Student and Teacher Perceptions of Factors Influencing Students’ Performance in KCSE Mathematics in Tana River County, Kenya.

Evans Mwajumwa Makeo
E55/CE/11990/07

Department of Educational Communication and Technology, Kenyatta University.

A Thesis Submitted in Partial Fulfillment for the Degree of Master of Education in the School of Education, Kenyatta University

SEPTEMBER, 2013
DECLARATION

This thesis is my original work and has not been submitted for an award of a degree in any University.

----------------------------------
MAKEO. E. MWAJUMWA
E55/CE/11990/07

This thesis has been submitted with our approval as University Supervisors.

----------------------------------
DR. RUKANGU, S. M,
Department of Educational Communication and Technology
Kenyatta University

----------------------------------
DR. MIHESO O’CONNOR,
Department of Educational Communication and Technology
Kenyatta University
DEDICATION

To my wife Jane Karanja and son Ian Makeo.
ACKNOWLEDGEMENT

It is my sincere gratitude to indicate my appreciation I have had in the course of my study. First, I owe gratitude to my supervisors Dr Rukangu and Dr Miheso for their generous encouragement, suggestions and wise advice which fostered my early interest in the topic.

I have also benefited from the thoughtful help from colleagues and administration of Hirimani Secondary School who gave me valuable suggestions and ample time to pursue my course during the holiday. Mr Antony D. Bojana deserves gratitude for editing the final work.

I appreciate my wife and son for their encouragement and support during the course of my study.
Lastly, I gladly acknowledge the encouragement offered by my brothers, sisters and in-laws who stood by me during the trying periods of undertaking this scholarship.

To all I say, thanks and may The Almighty God bless you all.
# TABLE OF CONTENTS

Declaration........................................................................................................ ii

Dedication........................................................................................................... iii

Acknowledgement.............................................................................................. iv

List of Tables....................................................................................................... viii

List of figures...................................................................................................... ix

Abbreviations and Acronyms............................................................................... x

Abstract............................................................................................................... xi

CHAPTER ONE: INTRODUCTION----------------------------------------------- 1

1.1 Background to the Study................................................................. 1

1.2 Statement of the Problem.......................................................... 5

1.3 Purpose of the Study................................................................. 6

1.4 Objectives of the Study............................................................ 6

1.5 Research Questions........................................................................... 7

1.6 Significance of the Study............................................................. 7

1.7 Assumption of the Study............................................................... 8

1.8 Scope and Limitations of the Study.............................................. 8

1.9 Theoretical Framework...................................................................... 9

1.10 Conceptual Framework............................................................... 10

1.11 Operational Definition of Terms................................................ 13

1.12 Summary of the Chapter............................................................. 14

CHAPTER TWO: LITERATURE REVIEW-------------------------------------- 15

2.1 Background Characteristics of the Students................................. 15

2.2 Teaching and Learning Resources............................................... 17

2.3 Students Attitudes Towards Mathematics..................................... 19

2.4 Teachers Characteristics and Mathematic Performance.............. 21
2.4.1 Teachers’ Attitudes Towards Students----------------------- 22
2.4.2 Teacher Availability and Accessibility------------------ 22
2.4.3 Teachers Qualification and Experience------------------- 24
2.5 Teaching Approaches in Mathematics------------------------ 25
2.5.1 Students’ Learning-------------------------------------- 27
2.8 Summary of the Chapter------------------------------------ 28

CHAPTER THREE: METHODOLOGY-------------------------------- 30
3.0 Introduction--------------------------------------------- 30
3.1 Research Design------------------------------------------ 30
   3.1.1 Variables------------------------------------------- 31
3.2 Location of the Study------------------------------------- 31
3.3 Target Population----------------------------------------- 32
3.4 Sampling Procedure and Sample Size---------------------- 32
3.5 Research Instruments-------------------------------------- 34
   3.5.1 Achievement Test for Students------------------------ 34
   3.5.2 Questionnaires-------------------------------------- 34
   3.5.3 Interview Schedule------------------------------- 36
3.6 Pilot Study----------------------------------------------- 36
   3.6.1 Validity-------------------------------------------- 36
   3.6.2 Reliability------------------------------------------ 37
3.7 Data Collection Procedure------------------------------- 38
3.8 Data Analysis--------------------------------------------- 38
3.9 Logistical and Ethical Considerations-------------------- 40
3.10 Summary of the Chapter--------------------------------- 40

CHAPTER FOUR: DATA PRESENTATION, ANALYSIS AND
INTERPRETATION--------------------------------------------- 41
4.0 Introduction--------------------------------------------- 41
4.1 Teacher-Related Factors that Influence Students’ Performance-41
4.2 Teaching Resources and Their Influence on Performance--------54
4.3 Student-Related Factors that Influence Performance----------58
4.4 Suggested Solutions to Improve Performance-----------------63
4.5 Summary of the chapter------------------------------------68

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS
5.0 Introduction ---------------------------------------------------------------69
5.1 Summary --------------------------------------------------------------69
5.2 Conclusion----------------------------------------------------------72
5.3 Recommendations-----------------------------------------------------74
5.4 Recommendation for Further Research,------------------------75
REFERENCES----------------------------------------------------------77
APPENDICES-------------------------------------------------------------82
Appendix A: Interview Guide for Headteacher------------------------82
Appendix B: Questionnaire for HoD Mathematics/Science---------84
Appendix C: Questionnaire for Mathematics Teachers--------------87
Appendix D: Questionnaire for Students ------------------------92
Appendix E: Achievement Test for Students ------------------------95
Appendix F: Introductory Letter to School-------------------------96
Appendix G: Secondary Schools in Tana River County-----------97
Appendix H: Tana River County Map--------------------------------98
**LIST OF TABLES**

