, teaching methods and mode of assessment.

**b) Mathematics Students’ Questionnaire (MSQ)**

This was designed to establish students-related factors that influence adaptation to mathematics learning techniques in secondary schools. The information collected was on students’ attitude towards the teacher and subject and study habits/styles.

#### Validity and Reliability of the Instrument

**a) Validity**

The validity of the questionnaires was determined by presenting them to the research experts in the Department of Educational Communication and Technology at Kenyatta university whose comments were and suggestions were used to revise the instruments.
b) Reliability

The researcher determined reliability coefficient of all instruments after piloting using the Cronbach Coefficient Formula. Thus;

\[ \alpha = \frac{n}{n-1} \left[ 1 - \frac{\sum s^2}{\delta^2} \right] \]

Where \( \alpha \) = reliability coefficient

\( n \) = number of items in the tool

\( \delta^2 \) = variance in the obtained test scores

\( \sum s^2 \) = sum of the variance of the single items

The coefficient formula is appropriate since the tools have non-dichotomous scores. A reliability coefficient 0.8 was obtained.

3.6 Data Collection Procedure
Data for the study were gathered in two stages; the pilot study and main study.

3.6.1 Pilot Study
A pilot study was carried out in two secondary (one poor performing and a good performing school) that were not included in the main study. The objectives of the pilot study were:

i. To establish the clarity, meaning and comprehensibility of each item in the tools

ii. To validate the instruments by cross checking their validity and reliability

iii. To gain basic administrative experience in conducting the research in preparation for the actual study
The data collected at this stage were analyzed and the results used for appropriate modification of the instruments.

3.6.2 Main study
The actual administration of research instruments and data collection required the researcher to make at least two visits to each of the schools selected for the study. This helped to win the confidence of the school authorities by establishing a good rapport. Mathematics teachers filled the MTQ. The MSQ were administered to the students with assistance of the mathematics teachers.

3.7 Variables
The main dependent variable was mathematics learning techniques resulting from interaction of various factors related to teachers, students, school and syllabus content. The following were independent variable;

i. Teacher-related variables
The variables included preferred teaching techniques, attitude towards; a) student, b) teaching, c) mathematics and learning activities.

ii. Student-related variables
The students’ related variables included were: attitude towards the subject and the teacher, interests to learning activities and preferred study styles.

iii. School-related variables
The variables included: availability, suitability and adequacy of instructional resources; adequacy of qualified mathematics teachers and curriculum implementation. Attention
was given to only those used during the teaching and learning process to enhance adaptation to mathematics learning.

3.8 Methods of Data Analysis

The data collected was coded and analyzed using descriptive statistics. This involved presentation of statistical data in form of frequency distribution tables, whose explanations were mainly descriptive. Items from questionnaires were arranged according to individual research objectives. In particular, the frequency of assessment and motivational techniques were analyzed using frequency distribution tables, computation of percentage and mean scores. Percentages have a considerate advantage over more complex statistics because they are easy to interpret (Peil, 1995).

To analyze the attitude of students towards mathematics as well the teachers’ attitude towards learners of mathematics, frequencies, and percentages and mean scores were calculated and presented in frequency distribution tables. Again, explanations were mainly descriptive. The information obtained from the analysis was discussed and this aided in the drawing of conclusions.

3.9 Ethical Considerations

The researcher got a letter of introduction from the Dean, Graduate School Kenyatta University then permission was sought from the ministry of education before any data collection. During the visits to each school, permission was sought from the principal before involving the teachers and students. The consent of both the teacher and the
students was sought before being given questionnaires to fill. The researcher also established a good rapport with the teachers and their respective Forms 2 and 3 students. They were assured that the information would be treated confidentially and used only for the purpose of the study.

3.10 Chapter Summary

This chapter has discussed the methodology that was used including the variables, research design, the target population, the sampling techniques, the computation of the sample size, the validity and reliability of the research, data collection techniques, data analysis and logistical and ethical considerations. Data collected by the MTQ and MSQ were appropriate and usable, therefore analyzed and presented Chapter four.
CHAPTER FOUR

DATA ANALYSIS, PRESENTATION AND DISCUSSION

4.0 Introduction
This study focused on challenges facing students in adapting to mathematics learning in secondary schools. This chapter presents data analysis, presentation and discussions are presented. It contains descriptive statistics such as percentages, frequency distributions and mean scores. Each analysis is followed by the interpretation and then discussion. This chapter is subdivided into six sections focusing on the following:

i. Demographic data of the respondents
ii. Students’ study habits in secondary schools
iii. Assessment techniques in use in secondary schools
iv. Teaching methods in use in secondary schools
v. Students attitude towards mathematics in secondary schools
vi. Teachers’ attitude towards learners of mathematics in secondary schools

4.1 Demographic Data of the Respondents

Teachers’ Demographic Data and Teaching Information
Teachers’ training is vital in secondary schools. This is because such teachers face many situations during the lessons that they need to handle with some level of professionalism. They are also likely to think about the mathematics lessons and best methods to teach any given content in order to enhance students’ understanding. The researcher sought to establish the teachers’ highest academic qualification. Figure 4.1 presents this information.
Figure 4.1: Teachers’ Highest Academic Qualification

Figure 4.1 shows that all the teachers sampled were professionally qualified, 65% holding Bachelor of Education degree qualifications and 35% holding Diploma in Education. As pointed out by Gitonga (1990), the potential of an education system is directly related to the ability of its teachers. This shows that the sampled teachers were all qualified and trained to effectively implement the curriculum. They are expected to be receptive and flexible classroom teachers. The researcher further asked teachers questions about their teaching experience and the classes they teach. Table 4.1 gives a summary of the responses.
Table 4.1: Teachers’ Teaching Experience and Forms

<table>
<thead>
<tr>
<th>Teaching Experience</th>
<th>Form 1</th>
<th>Form 1&amp;2</th>
<th>Form 3&amp;4</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-3 years</td>
<td>4</td>
<td>1</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>4-5 years</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>6-9 years</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>10 Years and above</td>
<td>0</td>
<td>0</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Total</td>
<td>6</td>
<td>2</td>
<td>13</td>
<td>20</td>
</tr>
</tbody>
</table>

Table 4.1 shows that 13 out of 20 of the teachers surveyed with teaching experience of 4 years and above teach forms 3 and 4 while the rest teach form 1 and 2. Teachers with many years of teaching have knowledge on how student study and therefore are thought to induct their students properly. This implies that such teachers would think about mathematics teaching and learning and make learners adaptable to the process. However, these results indicate that majority (65%) of these teachers prefer teaching senior classes (forms 3 and 4) yet a strong foundation in mathematics teaching and learning in secondary schools need to be inculcated in lower classes (forms 1 and 2). This view is supported by Brophy (1990) who noted that effective pedagogy is largely dependent on deep knowledge of the content to be learned to enable teachers run lively and effective mathematics discussions. In such situations, teachers with deep knowledge of the content and how students learn can respond to and build on students’ ideas, provide timely and appropriate feedback. Thus, there is need for teachers with many years of teaching to teach forms 1 and 2 because they are assumed to have a deep understanding of the content and how students learn it.
4.2.2 Students’ Demographic Data

The researcher also sought to establish the gender of the students included in the study. This information is presented in figure 4.2.