<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 KCSE National Scores for Selected Subject</td>
<td>3</td>
</tr>
<tr>
<td>1.2: Comparative Students Performance</td>
<td>4</td>
</tr>
<tr>
<td>1.3: KCSE Results in Coast Region</td>
<td>4</td>
</tr>
<tr>
<td>3.1: Respondents by School Category</td>
<td>33</td>
</tr>
<tr>
<td>3.2: Respondents by Gender</td>
<td>34</td>
</tr>
<tr>
<td>4.1: Academic Qualification of Mathematics Teachers</td>
<td>42</td>
</tr>
<tr>
<td>4.2: In-service Courses Attended by Mathematics Teachers</td>
<td>43</td>
</tr>
<tr>
<td>4.3: Experience of Mathematics Teachers</td>
<td>44</td>
</tr>
<tr>
<td>4.4: Mathematics Teachers and Their Workload in Schools</td>
<td>45</td>
</tr>
<tr>
<td>4.5: Consultation According to Teachers</td>
<td>48</td>
</tr>
<tr>
<td>4.6: HoDs Views on Commitment of Mathematics Teachers</td>
<td>49</td>
</tr>
<tr>
<td>4.7: Teachers Opinions on Teaching Mathematics</td>
<td>51</td>
</tr>
<tr>
<td>4.8: Teaching Methods Used by Teachers</td>
<td>52</td>
</tr>
<tr>
<td>4.9: Students Opinions on Mode of Teaching</td>
<td>53</td>
</tr>
<tr>
<td>4.10: HoDs Views on Availability of Resources</td>
<td>55</td>
</tr>
<tr>
<td>4.11: Challenges to Acquire Resources</td>
<td>56</td>
</tr>
<tr>
<td>4.12: Headteachers, HoDs and Teachers on Students’ Attitude</td>
<td>58</td>
</tr>
<tr>
<td>4.13: Opinions of Students Towards Mathematics and Teachers</td>
<td>59</td>
</tr>
<tr>
<td>4.14: Opinions of Students on Their Parental Support</td>
<td>62</td>
</tr>
<tr>
<td>4.15: Reasons for Poor Performance in mathematics</td>
<td>63</td>
</tr>
<tr>
<td>4.16: Suggested Solutions to Improve Student Performance</td>
<td>65</td>
</tr>
</tbody>
</table>
LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>11</td>
</tr>
<tr>
<td>4.1</td>
<td>47</td>
</tr>
<tr>
<td>4.2</td>
<td>48</td>
</tr>
<tr>
<td>4.3</td>
<td>50</td>
</tr>
<tr>
<td>4.4</td>
<td>54</td>
</tr>
<tr>
<td>4.5</td>
<td>56</td>
</tr>
<tr>
<td>4.6</td>
<td>57</td>
</tr>
<tr>
<td>4.7</td>
<td>60</td>
</tr>
<tr>
<td>4.8</td>
<td>61</td>
</tr>
</tbody>
</table>

1.1  Relationship between Prevailing Factors Influencing Mathematics Performance in KCSE

4.1: Headteachers Views on Availability of Teachers

4.2: Teachers Consultations According to Students’

4.3: Students Views on Teachers Attending Lessons

4.4: Aspects of Teaching Mathematics Liked by Students

4.5: Teachers Improvisation of Resources

4.6: Headteachers and HoDs Views on Utilization of Resources

4.7: Frequency of Students’ Study Mathematics

4.8: Opinions on Students’ Background on Performance
ABBREVIATIONS AND ACRONYMS

**ASALs** - Arid and Semi-Arid Lands

**CBE** - Curriculum Based Establishment

**DEO** - District Education Officer

**HoD** - Head of Department

**IICBA** - International Institute for Capacity Building in Africa

**KCSE** - Kenya Certificate of Secondary Education

**KIE** – Kenya Institute of Education

**KNEC** - Kenya National Examinations Council

**MKO** - More Knowledgeable Others

**MoE** – Ministry of Education

**NCTM** – National Council of Teachers of Mathematics

**SMASSE**- Strengthening of Mathematics and Science in Secondary Education.

**UNESCO**- United Nations Educational, Scientific and Cultural Organization

**ZPD** – Zone of Proximal Development
ABSTRACT

Students’ performance in Kenya Certificate of Secondary Education (KCSE) mathematics in secondary schools has been poor for many years in Kenya, particularly in Tana River County. Despite the various attempts by the Ministry of Education to put in place measures such as in-servicing mathematics teachers through Strengthening of Mathematics and Sciences in Secondary Education (SMASSE) project, review of the syllabus and subsidizing fees for the students, the KCSE mathematics mean score has remained consistently poor. This study has been designed to determine prevailing factors that influence students’ performance in KCSE mathematics. The study was done in Tana River County, Kenya. A descriptive survey of ex-post facto design was used as the researcher did not have direct control of independent variables as their manifestation had already occurred. Systematic random sampling procedure was used to select students in a population of 3760 students in all schools in the County. In every school, headteacher, heads of science/mathematics department, mathematics teacher and form three students’ were targeted for data collection. Data were collected using interview schedules and questionnaires. The sample of the study comprised of 344 students, 9 headteachers, 9 HoDs and 9 mathematics teachers. Pilot study of instruments were done by test-retest method and thereafter computed Pearson product-moment correlation coefficient on test done and cronbach’s alpha on likert scale on questionnaires to check reliability. Content validity was used to determine validity of the instruments by the researcher before administering them to the sampled respondents. Collected data were coded using code book and analyzed both quantitatively and qualitatively. Qualitative analysis involved making inferences from the headteachers, HoD mathematics/science, mathematics teachers and students open-ended questions. Data were analyzed using measure of central tendency such as mean and mode. The findings were presented using bar graphs, pie-charts and percentages. The study found that over 70% of the students had negative attitude towards mathematics, 8 out 9 mathematics teachers had negative attitude towards teaching mathematics despite teachers being in-serviced through SMASSE project and 8 out of 9 teachers use expository approach while teaching. All schools had inadequate resources and 89% of the students cited unsupportive parents as reasons for poor performance in mathematics. In order to improve performance the study recommends for guidance and counselling sessions by HoDs, teachers to use activity-oriented teaching, resource improvisation and monitoring of students work by teachers and teachers work by HoDs or Headteacher.
CHAPTER ONE
INTRODUCTION