Figure 4.2 shows 58% male students and 42% female students were included in the study.

4.2 Students’ Study Habits

Students’ study habits were looked at as a way of determining how students study in secondary schools. The researcher suggested ten possible ways that students study mathematics in secondary schools. The students were to indicate their opinion using a likert scale of Strongly Agree→Strongly Disagree. The mean score for every technique was calculated. A score below three (3) was viewed as an indication of agreement with the stated technique while a score above three (3) was viewed as a disagreement with the
stated technique. A score of three (3) was viewed as neither agreeing nor disagreeing with the given technique. Table 4.2 presents the summary of the results.

<table>
<thead>
<tr>
<th>Study habits</th>
<th>Percent (n=200)</th>
<th>Mean score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequently doing mathematics problems in class</td>
<td>71.0</td>
<td>11.0</td>
</tr>
<tr>
<td>Consulting teacher for guidance</td>
<td>26.5</td>
<td>14.5</td>
</tr>
<tr>
<td>Participating actively in mathematics lessons by asking questions, answering, solving problems</td>
<td>43.0</td>
<td>9.0</td>
</tr>
<tr>
<td>Solving other mathematical sums apart from those given in class</td>
<td>77.0</td>
<td>0.5</td>
</tr>
<tr>
<td>Solving mathematics problems quicker when discussing them with your peers</td>
<td>92.5</td>
<td>2.0</td>
</tr>
<tr>
<td>Enjoy doing exercises and homework</td>
<td>12.0</td>
<td>5.0</td>
</tr>
<tr>
<td>Doing self-assessment frequently</td>
<td>19.5</td>
<td>11.0</td>
</tr>
<tr>
<td>Understanding mathematics better when my teacher uses teaching aids</td>
<td>74.5</td>
<td>10.5</td>
</tr>
<tr>
<td>Asking oneself questions about statements in the textbooks</td>
<td>22.0</td>
<td>9.0</td>
</tr>
<tr>
<td>Having a study timetable for mathematics</td>
<td>21.0</td>
<td>7.5</td>
</tr>
</tbody>
</table>

From Table 4.2, the highest frequency reflected by the highest mean score (M=4.050) corresponds to the statement that students enjoy doing homework and exercises. 83% of students disagreed with the statement that they enjoy doing exercises and homework. A further 69% of students noted that they did ask themselves questions about statements in the textbook. Another 69.5% of learners indicated that they do not do self-assessment frequently while 71.5% did not have a study timetable for mathematics. Again, 59% of
students did not consult their teachers for guidance with another 48.5% stating that they did not participate actively in mathematics lessons by asking questions, answering and solving problems. This implies that there is need to encourage teacher-learner interaction for the better understanding. However, about 51.5% of the students agreed that they participate actively in mathematics lessons by asking questions, answering and solving problems. Another 77% agreed that they solve other mathematical sums apart from those given in class. This shows that the students do extra work that should enhance their understanding. Majority (92.5%) of students also agreed that they solve mathematics problems quicker when they discuss them with peers.

These results point at the view by Cohen (1976) who emphasizes that collaborative effort by learners allow problem solving to continue when an individual member encounters a difficult situation. This implies that teachers need to provide external monitoring for individuals in a group leading to a less restrictive social environment in which students are enabled to pursue various mathematical ideas and techniques. Similarly, Askew, Brown, Rhodes, Johnson & William (1997) and Martin, Mullis, Gregory, Hoyle & Shen (2000) pointed out that opportunity to learn mathematics effectively is dependent upon a wide range of factors, but among the most important are those which are related to activities and practices within the classroom. This indicates that teachers need to use teaching methods that enhance interaction among learners in the classroom.
Teachers also suggested the techniques they thought their students used to study mathematics in secondary schools. Table 4.3 summarizes these responses.

**Figure 4.3: Teachers’ views about their students’ study habits**

Figure 4.3 shows that 30% of the teachers indicated that their students study through discussions, presentations and personal reading. Another 30% stated that the students study through question-answer method and a further 60% indicated that students study through discussions with peers. These responses still emphasize the need for teachers to employ collaborative teaching since many students prefer studying in groups.
4.3 Teaching methods in use in teaching mathematics

The main objective of teaching is learning. Teaching, therefore, should produce at least observable changes in the student in form of performance at the end of each concept. This study sought to establish teaching methods used by teachers in secondary schools. The researcher suggested eight (8) methods that are applicable when teaching mathematics in secondary. Figure 4.4 presents summaries of the teachers’ response.

The results in Figure 4.4 show that 85% of the teachers surveyed used lecture method with only 50% using pair and group discussions. A further 30% used class discussions.
with another 35% using the discovery method. However, most teachers of mathematics did not use the other methods as indicated. In particular, 85% of the teachers did not use field trips, 95% did not use question and example. These methods are also very important in enhancing students’ performance in mathematics. Similarly, 85% did not encourage students demonstrating to each other and a further 85% did not employ teacher assisting individual student method.

It is important to note that effective teaching requires knowing and understanding mathematics students and pedagogical strategies since students learn mathematics through experiencing what teachers provide. Consequently, the learning techniques developed by students depend on the teaching methods employed by teachers. As noted by Centre for Curriculum Studies in Africa (1987), no particular teaching-learning strategy gives optimum learning conditions to all students. This implies that teachers need to combine more than one teaching method to enhance learners’ understanding. In connection to this, the researcher sought to establish from the teachers whether there are times they use more than one method in the same lesson. All the teachers surveyed indicated that there are times they use more that one method. Table 4.4 is presents the information on how the sampled teachers combined the methods.
The information in Table 4.3 shows that 40% teachers gave questions; students did individual work before engaging them in class discussion. 30% of teachers surveyed taught the whole class then gave an exercise that was done in groups. A further 85% used lecture, example and questioning technique and another 35% of teachers used lecturing and students demonstrating to each other method. The purpose of teaching is learning, therefore, students develop certain study habits depending on the teaching method used by their teachers.

Sidhu (1991) argued that it would be impossible to adapt to extreme form of expository or heuristic methods. This is because extremes are either teacher-centered or learner-centred thus the need to strike a balance between the two strategies. In relation to this, the teachers were asked to indicate with reasons the teaching methods that were thought to enhance adaptation to mathematics teaching and learning in secondary schools. This information is presented is presented in Figure 4.5
Table 4.5 shows 60% of mathematics teachers felt that students demonstrating to each other if used during teaching are likely to enhance students’ adaptation to mathematics learning techniques. Few (35%) teachers indicated lecture method, 40% cited small group discussion and 35% indicated that teacher assisting individual student could enhance learning. As noted earlier, most teachers (85%) used lecture method when teaching yet very few of them thought the technique enhances students’ adaptation to mathematics learning techniques. This, partly, could be possible challenge students may
be facing in adapting to mathematics learning and consequently poor performance in mathematics examinations in KCSE.

Teacher who suggested lecturing method stated that a lot of content covered within a short time while those who cited small group instruction said students feel free to discuss in group and enables the teacher to focus on the learner. Teachers also noted that students learn to express themselves while asking or answering questions thus gaining confidence when they demonstrate to each other in class. Teachers who suggested teacher assisting individual student noted that weak students are identified and assisted when this method is employed. In addition, it was noted that in this method, the teacher is able to identify and correct misconceptions as well as learners building confidence and trust in their teachers. Teachers were further asked to give some of the challenges they face as mathematics teachers when teaching mathematics in their schools and suggest possible solutions. Their responses are summarized in Table 4.9

<table>
<thead>
<tr>
<th>Challenge</th>
<th>Percent (n=20)</th>
<th>Possible solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of proper revision on what is taught</td>
<td>55</td>
<td>- Need to give frequent assessment to keep students on their toes throughout the term</td>
</tr>
<tr>
<td>Students lack concentration and therefore take time to understand concepts</td>
<td>65</td>
<td>- Need for individual attention</td>
</tr>
</tbody>
</table>
The belief that mathematics is difficult and boring 45 • Need to make mathematics teaching interesting and enjoyable
Coping with students’ different attitudes 30 • Need to develop positive attitude

From Table 4.4 gives challenges that teachers face while teaching mathematics. These can be classified into two categories. The first category consists of; students’ lack of proper revision on the concept taught (55%), lack of concentration, and therefore take time to understand concepts (65%). This category points at the study habits that learners may have developed. The second category consists of; the belief that mathematics is difficult (45%) and coping with different attitudes (30%). These unstable traits can be controlled both externally and internally. Students may develop negative attitude due to frustrations from teaching techniques used by teachers, the curriculum or even parents. As stated by Orton (1987), some students are blamed for having negative attitude towards mathematics yet most of them are not motivated to change that attitude. Therefore, all the people concerned especially teachers need to help students to develop positive attitude if their performance in mathematics is to be enhanced.

**4.4 Assessment techniques in use in secondary schools**

The researcher also sought to establish the teachers’ reasons for assessing their students. Teachers of mathematics in the sample gave reasons for assessing their students. Table 4.5 presents a summary of this information.

<table>
<thead>
<tr>
<th>Reasons for assessing</th>
<th>Percent (n=20)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>
Determining who needs individual attention: 30% 70%
Integral part of teaching and learning: 70% 30%
Judging teaching effectively: 25% 75%
Finding out pupils, mastery of content and skill: 55% 45%
Preparing students for external exams: 70% 30%
Ranking students: 65% 35%
Encouraging students to learn: 40% 60%
Determining learners entry behavior: 20% 80%
Predicting the courses that students will take: 30% 70%

Table 4.5 shows that majority (70%) of the teachers surveyed indicated that they assess for continuous assessment as part of teaching and learning. On determining learners’ readiness for a topic, 70% of the teachers indicated that it was not a reason for assessing. This implies that majority (70%) of teachers surveyed mainly take assessment as a teaching routine. Only 25% of the teachers indicated that they assess students in order to judge teaching effectively. These results contradicts the view by Davies (2004) who points out that assessment should illustrate the partnership that exists between teaching and learning processes rather than collecting data on performance. Such emphasis on assessment keeps the students in formed about the learning objectives they are working towards. This depicts the stress put on assessment and shows that teachers do not give assessment the adequate emphasis it deserves.

A further 55% however indicated that they assess their learners to find out students’ mastery of the content while 70% of the teachers indicated that they assess students to prepare them for external examinations with another 65% stating that they assess students to rank them. 60% of the teachers did not consider encouraging students to learn it as a reason for assessment. Similarly, besides assessing their students for various reasons, 30% of the teachers also assessed to predict the courses their students will take...
in future whereas a majority (70%) does not. These shows the concern teachers have for their students even after formal schooling that translates to the need to shape up their students’ abilities. This could be done by properly inducting them in mathematics learning techniques at each class level to improve performance. Thus, there is need for teachers of mathematics to have concern for their students if the students are to overcome challenges they face in adapting to mathematics learning techniques in secondary school. Teachers’ realization of the fundamental reasons of assessment may achieve this.

The researcher also sought to establish the methods employed by teachers when assessing their students during the teaching process. Table 4.6 summarizes this information.

<table>
<thead>
<tr>
<th>How teachers assess during teaching</th>
<th>Percent (n=20)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All students do supervised exercise during the lesson</td>
<td>Yes</td>
</tr>
<tr>
<td>All students are given the same assignment</td>
<td>80</td>
</tr>
<tr>
<td>Giving challenging questions to brighter students</td>
<td>50</td>
</tr>
<tr>
<td>Giving extra lessons to weaker students</td>
<td>35</td>
</tr>
<tr>
<td>Marking all assignments done by my students</td>
<td>10</td>
</tr>
<tr>
<td>Marking all assignments done by my students</td>
<td>10</td>
</tr>
</tbody>
</table>
Table 4.6 shows that 80% of teachers indicated that all students do supervised exercise during the lesson, a further 50% of them stating that all their students are given the same assignment. This implies that only 50% of the teachers surveyed take into consideration the mixed ability of the students.

Similarly, only 35% of the teachers sampled give extra lessons to weaker students while all the teachers indicating that they do not give extra lessons to weaker students. This could be a possible challenge to weak students because they need to develop learning techniques that would enhance their understanding. In addition, 90% of teachers indicated that they do not mark all assignments done by their student. This implies that students do not get adequate feedback on their learning. However, as noted by Burns et al (n.d) suggestion that formative assessment immediate evidence of student learning and used to help improve the quality of instruction and monitor progress in achieving learning outcomes. Notably, homework also falls into this category of formative assessment because it typically supports learning. Thus, teachers need to develop assessment methods that would provide constant feedback as well as cater for mixed abilities of their students.

In addition, the researcher also sought to establish the frequency of assessment in mathematics during teaching process. Five techniques commonly used in assessment
of mathematics were listed and teachers indicated the frequency of use for each technique in assessing their students. Table 4.7 presents this information.

Table 4.7: Assessment techniques in use

<table>
<thead>
<tr>
<th>Assessment technique</th>
<th>Daily</th>
<th>Weekly</th>
<th>Monthly</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Written tests</td>
<td>15</td>
<td>15</td>
<td>70</td>
<td>100</td>
</tr>
<tr>
<td>Manipulation of objects</td>
<td>0</td>
<td>0</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Making models</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Oral communication</td>
<td>0</td>
<td>0</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Homework</td>
<td>85</td>
<td>15</td>
<td>0</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 4.7 shows that written tests and homework are the techniques used most (by all the teachers surveyed). The most frequently used technique is homework with 85% of the sampled teachers using it daily and the rest weekly. Though most teachers used written tests in assessing their students, most of them used it monthly (70%) while only 30% (by adding weekly and daily percentages) used it more frequently. Assessment using written tests done monthly may not be sufficient to diagnose students’ weakness. Again, these commonly used techniques of written tests and homework mainly assess the acquisition of knowledge and facts, which though useful are not sufficient for good learning of mathematics.