1.0 Introduction

This chapter covers the background to the study, statement of the problem, significance of the study, objective of the study, research questions, assumptions of the study, scope and limitation of the study, delimitation, theoretical framework, conceptual framework and operational definition of terms as used in the study.

1.1 Background to the Study

Mathematics concepts are applied in many fields of study and job opportunities. The subject affects all aspects of life. The social, political, economic, geographical, scientific and technological aspects of man are centred on mathematics (UNESCO, 2003). This requires that all students, not just those aspiring scientific career, should be mathematically literate. Despite the importance of the subject, UNESCO (2003:p79) notes that:

Students’ performance in mathematics has been a great concern to the society, poor performance in mathematics has resulted to opting out of many courses and eventually, opting out of many job opportunities.

According to Ivowi (2001), the state of our schools particularly in secondary and tertiary levels indicates that the standards of education have dropped especially the performance in such subjects as mathematics and science examinations. In Kenya, mathematics is compulsory subject in secondary curriculum. The subject
according to Okwemba (2008), is a critical filter to many educational and career opportunities. However, Ivowi (2001) comments that students’ performance in African countries especially in mathematics and sciences is declining compared with the past standards.

The subject is compulsory at primary and secondary schools in Kenya. The subject is widely applicable in our daily life. Schoenfield (2002) adds that to fail children in mathematics or to let mathematics fail them is to close off an important means of access of society’s resources. Both children and adults in understanding and improving their immediate world would need mathematics skills. Mathematics concepts are applied at home, in offices and industries. Okwemba (2008) notes that even for those careers which are not business-oriented, there is no escape from mathematics. The subject is applied by children as they play with toys, men and women in their career, home and largely in industry. However, Wambui (2002) asserts that despite students being aware of this importance of mathematics, they continue to perform poorly, possibly due to the abstract nature of mathematics curriculum and consequently how content is presented by teachers. Mathematics performance in Kenya has persistently remained low in comparison with other subjects as shown in Table 1.1.
Table 1.1: KCSE national Scores as Percentage: 2007 – 2011

<table>
<thead>
<tr>
<th></th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>38.5</td>
<td>34.0</td>
<td>32.8</td>
<td>37.8</td>
<td>39.4</td>
</tr>
<tr>
<td>Mathematics</td>
<td>15.5</td>
<td>16.7</td>
<td>21.2</td>
<td>17.9</td>
<td>20.6</td>
</tr>
<tr>
<td>Physics</td>
<td>39.6</td>
<td>36.4</td>
<td>38.5</td>
<td>33.2</td>
<td>37.4</td>
</tr>
<tr>
<td>Chemistry</td>
<td>32.4</td>
<td>33.6</td>
<td>33.9</td>
<td>28.5</td>
<td>30.5</td>
</tr>
</tbody>
</table>

Source: KNEC

Table 1.1 shows that KCSE mathematics performance in comparison with English, physics and chemistry is very low. The best score attained was 20.6% in 2011. In response to such performance, there have been government efforts like in servicing mathematics teachers through Strengthening of Mathematics and Sciences in Secondary Education (SMASSE) project, review of the syllabus and subsidizing school fees, among others. Despite the efforts, mathematics performance is still very low.

Students’ performance in mathematics examinations at the national and school level in Tana River County has been poor and a major concern to society. As most students enrol in form one, their Kenya Certificate of Primary Education (KCPE) mathematics performance is relatively better and their performance drops as they are in form three as shown in Table 1.2 and eventually performs poorly in Kenya Certificate of Secondary Education (KCSE) mathematics. Table 1.2 shows the
comparative mathematics performances of students as they were enrolled in form one and previous terms’ examinations during the study.