The least frequently used techniques are manipulation of objects and oral communication done it is monthly by 15% and 30% of the teachers respectively. This implies that teachers were aware of the need to use a variety of techniques of assessment. Davies (2004) also noted that assessment involves multiple techniques including written, oral and demonstration formats as well as group and class activities.
Despite the fact that teachers use most of the assessment techniques suggested, the frequencies are not sufficient. The frequencies of these techniques could significantly influence the learners’ adaptation to mathematics learning. However, this generalization may be true for all cases if most teachers assess their students as frequently as possible.

4.5 Students’ attitude towards mathematics in secondary schools

The researcher also sought to establish the students’ attitude towards mathematics on a 5-point likert scale. The respondents were expected to indicate their opinion using a likert scale of Strongly Agree – Strongly Disagree. The mean score for every technique was calculated. A score below three (3) was viewed as an indication of agreement with the statement while a score above three (3) was viewed as a disagreement with the statement. A score of three (3) was viewed as neither agreeing nor disagreeing with the given technique. Table 4.8 presents the frequencies and equivalent mean scores for the students’ feelings.

<table>
<thead>
<tr>
<th>Students’ Feelings</th>
<th>Agreeing</th>
<th>Undecided</th>
<th>Disagreeing</th>
<th>Mean score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Always looking forward to mathematics lessons</td>
<td>88.0</td>
<td>7.0</td>
<td>5.0</td>
<td>1.755</td>
</tr>
<tr>
<td>Learning mathematics is interesting and fun</td>
<td>24.5</td>
<td>5.0</td>
<td>70.5</td>
<td>3.760</td>
</tr>
<tr>
<td>Mathematics word problems are related to activities in the environment</td>
<td>23.5</td>
<td>9.5</td>
<td>67.0</td>
<td>3.750</td>
</tr>
</tbody>
</table>
Mathematics helps to think, reason and make good decisions 75.0 5.5 19.5 2.165
Mathematics only requires memorization of formulae without understanding 18.0 2.5 79.5 3.705
I study mathematics because it is useful, important and relevant in my daily life 1.1 2.5 96.0 4.645
Enjoying learning mathematics 14.0 5.4 80.6 4.060
Mathematics is a dull subject 15.0 5.5 79.5 4.215

From Table 4.8, a majority (88%) of students indicated that they look forward to mathematics lessons with another 75% of students stating that mathematics helps them reason and make good decisions. A further 79.5% of students stated that mathematics did not only require memorization of formulae without understanding. These results indicate a positive attitude students have towards mathematics that could enhance their understanding.

However, 80.6% of students stated that they did not enjoy learning mathematics while 70.5% noted that learning mathematics was not interesting and fun to them. The highest frequency reflected by the highest mean score (m = 4.645) corresponds to the students’ feeling that they study mathematics because it is useful, important and relevant in daily life; 96% of the students disagreed with this statement. Again, 67% of students noted that mathematics problems are not related to activities in the environment, which has a mean score above 3 out of 5. Although the results indicate that students have positive attitude towards mathematics, majority (80.6%) do not enjoy learning mathematics.
Students’ adaptation to mathematics learning in secondary schools could probably ensure that learners enjoy learning mathematics.

This study contended that students will not be motivated to learn if teachers do not provide a conducive environment. The researcher suggested seventeen possible methods of either motivating or de-motivating students. These techniques were divided into two, which is, 10 were positive views and 7 were negative views techniques. Students were to indicate whether their teachers used these techniques bases on three point likert scale. Table 4.14A and 4.14B presents a summary of their responses.

<table>
<thead>
<tr>
<th>Students views about my teacher</th>
<th>Percent (n=200)</th>
<th></th>
<th></th>
<th>Mean score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explains the work well and sometimes repeats where if is not clear</td>
<td>8.5</td>
<td>1.5</td>
<td>65</td>
<td>2.565</td>
</tr>
<tr>
<td>Answers questions in class thoroughly</td>
<td>5</td>
<td>27</td>
<td>68</td>
<td>2.130</td>
</tr>
<tr>
<td>Knows the content very well</td>
<td>14</td>
<td>21.5</td>
<td>64.5</td>
<td>2.505</td>
</tr>
</tbody>
</table>
Table 4.9A shows that, most students view almost all their teachers’ teaching techniques positively. However, several students agreed that their teachers did not mark and return their homework the next day, which had the lowest mean score of 1.4 out of 3. This was also noted earlier in this discussion where only 10% of teachers marked students’ assignment regularly. In particular, 64.5% of students felt that their teachers always knew the content well and 65% felt that they always explained the work well and sometimes repeat if not clear. This shows that most of the teachers have a mastery of content.

Furthermore, 68% of students felt that their teachers always answered their questions thoroughly in class and 64% felt that their teachers were always organized when teaching. Similarly, 51% felt that their teachers always taught them how to study while, 53% felt that their teachers always taught them how to answer mathematics questions. Finally, 57.5% of students agreed that their teachers sometimes meet them outside class

<table>
<thead>
<tr>
<th>Activity</th>
<th>Mean</th>
<th>Median</th>
<th>SD</th>
<th>Mean Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gives homework, marks and returns the next day</td>
<td>65</td>
<td>30</td>
<td>5</td>
<td>1.400</td>
</tr>
<tr>
<td>Arranges to meet students outside class to discuss</td>
<td>19</td>
<td>57.5</td>
<td>23.5</td>
<td>1.660</td>
</tr>
<tr>
<td>mathematics problems</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Encourages me to participate in mathematics lessons</td>
<td>25.5</td>
<td>16</td>
<td>58.5</td>
<td>2.380</td>
</tr>
<tr>
<td>Always organized when teaching</td>
<td>14.5</td>
<td>21.5</td>
<td>62</td>
<td>2.495</td>
</tr>
<tr>
<td>Teaches me how to study mathematics</td>
<td>22</td>
<td>27</td>
<td>51</td>
<td>2.290</td>
</tr>
<tr>
<td>Teaches me how to answer mathematics questions</td>
<td>22</td>
<td>25</td>
<td>53</td>
<td>2.310</td>
</tr>
<tr>
<td>Arranges to have homework revised</td>
<td>23</td>
<td>32</td>
<td>38</td>
<td>2.150</td>
</tr>
</tbody>
</table>
to discuss sums. On the contrary, only 19% agreed that their teachers always did the same.