Table 1.2: Comparative students’ performance between KCPE and school-based examinations in Tana River County (n=344)

<table>
<thead>
<tr>
<th>Marks</th>
<th>Mathematics KCPE (%)</th>
<th>Mathematics exam for form three in previous term before the study (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 30</td>
<td>4.6</td>
<td>65.1</td>
</tr>
<tr>
<td>30 - 50</td>
<td>41.3</td>
<td>30.2</td>
</tr>
<tr>
<td>Above 50</td>
<td>54.1</td>
<td>4.7</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Students questionnaire, 2011

The overall combined performance in KCSE mathematics for neighbouring students’ in ASAL regions in Coastal region where Tana River County lie are as shown in Table 1.3

Table 1.3 KCSE Results for Tana River and Neighbouring Counties in Coast region

<table>
<thead>
<tr>
<th>Year</th>
<th>Tana River</th>
<th>Kilifi</th>
<th>Lamu</th>
<th>Kwale</th>
<th>Maximum score expected</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>1.394</td>
<td>1.945</td>
<td>1.402</td>
<td>2.021</td>
<td>12</td>
</tr>
<tr>
<td>2008</td>
<td>1.483</td>
<td>1.751</td>
<td>1.803</td>
<td>1.524</td>
<td>12</td>
</tr>
<tr>
<td>2009</td>
<td>1.352</td>
<td>1.931</td>
<td>1.368</td>
<td>1.632</td>
<td>12</td>
</tr>
<tr>
<td>2010</td>
<td>1.366</td>
<td>2.102</td>
<td>1.526</td>
<td>1.733</td>
<td>12</td>
</tr>
<tr>
<td>2011</td>
<td>1.401</td>
<td>1.842</td>
<td>1.781</td>
<td>1.921</td>
<td>21</td>
</tr>
</tbody>
</table>

Source: PDE-Coast Province, 2012.

The situation shown in Table 1.3 indicates a generally poor performance in KCSE mathematics in the counties. The performance in Tana River County is relative low
as compared with other counties with almost the same geographical conditions in Coastal region. The best mean score recorded in the county was 1.483 out of 12 in the year 2008. It’s a matter of concern that the performance in mathematics remained very low at national level as shown in Table 1.1 and particularly in Tana River County as in Table 1.3. The forces influencing poor performance in KCSE mathematics are not known by stakeholders in Tana River County. KNEC (2008) report on candidates’ performance revealed the difficulties experienced by students’ even on the most basic operations and problem-solving techniques. This could suggest inadequacy in the process of teaching and learning mathematics. It is in this view that this study was designed to establish factors which affect mathematics performance in Tana River County

1.2 Statement of the problem

Students’ performance in KCSE mathematics in Kenya generally and in Tana River County in particular consistently remains low. In response to such low performance in mathematics, the government of Kenya has tried to resolve the situation by inservicing mathematics teachers with current approaches of teaching mathematics which is student-centred through SMASSE projects, offering financial assistance to students and review of syllabus. Despite these efforts, there is little impact on mathematics performance in Tana River County as shown in Table 1.3. This means that there must be some factors which have not been addressed as far as students’ performance in mathematics is concerned. It is due to this low performance that the
study was carried out to establish factors influencing mathematics performance and give recommendations.

1.3 Purpose of the study
The purpose of this study was to identify and document factors that influence students’ performance in KCSE mathematics and give recommendation which if implemented would improve the study of mathematics and eventually mathematics performance at school and national examination in Tana River County.

1.4 Objective of the study

The objectives of the study were to:-

i) Establish teacher-related factors that influence students’ performance in KCSE mathematics in Tana River County.

ii) Determine the available resources and how often teachers use them in teaching mathematics in Tana River County.

iii) Establish the student-related factors that influence performance in KCSE mathematics.

iv) To establish measures that should be employed to improve performance in KCSE mathematics in Tana River County.
1.5 Research Questions

Research questions were:

i) What are teacher-related factors that influence students’ performance in KCSE mathematics in Tana River County?

ii) What resources are available and how often do teachers use them in teaching mathematics in Tana River County?

iii) What are student-related factors that influence performance in KCSE mathematics?

iv) What measures would be employed in order to improve performance in KCSE mathematics in Tana River County?

1.6 Significance of the Study

The results of the study will enable teachers to evaluate their teaching approaches and adopt those which improve performance in mathematics instructions. In addition, they will realize the importance of being sensitive on gender to avoid bias and economic background of students while teaching mathematics.

The results of the study may be important to the curriculum developers and implementers. Ministry of Education (MoE) may realize the problem encountered by teachers hence the need and urgency to deploy mathematics teachers in Tana River County. The KIE would use the findings to develop guidelines on approaches and resource to be used while teaching mathematics. Quality assurance
and standards officers may use the findings of this study to formulate relevant in-service programmes for mathematics teachers.

1.7 Assumption of the Study
The assumptions of the study were:

i) Mathematics teachers in the county are trained in mathematics education.

ii) There is a relationship between prevailing factors and performance in KCSE mathematics.

1.8 Scope and Limitation of the study

1.8.1 Scope
The study involved ten public secondary schools from Tana River County. In all the secondary schools in the county: form three students, headteachers, mathematics teachers currently teaching form three and HoD mathematics/sciences were involved.

1.8.2 Limitations

(i) Tana-River County is one out of the 47 counties in Kenya, all of which have different, varied factors: environmental, cultural and socio-economic. Hence, the findings may not be generally applied to all institution.

(ii) The study was done in ASAL region and its findings may not be fully applicable to secondary schools in urban and other areas in the country because of different varied factors ranging from climate, cultural and socio-economic.
1.9 Theoretical Framework

The study was based on Vygosky’s theory of social constructivism development. The theory states that the social interaction precedes development and that consciousness and cognition is the end product of socialization and social behaviour. The theory focuses on connections between people and social cultural context in which they act and interact in shared experience. It asserts three major themes:

(i) Social interaction plays a fundamental role in the process of cognitive development.

(ii) The more knowledgeable others (MKO). This refers to anyone with higher ability level than the learner. They could be a teacher, parents or peer.

(iii) The zone of proximal development (ZPD). ZPD is a term for the range of tasks that are too difficult for the children to master alone but can be learned with the guidance and assistance of more skilled person. Lower limit of ZPD is the level of skills reached by the child working independently. The upper limit of ZPD is the level of additional responsibility the child accepts with the assistance of MKO.

The theory provides a strong argument for using appropriate models and concrete material to illustrate mathematical concepts and for actively involving students in learning process.

Major instruction implication is that teachers should explain new information in terms of knowledge students already possess. A teacher should collaborate with
their students in order to facilitate learning mathematics. Learning mathematics according to Reys (2001) involves the following principles: actively involving students built on their previous knowledge and use of resources learning process. Actively involving students in learning mathematics leads to retention of information for long term.

1.10 Conceptual Framework.

It is important to note that one of the objectives of secondary mathematics in Kenya is to prepare students to appreciate the role, value and use of mathematics in society. The objective requires good performance in KCSE mathematics. The government efforts to reverse the trend seem to have little impact especially in Tana River County. That notwithstanding certain factors was likely to influence performance in KCSE mathematics examination. The possible factors and expected outcome are presented in Figure 1.1.
Figure 1.1 Relationship between prevailing factors influencing Mathematics performance in KCSE.


From Figure 1.1, students’ performance in KCSE mathematics in Tana River County has various possible determinants. These are students’ socio-economic background which includes career aspirations, parental education attainment, peer pressure, culture and economic status of their parents. In addition, teaching activities in a mathematics class is facilitated by teachers who have their own attitude towards students or the subject. Moreover, there are qualities of the
teachers that influence performance in mathematics examination. The teachers choose the teaching methods and resources which have an impact on students’ mathematics performance. KCSE mathematics performance is therefore, influenced by a wide range of factors which require interventions from all the stakeholders of education in Tana River County if mathematics performance is to improve.
1.11 Operational Definitions of Terms

**Attitude** - Refers to the way a teacher or a student feels or think about mathematics. This can be positive or negative.

**Performance** - Refers the extent to which a student accomplishes mathematics examination as summarized in grades or mean score.

**Gender Stereotype** - A fixed idea about girls that they are inferior to boys or boys to girls

**Content Validity** - Refers to the degree to which an instrument provides adequate coverage of the topic under study.

**Ex-Post-Facto Research** – Systematic empirical inquiry in which the scientist does not have direct control of the independent variables because their manifestations have already occurred.

**Teacher-Related Factors** – Refers to independent variables which influence performance and involves teacher. These are qualification, experience, accessibility and attitude.

**Student-Related Factors** – Refer to independent variables which involve students or interfere with student’s performance. They include student’s background and attitude.

**Activity-Oriented Teaching** – Method of teaching encouraging participation and involvement of learners in planned class activities.

**Compulsory Subject** - Subjects which are not optional in secondary education in Kenya. They include Mathematics, English and Kiswahili
1.12 Summary of the Chapter

In this chapter the background to the study, statement of the problem, purpose, objective, research questions, significances, assumption, scope, limitations, theoretical framework, conceptual framework and operational definitions of term in the study were analyzed. The next chapter is on literature review.
CHAPTER TWO
LITERATURE REVIEW

2.0 Introduction
This chapter reviews related studies conducted on factors influencing performance in mathematics examinations. Issues discussed include background characteristics of the students, teaching and learning resources, attitude towards mathematics, teachers’ characteristics, teaching methods and socio-cultural factors.

2.1 Background characteristic of the students and mathematics achievement.
According to Ethington (1992) parents play an important role in influencing students’ attitude towards mathematics. Rukangu (1987) adds that if parents speak of difficulties they faced in learning mathematics in their school days discouragingly, it is likely that their children will be less encouraged to learn the subject. Negative expectation of parents concerning students’ performance in mathematics in any society is likely to affect the learners. Positive remarks from parents about mathematics can encourage students in mathematics.

Concerning the relationship between parental support and mathematics performance, Jelfer and Lupart (2001) have reported that children who have relationships with their parents, who encourage them, will achieve better grades in mathematics and sciences. The involvement of parents improves their cognitive and social skills which help them to succeed in mathematics. A study by
Hammrich (2002) has shown that lower parental education level is a significant determinant on how they support their child in mathematics.

Students’ learning process is largely influenced by culture, social and economic experience (Nelson, 1993). The qualities of these experiences determine how the learner in a given school is able to either do well or not in mathematics. Christian (1986) argues that family, community, society and culture serve as tangible and intangible resources that have a bearing on how well children build their own mathematics concepts. Tana River is an ASAL region predominantly occupied by pastoralist and non-pastoralist communities who cultivate along the river. These communities have their own cultural set-up which are organized in small decentralized and autonomous household units. Many lead a nomadic way of life as resources diminish they shift.

Cultural and social activities form a good source of examples and resources which makes learning mathematics real. Nelson (1993) stresses that recognition and valuing of cultural heritage of the people helps build their confidence which is necessary in understanding mathematical concepts. Social issues and cultural activities like gender stereotypes, community interactions, language, environmental issues and social needs contribute to teaching mathematics. The researcher investigated whether the teaching methods used, regularly incorporate cultural or social activities of students as examples and illustration while teaching mathematics.
Nelson (1993) says that in some marginalized areas: poverty, nomadic life and high-level of illiteracy has created psychological trauma to students’ learning pattern. Tana – River County being an ASAL, with introduction of subsidized secondary education, most students continued with education and eventually increase in class size. Finn and Achilles (1990) say that class size has a large influence on students’ performance.