Likewise, Table 4.9A indicates that 30% of students noted that their teachers sometimes gave homework, marked books and returned the next day. Those who always arranged to have homework revised were only 23%. However, 65% of students noted that their teachers never gave homework, marked and returned the next day. As noted earlier in this discussion, 85% of the teachers use homework an assessment technique daily. This implies that there is need for teachers to give learners constant feedback by marking their assignments’ more frequently. This is likely to help learners adapt to learning techniques in mathematics. Similarly, some of the negative teaching techniques practiced by teachers are summarized in Table 4.9B

<table>
<thead>
<tr>
<th>Views about mathematics teacher</th>
<th>Never</th>
<th>Sometimes</th>
<th>Always</th>
<th>Mean score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gives too much homework</td>
<td>11.0</td>
<td>49.0</td>
<td>40.0</td>
<td>2.290</td>
</tr>
<tr>
<td>Is against me, does not mark my assignment</td>
<td>13.0</td>
<td>14.5</td>
<td>72.5</td>
<td>2.595</td>
</tr>
<tr>
<td>Is very fast</td>
<td>26.5</td>
<td>27.0</td>
<td>46.5</td>
<td>2.200</td>
</tr>
<tr>
<td>Discourages weak students by ignoring them</td>
<td>30.0</td>
<td>10.0</td>
<td>60.0</td>
<td>2.300</td>
</tr>
<tr>
<td>Concentrates on bright students</td>
<td>30.0</td>
<td>22.5</td>
<td>44.5</td>
<td>2.175</td>
</tr>
<tr>
<td>Responds rudely to students’ questions</td>
<td>25.0</td>
<td>6.0</td>
<td>69.0</td>
<td>2.390</td>
</tr>
</tbody>
</table>
Table 4.9B shows that teachers practice some negative teaching techniques in class. Some of the views noted above are professional problems that need the teachers to evaluate themselves that included teachers being very fast (26.5%). Some of the views in the table show the teachers’ attitude towards students with mixed abilities. They include teachers always concentrating on bright students (44.5%), being against some students or not marking their work (72.5%) and always discouraging weak students by ignoring them (60%).

Teachers also need to interact well with their students in class by allowing them to express themselves. In connection with the above, students were asked about their teachers’ ways of expressing themselves in class. Approximately 55% of students felt that their teachers are always harsh and moody in class and 69% felt that their teachers sometimes respond rudely to students’ questions.

4.6 Teachers’ attitude towards learners of mathematics in secondary schools

The researcher sought to establish the teachers’ attitude towards learners of mathematics on a 5-point likert scale. The respondents were expected to indicate their opinion using a likert scale of Strongly Agree—Strongly Disagree. The mean score for every statement was calculated. A score below three (3) was viewed as an indication of agreement with the stated statement while a score above three (3) was viewed as disagreement with the stated statement. A score of three (3) was viewed as neither agreeing nor disagreeing
with the given technique. Table 4.16 presents the frequencies and mean scores for the teachers’ feelings.

Table 4.10: Teachers’ feelings about their students

<table>
<thead>
<tr>
<th>Teachers’ feelings</th>
<th>Percent (n=20)</th>
<th>Mean Score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Agreeing</td>
<td>UD</td>
</tr>
<tr>
<td>Most students have problems in expressing themselves while asking or answering questions</td>
<td>80</td>
<td>0</td>
</tr>
<tr>
<td>If I were to judge my students, they appear dull and fear mathematics</td>
<td>70</td>
<td>0</td>
</tr>
<tr>
<td>Most of my students are shy to display their solutions on blackboard</td>
<td>65</td>
<td>20</td>
</tr>
<tr>
<td>My students only memorize the formulae without understanding</td>
<td>90</td>
<td>0</td>
</tr>
<tr>
<td>My students are always active during the lesson</td>
<td>65</td>
<td>0</td>
</tr>
<tr>
<td>My students are always ready to learn</td>
<td>30</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 4.10 shows that the highest mean score (M=3.60) corresponds to teachers’ view that the students’ readiness to learn is an indicator of learners’ interest in mathematics. These results indicate that students are not usually prepared or ready to learn. Students’ readiness to learn is an indicator of learners’ interest in mathematics. However, these results point out teachers feel that their students are not usually prepared or ready to learn. This could one of the possible challenges facing learners in adapting to learning techniques in secondary schools is the students’ readiness to learn.

The analysis also reveals that majority (70%) of the teachers feel that their students usually appear dull and fear mathematics. 65% felt that most of their students are shy to
display their solutions on the blackboard while 80% felt that most students have problems in expressing themselves while asking or answering questions. Lack of confidence is one of the main indicators of poor performance in mathematics. This is because low confidence hinders students’ effective participation in the teaching and learning process. This could probably be a possible challenge facing students in adapting to mathematics learning in secondary schools.

The results in Table 4.10 further shows that that only 15% of the teachers agree that their students are always active during mathematics lessons with another 90% agreeing that their students only memorize the formulae without understanding. These results show that the students’ interest in mathematics according to teachers, need to be cultivated. However, as noted in Table 4.10 majority (85%) of teachers surveyed used lecture method with only 50% using pair and group discussions. These sentiments also echoed by Wasiche (2004) who noted that the initial step in encouraging students to like mathematics is to keep them motivated by knowing their external motivators and external motivators such as peer influence and encouragement from the teacher. This implies that approximately, 85% of teachers need to arouse the students’ interest by using a combination of teaching methods that encourage students’ participation.

### 4.7 Chapter Summary

This chapter has presented the findings of the study according as per the research objectives as follows;
1) Students, study habits in secondary schools

Majority (92.5%) of students agreed that they solve mathematical problems quicker when they discuss them with peers, 60% of the teachers indicated that students study through discussions with their peers. However, some students did not consult their teachers for guidance with another 48.5% stating that they did not participate actively in mathematics lessons by asking questions, answering and solving problems. These responses emphasize the need for teachers to employ collaborative teaching since many students prefer studying.

2) Students attitude towards mathematics and their teachers

Majority of students indicated that they look forward to mathematics lessons with another 75% of the students stating that mathematics helps them reason and make good decisions. However, 80.5% did not enjoy learning mathematics with 70.5% noting that learning mathematics was not interesting and fun to them. Most (55%) of the students felt that their teachers are always harsh and moody in class while 69% of the students stated that their teachers sometimes respond rudely to students’ questions.

3) Teaching methods in use in teaching mathematics

Majority (85%) of the teachers surveyed used lecture method with only 50% using pair and group discussions. 30% used class discussions with another 35% using the discovery method. Another 40% of the mathematics teachers felt that students demonstrating to
each other if used during teaching are likely to enhance adaptation to mathematics learning in secondary schools with only 15% of the teachers citing lecture method.

4) Assessment Techniques in use in teaching mathematics

Written tests and homework are the techniques used by all the teachers surveyed. Though teachers used written tests in assessing their students, most of them used it monthly (70%) while only 30% using it weekly and daily. The least frequently used techniques were manipulation of the objects and oral communication which is done monthly 15% and 30% of the teachers respectively.

5) Teachers’ Attitude towards Learners of Mathematics

Most (70%) of the teachers felt that their students usually appear dull and fear mathematics and a further 65% felt that most of their students are shy to display their solutions on the blackboard. Majority (80%) of the teachers felt that most students have problems in expressing themselves while asking or answering questions. Only 15% of the teachers agreed that their students are always active during mathematics lessons with another 90% agreeing that their students only memorize the formulae without understanding. Most of the teachers’ sentiments point at the attitudes that the students may have developed towards mathematics learning.

Chapter five provides the summary of these research findings, conclusions, recommendations of the study and suggestions for further research.
CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

The purpose of this study was to investigate the challenges facing students in adapting to mathematics teaching and learning techniques. This chapter presents a summary of the research findings, conclusions, recommendations of the study and suggestions for further research.
5.1 Summary of Findings

The following is a summary of the findings based on the general research questions of the study.

1) Students’ study habits in secondary schools

Majority (83%) of students disagreed with the statement that they enjoy doing exercises and homework while 69% of students noted that they did ask themselves questions about statements in the textbook. 69.5% of learners indicated that they do not do self-assessment frequently while 71.5% did not have a study timetable for mathematics. A further 59% of students did not consult their teachers for guidance but only 48.5% did not participate actively in mathematics lessons by asking questions, answering and solving problems. 77% agreed that they solve other mathematical sums apart from those given in class while 92.5% of students also agreed that they solve mathematics problems quicker when they discuss them with peers. 60% indicated that students study through discussions with peers. These responses emphasize the need for teachers to employ collaborative teaching since many students prefer studying in groups.

2) Students attitude towards mathematics and their teachers in secondary schools

Majority (88%) of students indicated that they look forward to mathematics lessons with another 75% of students stating that mathematics helps them reason and make good decisions. A further 79.5% of students stated that mathematics did not only require memorization of formulae without understanding. 80.5% of students stated that they did not enjoy learning mathematics while 70.5% noted that learning mathematics was not interesting and fun to them. Similarly, 67% of students noted that mathematics
problems are not related to activities in the environment. Students agreed that their teachers did not mark and return their homework the next day. 64.5% of students felt that their teachers always knew the content well and 65% felt that they always explained the work well and sometimes repeat if not clear.

Most (68%) of students felt that their teachers always answered their questions thoroughly in class and 64% felt that their teachers were always organized when teaching. 51% felt that their teachers always taught them how to study while, 53% felt that their teachers always taught them how to answer mathematics questions. 57.5% of students agreed that their teachers sometimes meet them outside class to discuss sums. On the contrary, only 19% agreed that their teachers always did the same. 30% of students noted that their teachers sometimes gave homework, marked books and returned the next day. Only 23% of the students noted that their teachers always arranged to have homework revised. However, 65% of students noted that their teachers never gave homework, marked and returned the next day. 26.5% teachers are very fast with 44.5% noting that their teachers concentrate on bright students while 60% noted their teacher ignored weak students and further 72.5% indicated that the teachers are against some students or not marking their work. 55% of students felt that their teachers are always harsh and moody in class and 69% felt that their teachers sometimes respond rudely to students’ questions.

3) Teaching methods in use in secondary schools
Majority (85%) of the teachers surveyed used lecture method with only 50% using pair and group discussions. 30% used class discussions with another 35% using the discovery method. Another 85% of the teachers did not use field trips, 95% did not use question and example. 85% did not encourage students demonstrating to each other and a further 85% did not employ teacher assisting individual student method. However, 40% teachers gave questions; students did individual work before engaging them in class discussion. 30% of teachers surveyed taught the whole class then gave an exercise that was done in groups. 40% of mathematics teachers felt that students demonstrating to each other if used during teaching are likely to enhance students’ adaptation to mathematics teaching and learning in secondary schools with only 15% teachers citing lecture method.

Most (55%) of the teachers cited students’ lack of proper revision on the concept taught lack of concentration, and therefore take timing to understand concepts some of the challenges they face. This category points at the study habits that should be developed. A few (30%) of the teachers indicated the need to cope up student’ different attitudes and beliefs as a possible challenge. These unstable traits can be controlled both externally and internally. Students may develop negative attitude due to frustrations from teaching techniques used by teachers, the curriculum or even parents. Therefore, all the people concerned especially teachers need to help students to develop positive attitude if their performance in mathematics is to be enhanced.

4) Assessment techniques in use in secondary schools
Majority (70%) of the teachers surveyed indicated that they assess for continuous assessment as part of teaching and learning while 70% of the teachers indicated that determining students’ entry behavior was not a reason for assessing. Only 25% of the teachers indicated that they assess students in order to judge teaching effectively. This depicts the stress put on assessment and shows that teachers do not give assessment the adequate emphasis it deserves. Most (55%) indicated that they assess their learners to find out students’ mastery of the content while 70% of the teachers indicated that they assess students to prepare them for external examinations with another 65% stating that they assess students to rank them. 60% of the teachers did not consider encouraging students to learn as a reason for assessment. Further, 30% of the teachers also assessed to predict the courses their students will take in future.

On assessing students during the lesson, 80% of teachers indicated that all students do supervised exercise, 50% indicated that all students are given the same assignment. This implies that only 50% of the teachers surveyed take into consideration the mixed ability of the students. Only 35% of the teachers sampled give extra lessons to weaker students while all the teachers indicating that they do not give extra lessons to weaker students. However, 90% of teachers indicated that they do not mark all assignments done by their student. Written tests and homework are the techniques used by all the teachers surveyed. The most frequently used technique is homework with 85% of the sampled teachers using it daily and the rest weekly. Though most teachers used written tests in assessing their students, most of them used it monthly (70%) while only
30% using it weekly and daily. The least frequently used techniques are manipulation of objects and oral communication which is done monthly by 15% and 30% of the teachers respectively.

5) Teachers’ attitude towards learners of mathematics in secondary schools

Most (70%) of the teachers feel that their students usually appear dull and fear mathematics and a further 65% felt that most of their students are shy to display their solutions on the blackboard. 80% felt that most students have problems in expressing themselves while asking or answering questions. Only 15% of the teachers agreed that their students are always active during mathematics lessons with another 90% agreeing that their students only memorize the formulae without understanding. 85% of teachers surveyed used lecture method with only 50% using pair and group discussions. This implies that approximately, 85% of teachers need to arouse the students’ interest by using a combination of teaching methods that encourage students’ participation.

5.2 Conclusion

From the summary of the findings given in section 5.1, it can be concluded that:

1. The findings in this study indicate that most students did not consult their teachers for guidance and did not participate actively in mathematics lessons by asking questions, answering and solving problems. This emphasizes the need for collaborative teaching since most students prefer group discussions as well as individual work.
2. A positive attitude towards mathematics motivates learners to like the subject hence enhancing performance. The findings of this study indicate that students have positive attitude towards mathematics as a subject but indicated that learning mathematics was not interesting and fun to them. This may be partly because the students have not adapted to mathematics learning in secondary schools, which, made them not to enjoy learning the subject.

3. Teachers surveyed agreed that small group instruction, individualized attention and students demonstrating to each other are methods that are likely to enhance mathematics learning in secondary schools. Ironically, teachers felt that lecture method did not enhance students’ adaptation to mathematics learning yet most of them use it frequently during the lessons. This shows that the teaching methods used by most teachers did not enhance adaptation to mathematics learning and this could be partly be a possible challenge facing students.

4. The findings of this study indicate that teachers gave assignments but did not mark them frequently leading to lack of immediate feedback on the part of the students. This probably was partly a challenge on the part of the students since this practice did not enhance adaptation to mathematics learning de to lack of timely and immediate feedback.

5. Teachers practiced both positive and negative teaching habits in class. Positive teaching habits enhanced adaptation to mathematics learning while negative habits de-motivated students leading to poor performance. Specifically, students
felt that their teachers were always harsh and moody in class and sometimes responded rudely to students’ questions thus, de-motivating them.