Peer pressure has also a fundamental role to play in mathematics performance. The beliefs, attitudes and behaviour of individuals are to a great extent influential to other students. Opdenakker and Van Damme (2002) point out that the influence of peer group on mathematics performance has been recognized for a long time. Behaviour is learned; hence students who persistently perform poorly in mathematics tend to influence the few who are performing well. The present study intended to find out the extent to which students’ background influence students’ performance in Tana River Country.

2.2 Teaching and learning resources

Twoli et-al., (2007) define resources as aids that teachers use to assist learning and also increase interest in learning. They enhance standard participation in class for effective learning. The availability of resources determines good performance. Despite that, Mutunga and Brekwell (1992) found that a vast majority of pupils and even grown-up people still think that mathematics lack teaching resources and is
difficult subject. Such feelings make students have little interest towards the subject and this affects their performance.

SMASSE (2003) classifies resources into reading materials, material for viewing, flat materials, projected materials, materials for listening to and programmed instruction. These resources can either be locally made or commercially manufactured. The Ministry of Education Secondary Mathematics Handbook (2006) notes that the manipulation of these resources helps to convey meaning and structure of mathematical concepts and equally well and will serve as a motivational force to awaken the interests of the learners. This will make abstract concepts to be understandable in mathematical process or system. However, Patel and Mukwa (1993) note that resources should be used as an integral part of learning activity in order to achieve the highest level of understanding within the concept of the subject matter relationships but they should not replace the teacher.

The World Education Forum in Dakar (2000) found that many teachers do not effectively use the resources and where present they are underutilized as more than one-third of world’s secondary schools have no access to new skills and technologies that could help improve in the process of acquisition of knowledge. The report adds that where resources are limited, the range of work is reduced: science and mathematics become less stimulating. Tana River County has few resources but with subsidized secondary education by the government, the study attempted to find out the available resources and how often teachers use them.
A study conducted by Leader, Pehkonen and Torner (2002) found that a well-designed material aid can to a certain extent enhance individual learning and creativity, instead of relying on adult knowledge. In a situation with restricted access to resources, the possibilities of independent studies are reduced. Kiragu (1986) adds that there is a positive impact on sciences and mathematics when instrumental materials are used. This study attempted to establish the extent to which the resources are available and used for teaching mathematics in Tana River County, noting that the government subsidizes secondary education.

2.3 Students’ attitude towards mathematics and performance

Twoli et al., (2007) define attitude as a mental concept that depicts favourable or unfavourable feeling towards an object, people or academic subjects. Attitude towards mathematics can either be positive or negative. A consistent pattern of positive attitude towards school subjects has been confirmed by studies done by McMillan (1997) and Bell (1981) which show a positive correlation between positive attitudes towards mathematics and performance. It is through this study the students’ attitude towards mathematics was investigated.

SMASSE (2003) comments that negative attitude will lead to poor performance while positive attitude will lead to good performance. Students’ attitude towards mathematics is a crucial factor in learning and achieving good performance. These attitudes, feelings and ideas about school subjects over time and from variety of sources have an impact on performance. A study by Smith (1996) shows that
attitude is perhaps the basis for all motivated behaviour. Mwangi (1985) suggests that friends, materials pressure for learning mathematics, school climate, home background, mathematics self-concepts, teaching factors and external motivation are among the factors that construct students’ attitudes and belief towards mathematics. If a student has to perform well, the above factors have to be favourable and supportive on students.

According to Reys et-al., (2001), negative attitude can be revealed by students in various classic symptoms of mathematics such as poor performance, misunderstanding and dislike for mathematics. SMASSE (2003) adds that there are certain actions associated with negative attitudes among students which can either be verbal expressions like ‘I hate mathematics’, or ‘mathematics is difficult’. This also includes such acts as coming to class late, sleeping during lessons, not feeling bothered by low scores, absenteeism and rudeness to teachers. These are developed due to observational learning from students’ environment and peer influence. The study attempted to find out the students’ attitude and its effect on mathematics performance in Tana River County.

Many girls tend to have negative attitude towards mathematics than boys in class. Eshiwani (1983) reports that girls in Kenya generally have negative attitude towards mathematics and this attitude tends to affect their performance. Gutbezahl (1995) adds that girls hold entity theory of intelligence, that is, girls tend to attribute their failure in mathematics to lack of ability and consequently give up
trying. In another study by Wolleat, Pedro, Becker and Fernemma (1980), it was found that females, as compared to males, have been found to be less confident about their ability to learn mathematics, to underestimate their ability to solve mathematical problem and to believe to a lesser degree that mathematics will be personally useful. The study established the ratio of girls with negative attitude towards mathematics as compared to boys and whether their gender had an influence on performance in mathematics. In this study, views of students were analyzed and their attitude towards mathematics was investigated.

2.4 Teachers Characteristics and mathematics achievement

Teachers play a very important role in the educational setting of a child. Nyhof-Young and Hanna (1995) assert that teachers are one of the most important educational influences on students’ learning of mathematics. The way teachers behave, interact with students, their expectations of the students’ outcome and achievement have an impact on the child and the way the child will learn. Hyde and Jaffee (1998) believe that the school environment in general and teachers’ characteristics in particular make significant contribution to academic performance of the student. Teachers play a very important role on a child’s development from kindergarten onwards. Their contribution to the mathematics performance of the students too is influential. Teacher-related issues that influence mathematics performance include attitude, qualification, experience, availability and accessibility of the teachers.
2.4.1 Teachers Attitude Towards Students

Teacher’s attitudes towards students contribute to their performance. The National Council of Teachers for Mathematics (2000) says that the teachers’ appreciation of mathematics as an important, dynamic subject must be real and deep. Their attitude towards students must be sympathetic, understanding and interest must be great. If the teacher’s attitudes and interests are less favourable, then the student is likely to develop negative attitude toward the teacher or mathematics. The teacher should always make his students feel that his attitude is friendly regardless of success or failure. The study attempted to establish the attitudes of teachers towards their students and teaching mathematics in Tana River County.

2.4.2 Teachers Availability and Accessibility

The problem of inadequate teachers in mathematics in Kenya has been there since independence. Mwangi (1983) and Josephine (2005) assert that there is a great dearth of qualified secondary school teachers in Kenya. This in itself is major setback to mathematics teaching. It is through this study that the researcher attempted to find the number of qualified mathematics teachers per school in relation to student population and whether such ratio has a bearing on students’ performance in mathematics.

In Kenya, the role of employing teachers is left to the Teachers Service Commission (TSC). TSC was established by an act of parliament in 1967 to recruit,
keep records, monitor and discipline teachers in public schools. In 1997, guaranteed employment by TSC after college was stopped and this led to shortage of mathematics teachers in Kenya. UNESCO (2003) reports that, shortage of mathematics teachers is a global issue and the number of teaching vacancies in sciences and mathematics is higher than that in any other subject. This has an adverse effect on teaching and limits learning in mathematics.

Shortage of teachers occurs when many of them leave the profession to pursue more lucrative career opportunities, and others because of unfavourable working conditions in the teaching profession. Josephine (2005) notes that discrepancies in payment among government employees have made many teachers leave the profession. This has led many schools in the country to experience shortage of teachers. In his research, Mwangi (1983), found that many graduate teachers in Kenya have joined the private sector or got into business where rewards are better, hence creating teacher shortage in Kenya secondary schools.

Accessibility is a state at which an individual or situation can be reached, talked to and get to know him/her (Barnhart, 1988). Accessibility is possible when teachers communicate and interact with students in class. Reddy (2006) says that interactions form the social context in which children participate and also mediate students thinking and learning. Good interaction between teachers and students plays an extremely significant role in the teaching and learning process of mathematics. In addition, the time spent by teachers with students boosts
performance (Reddy, 2006). The study attempted to establish whether the schools have enough teachers for effective instructions based on teacher-student ratio.

2.4.3 Teacher’s Qualification and Experience

Kiragu (1986) points out that the more training a teacher has received, the better the achievement for his students. If the level of teacher training is increased, the average test score of pupils in school would improve and thus improve the quality of output. The teacher should be well-trained to handle their subjects and have frequent in-service to update them on issues to do with teaching and learning mathematics. UNESCO (2003) advises that to upgrade teaching, teachers should be better trained.

According to Bell (1981), a trained and experienced teacher produces higher academic performance than the untrained one. Study by Fuller (1985) reveals that there is a positive correlation between years of experience and performance in teaching. However, earlier study by Hanson and Brembeck (1983) differed as it found that experience does not matter a lot as a trained teacher has already grasped the content. The fundamental issue is whether the qualified teacher is prepared to teach using the right methodology, teaching aids and other factors for effective teaching.

Shortage of trained teachers has caused many schools to accept unqualified teachers who are not aware of modern trends in teaching mathematics. Mwangi (1983) argues that the question of lack of enough qualified teachers in rural schools
has on many occasions been mentioned as one of the causes of poor performance in examination. Untrained teachers take teaching as a bridge to better employment or a waiting stage towards joining university. Such teachers do not make any effort in assisting students understand the subject as they are on transit. The study attempted to find out whether the teacher-related issues such as attitude, availability, accessibility, qualification and experience has an effect on students’ mathematics performance in Tana River County.

2.5 Teaching Approaches in Mathematics and student performance

Twoli et al., (2007) define approach to teaching as an overall way in which the process of instruction is organized and executed. There is the heuristic and the expository approach. Heuristic approach is whereby a teacher helps the learners find information by posing questions, guiding, indicating sources of information and sharing ideas, problems and solution. Mutunga and Brekwell (1992) describe it as student centred approach. Under such circumstances, transfer and application of mathematical knowledge become natural to the learner and adaptable to familiar and unfamiliar situation. Ministry of Education Handbook for Mathematic Teachers (2006) notes that, heuristic approaches make retention of concepts higher and positively generate confidence among learners. Methods in this category are: programmed learning, small group discussion, practical, projects and problem-solving.
The expository approach is characterized by predominance of teacher-talk, with little or no involvement of students in practical activities. Mutunga and Brekwell (1992) describe this approach as teacher-centred. The approach lacks active participation by the students and effective teacher/learner interaction. The scenario, according to the Ministry of Education Handbook for Mathematics Teachers (2006) is associated with less understanding of mathematical structure and concept, resulting in little retention of what is learnt. Methods in this category are lecture and teacher demonstration; hence the study investigated the teaching approaches used by teachers while teaching mathematics.

The need for effective teaching of mathematics in the classroom has led to several studies in different parts of the world. Many studies have been conducted to discuss this important issue. Twoli et al., (2007), Mutunga and Brekwell (1992) and NCTM (2000) observe that students learn mathematics through the experiences that teachers provide. In addition, NCTM (2000) says students’ understanding of mathematics, their ability to use it to solve problems, their confidence in and disposition towards mathematics are all shaped by the teaching approaches used in class. The improvement of mathematics for all students requires effective mathematics teaching in all classrooms. Effective teaching and learning occurs when a student is actively involved class activity.