6. Teachers felt students were not usually prepared or ready to learn mathematics yet students’ readiness to learn is an indicator of learners’ interest in the subject. However, students also pointed out that learning mathematics was not interesting to them. This could partly be because learners have not adapted to mathematics learning in secondary schools. In addition, teachers felt that their students were not confident and this hindered students’ effective participation in the teaching and learning process. However, the study also revealed that majority of teachers sometimes responded rudely to students’ questions and others always appeared harsh and moody and these practices may have de-motivated students leading to lack of confidence.

5.3 Recommendations of the study

Based on the conclusion, the following recommendations are made;

1. Most students did not consult their teachers but agreed that they solve mathematics problems quicker when they discuss them with peers and mainly studied through discussions with peers. There is need to for teachers to encourage teacher-learner and learner-learner interaction to enhance adaptation to mathematics learning in secondary schools. This may be done by use of
teaching methods that enhance interaction among learners and with teachers such as collaborative teaching.

2. Students indicated positive attitude towards mathematics but noted that learning mathematics was not interesting and fun to them. There is need for teachers to develop and maintain positive attitude towards mathematics by ensuring students adapt to mathematics learning mathematics in secondary schools.

3. The findings of this study also show that small group instruction, teachers assisting individual students and students demonstrating to each other were methods that are likely enhance adaptation to mathematics learning techniques in secondary schools. Since the findings of the study indicate that majority of the teachers used lecture method, a combination of this method and the ones suggested above, were likely to enhance adaptation to mathematics learning and consequently improving performance in mathematics.

4. Teachers gave assignments but did not mark them frequently leading to lack of immediate and frequent feedback on the part of the students. Therefore, teachers need to provide immediate feedback by giving assignments, marking and revising to make learners adaptable to mathematics learning in secondary school.

5. It was noted that teachers practice both positive and negative teaching habits in class. There is need for teachers to practice positive teaching habits that enhanced mathematics while avoiding negative habits which, de-motivated students. Students’ readiness to learn is an indicator of learners’ interest in
therefore, for teachers to arouse students’ interest in learning mathematics by creating a friendly and interactive environment. There is need for teachers to develop positive attitude towards their learners to make students adaptable learning mathematics in secondary schools.

5.4 Suggestions for further research

The researcher is of the opinion that further research can be carried out in the following areas:

1) This study can be replicated in other districts in order to give a reflection of the whole country. This will facilitate better decision making on ways of improving teachers’ assessment practice, attitudes and teaching methods for enhancing students’ adaptation to learning techniques in Kenya.

2) A study be done on challenges facing pupils in adapting to mathematics learning in primary schools in Kenya.
REFERENCES


National Council of Teachers of Mathematics (NCTM), 2000


APPENDICES

APPENDIX A

LETTER OF INTRODUCTION

Dear respondent,

My name is Bertha Mating’i Kakai, a student of Kenyatta University undertaking an M.Ed research on the challenges facing students in adapting to mathematics learning in secondary schools in Bungoma South District. This study will benefit Bungoma South District in particular and other districts in the country. Your responses will be treated in strict confidence and your name will not be mentioned in the report.

Thank you

----------------------------------

Bertha Mating’i Kakai

M.Ed Student (Kenyatta University)
APPENDIX B

MATHEMATICS STUDENTS QUESTIONNAIRE (MSQ)
The purpose of this questionnaire was to find out students’ views about mathematics study habits and evaluate teachers’ techniques and habits in the classroom.

INSTRUCTIONS
1. You MUST not write your name anywhere in this questionnaire.
2. The information you give concerning your view about mathematics and your teacher will be confidential, so please respond.
3. The questionnaire consists of three sections. Answer all the questions in each section.
4. Please complete the following questionnaire by answering the questions and placing a tick (√) in the appropriate block (only one block).

SECTION A: General information about the student and school
1. In which form are you?

<table>
<thead>
<tr>
<th>Form</th>
<th>Tick(√)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a Form two</td>
<td></td>
</tr>
<tr>
<td>b Form three</td>
<td></td>
</tr>
</tbody>
</table>

2. Gender: Male [ ] Female [ ]

SECTION B
Your views about mathematics
This section has statements concerning your views about mathematics decide carefully whether you: Strongly Agree (SA)=1; Agree (DA) =2; Undecided (UD)=3; Disagree (A)=4; Strongly Disagree (SD)=5; Put a tick (√) only in one box for each statement. If you make a mistake, put a cross through the marked box and then tick the correct box.
Students’ feelings

<table>
<thead>
<tr>
<th>Statement</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>I always look forward to mathematics lessons</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mathematics is interesting and fun to me</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mathematics problems are related to activities in my environment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mathematics help you to think, reason and make good decisions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mathematics only requires memorization of formulae without understanding</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I study mathematics because it is useful, important and relevant in my daily life</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I enjoy learning mathematics</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teacher relates the contents of mathematics to problems in real life</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mathematics is a dull subject</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. The following are learning techniques that can be used by students to enhance learning of mathematics in secondary schools, show the extent of agreement using the words; Strongly Agree (SA)=1; Agree (DA)=2; Undecided (UD)=3; Disagree (A)=4; Strongly Disagree (SD)=5. Put a tick only in one box for each statement. If you make a mistake, put a cross through the marked box and then tick the correct box.

Study habits

<table>
<thead>
<tr>
<th>Statement</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>I frequently work out mathematics problems on the chalkboard in class</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I consult my teacher for guidance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I undertake mathematics experiments in class</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I enjoy conducting mathematics experiments</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I participate actively in your mathematics lessons by asking questions, answering, solving problems</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I solve other mathematical sums apart from those given in class</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I solve mathematics problems quicker when I discuss them with my peers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I participate actively in class</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I enjoy doing exercises and homework</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I do self-assessment frequently</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I understand mathematics better when my teacher uses teaching aids</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I try to ask myself questions about statements in the textbooks</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I have a study timetable for mathematics</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I consult peers regularly</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
7. Which teaching method do you think can help you **BEST** when learning mathematics?

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Tick(✓)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Teacher telling me</td>
<td></td>
</tr>
<tr>
<td>B Group work</td>
<td></td>
</tr>
<tr>
<td>C Reading and working alone</td>
<td></td>
</tr>
</tbody>
</table>

8. Do you feel free to discuss with your desk mate during mathematics class? (Tick one.)

Yes [   ]       No [   ]

i) If yes, when do you do so? (Pick one.)

a) When teacher permits [   ]

b) When I couldn’t understand [   ]

c) Other (Please specify.) ---------------------------------------------

ii) If no, please state the reason.

--------------------------------------------------------------------------------

**SECTION C**

5. The following statements are views concerning the way your mathematics teacher either motivates or de-motivates you in and outside the class. Place a tick in the appropriate space on the right statement about your mathematics teacher, Rating is as follows: Never=1, Sometimes= 2, Always=3
<table>
<thead>
<tr>
<th>Views about your teacher</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explains the work well and sometimes repeats where if is not clear</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Answers questions in class thoroughly</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knows the content very well</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gives homework, marks and returns the next day</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arranges to meet students outside class to discuss mathematics problems</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Encourages me to participate in mathematics lessons</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Always organized when teaching</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gives too much homework</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is against me, does not mark my assignment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arranges to have homework revised</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is very fast</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discourages weak students by ignoring them</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concentrates on bright students</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Responds rudely to students’ questions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is harsh and moody in class</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Thank you very much for your cooperation.

BERTHA MATING’ I KAKAI
RESEARCHER
APPENDIX C

MATHEMATICS TEACHERS QUESTIONNAIRE

The questionnaire aims at getting your opinion pertaining to mathematics learning techniques of mathematics in secondary schools in Bungoma South District. The information you give IS FOR RESEARCH PURPOSE ONLY. You may not write your name otherwise your identity will remain confidential. Feel free to give opinions in your responses. Please complete the following questionnaire by answering the questions and placing a tick (√) in the appropriate block (only one block). Be honest as much as possible.

PART 1

General information

1. Teachers’ characteristics
   a) Gender: Male ( ) Female ( )
   b) Teachers’ professional qualification

<table>
<thead>
<tr>
<th>Qualification</th>
<th>Tick (√)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Graduate in B.Ed</td>
<td></td>
</tr>
<tr>
<td>B Graduate in B.A or B.Sc With PGDE</td>
<td></td>
</tr>
<tr>
<td>C Graduate in B.A or B.Sc</td>
<td></td>
</tr>
<tr>
<td>D Diploma in Education</td>
<td></td>
</tr>
<tr>
<td>E Others (Specify)</td>
<td></td>
</tr>
</tbody>
</table>

2. How long have you been teaching mathematics in your current school? (tick √ where applicable)
   Between 1-3 years [ ]
   Between 4-5 years [ ]
   Between 6-9 years [ ]
   10 and above years [ ]
3. Which forms do you teach mathematics?

<table>
<thead>
<tr>
<th>Form</th>
<th>Tick (✓)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a Form one</td>
<td></td>
</tr>
<tr>
<td>b Form two</td>
<td></td>
</tr>
<tr>
<td>c Form three</td>
<td></td>
</tr>
<tr>
<td>d Form four</td>
<td></td>
</tr>
</tbody>
</table>

**PART 2**

**Teachers feeling towards students**

5. The following are some of the feelings you may have about your students please indicate how you feel about mathematics teaching in secondary school, show the extent of agreement using the words; Strongly Agree (SA)=1; Agree (DA) =2; Undecided (UD)=3; Disagree (A)=4; Strongly Disagree (SD)=5. Put a tick only in one box for each statement. If you make a mistake, put a cross through the marked box and then tick the correct box.

<table>
<thead>
<tr>
<th>Teachers’ Feelings about students</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>a Most students have problems in expressing themselves while asking or answering questions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b If I were to judge my students, they appear dull and fear mathematics</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c Most of my students are shy to display their solutions on blackboard</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d My students only memorize the formulae without understanding</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e My students are always active during the lesson</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F My students are always ready to learn</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**PART 3**

**Assessment Techniques in mathematics**

The following are possible reasons for assessing your students. Indicate whether you agree or not using the words; Yes and No. Put a tick only in one box for each statement. If you make a mistake, put a cross through the marked box and then tick the correct box.
4. The statements below show how teachers assess their students. Which method(s) is applicable to you.

<table>
<thead>
<tr>
<th>Method of Assessment during the lesson</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>All students do exercise from the class text during each lesson</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All my students are given the same work during each lesson</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I mark all exercises done by my students</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I give extra lessons to weaker students</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I give challenging questions to brighter students</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5. The table below shows various assessment techniques used by teachers. Please indicate against each one the frequency to which you use to assess your students

<table>
<thead>
<tr>
<th>Technique</th>
<th>Daily</th>
<th>Weekly</th>
<th>Monthly</th>
<th>Others(specify)---------</th>
</tr>
</thead>
<tbody>
<tr>
<td>Written</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manipulating objects</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Making models (G-models)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oral communication</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Homework</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
11. Which of the above techniques’ results do you include in your progress record book?

I) Do you discuss progress in mathematics with your students?

Yes [ ] No [ ]

II) How do you utilize the progress report for when teaching?

PART 4
Methods of teaching mathematics

13.(a) The following teaching methods could be used by teachers to enhance students’ adaptation to mathematics learning. Show by indicating against each method whether or not you use it frequently.

<table>
<thead>
<tr>
<th>Teaching Methods</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecturing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pair, group or class</td>
<td></td>
<td></td>
</tr>
<tr>
<td>discussion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Question and example</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discovery</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fieldtrips</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Problem solving</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discussion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Individual work</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demonstration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others; specify</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

b. Which of the method(s) in (a) above do you think enhances adaptation to mathematics learning at different levels in secondary schools? Explain
c. Are there times when you use more than one method in the same lesson?

Yes [ ] No [ ]

If yes, in what ways?

PART 5

General comments about teaching of mathematics

15. What challenges do you encounter as a mathematics teacher when teaching at different levels in your schools?

Suggest some possible solutions

Thank you

BERTHA MATING’I KAKAI
RESEARCHER
MINISTRY OF HIGHER EDUCATION SCIENCE & TECHNOLOGY

Telegrams: "SCIENCE TEC", Nairobi
Telephone: 02-318581
E-Mail: ps@scienceandtechnology.go.ke

When Replying please quote
Ref. MOST 13/001/ 38C 247/2

JOGOO HOUSE "B"
HARAMBEE AVENUE,
P.O. Box 9583-00200
NAIROBI

16th May 2008

Matingi Bertha Kakai
Kenyatta University
P.O. Box 43844
NAIROBI

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on, 'KCPE Mathematics Performance as a Predictor of KCSE Examination Grade in Mathematics in Selected Schools in Bungoma District, Kenya'

I am pleased to inform you that you have been authorized to carry out research in selected Schools in Bungoma District for a period ending 30th December 2008.

You are advised to report to the District Commissioner and the District Education Officer Bungoma District before embarking on your research project.

On completion of your research, you are expected to submit two copies of your research report to this office.

M. O. ONDIEKI
FOR: PERMANENT SECRETARY

Copy to:
The District Commissioner
BUNGOMA DISTRICT
MINISTRY OF EDUCATION

Telephone Bungoma: 30148
Fax: 30700
House Tel. 30584
When replying please quote
Our Ref: BD/GA/29/4

DISTRICT EDUCATION OFFICE
BUNGOMA SOUTH
P.O. BOX 40,
BUNGOMA.
DATE : 10/06/2008

RE: RESEARCH AUTHORIZATION

This is to verify that Matingi Bertha Kakai of Kenyatta University has authority to carry out research on “KCPE Mathematics Performance as a Predictor of KCSE Examination Grade in Mathematics in selecting schools in Bungoma District Kenya”.

Kindly accord her the necessary assistance.

OMITHA M. JOHN
FOR: DISTRICT EDUCATION OFFICER
BUNGOMA SOUTH.