According to Saxe, Gearhart and Nasir (2001), mathematics education should shift from instruction that encourages memorization of definitions and use of rules and
procedures towards instruction that emphasizes meaning and conceptual understanding. Teaching approaches which emphasize meaning should be more emphasized. Teaching for meaning has been used by Knapp, Shields and Tumbull (1995) to mean the following:

a) Instructions that help students perceive the relationship of ‘parts’ to whole.

b) Instructions that provide students with tools to construct meaning in their encounter with academic tasks and in their world in which they live.

c) Instructions that make explicit connections between one subject area and the next and between what is learned at school and children’s home.

Students who were exposed to instruction, emphasizing meaning, performed significantly better in mathematics than those students who were exposed to conventional sessions like lectures. Enough opportunities should be given to student to deal with real life mathematical situations within the school context and use the knowledge to deal with similar tasks in the real world.

2.5.1 Students’ Learning

Booler (1998) strongly supports appropriate teaching strategies that would help students make smooth transition of their mathematical knowledge to novel situations in the real world. If students based on the experiences encountered in
classroom, see mathematics as a set of rules and procedures that should be remembered and followed to solve problems, they will tend to encounter problems when the situations they face are slightly different from the ones they would normally face. Similarly, students who believe that mathematics involves active and flexible thought and who develop an ability and change methods to fit new situations, tend to deal with situations in real world more successfully. The study established the teaching approaches used by teachers while teaching mathematics and their influence on students’ performance in KCSE mathematics in Tana River County.

2.6 Summary of the Chapter

In this chapter, different studies related to students’ performance in mathematics are considered. The different factors that influence the performance of students in mathematics were analyzed. How different intervention programmes and strategies developed would deal with factors affecting students’ performance in mathematics is noted. Various degrees of success of these pedagogical ways, if implemented in teaching can lead to performance in mathematics in many countries. It has also been highlighted that much effort is done by the government of Kenya in order to improve students’ performance in mathematics; such as, in-service training through SMASSE project. The training was to equip teachers with teaching approaches which a student-centred and skill to deal with attitude. In addition the government subsidizes secondary education to ensure that basic resources such as text books or
chart are in schools and regularly employ teachers to reduce the teacher-students ratio. Despite such effort, student performance in mathematics persistently remains low in Tana River County. The study attempted to find out the teacher-related factor, student-related factor and resources available in schools noting the effort done by the government of Kenya. The next chapter describes the methodology used in this study.
CHAPTER THREE
METHODOLOGY

3.0 Introduction
This chapter covers the following areas: description of the research design, location of the study, target population, sampling procedures, research instruments, pilot study, procedure of data collection and methods of data analysis.

3.1 Research Design
The study design selected was descriptive survey of ex-post facto to investigate the student and teacher perceptions of factors influencing students’ performance in KCSE mathematics in Tana River County. This design is suitable because the researcher did not have direct control of independent variables as their manifestation had already occurred. Also, it’s useful in obtaining both qualitative and quantitative data regarding the strategies teachers use in mathematics to facilitate learning. This design involved collecting data in order to answer questions concerning the current status of mathematics. It’s also useful in assessing attitude about events, individuals or procedures hence suitable in obtaining students and teachers’ opinions on factors influencing mathematics performance in Tana River County
3.1.1 Variables

The dependent variable in this study was students’ performance in KCSE mathematics in Tana River County.

The independent variables in this study included:

- Mathematics curriculum offered in secondary schools of Kenya.
- Student-related variables which include students’ background and attitude towards mathematics and their teachers.
- Teacher-related variables which include qualification, teaching experience, availability, accessibility, teaching methods and attitude towards mathematics and students.
- Teaching and learning resources available in Tana River County.

3.2 Location of the Study

The study was conducted in Tana River County, Kenya as shown in appendix I. The County borders Isiolo County to the North, Garissa County to the North East, Lamu County to the East, Kilifi County to the South East, Taita-Taveta County to the South and Mwingi County to the North West. The county is about 500km from Nairobi, the capital city of Kenya.

The county has an estimated area of 38,446 km$^2$ and lies between latitude $0^\circ$ and $3^\circ$ S and longitude $39^\circ$ E and $41^\circ$ E. The county has three constituencies, namely; Bura, Galole and Garsen. The County is a flat land which is sparsely populated.
The major physical feature in Tana River County is the River Tana, flowing from the north to southern part of the County. The region records temperature ranging from 28°C to 38°C throughout the year. Student’s performance in KCSE mathematics has been persistently poor for many years in Tana River County as shown earlier in Table 1.3. Such performances lead the researcher to investigate factors influencing such performance. In addition, the region was identified as little research has been done in the county.

3.3 Target Population

Tana River County has ten secondary school which conduct KCSE. The schools are classified as National and County secondary schools. The researcher obtained the sample of the study from the ten secondary schools, 3760 students and 154 teachers.

3.4 Sampling Procedure and Sample Size.

Tana River County has ten public secondary schools only. One school was purposively selected for piloting while the data was collected in the remaining nine schools.

In every school sampled, one teacher currently teaching mathematics in form three, HoDs of sciences/ mathematics and headteacher were purposively selected. The researcher involved nine teachers, nine HoDs of Sciences/Mathematics, eight
headteachers and one deputy headteacher from the nine schools. Simple random sample was used to select the teacher in school with more than one stream.

In the sampled schools, students in form three were considered to ensure the participation of students who have been exposed to form 1 and form 2 works which is about 50% of the secondary curriculum. In a school with more than two streams, simple random sample was used to select two experimental streams. In two streams, Systematic random sampling technique was used to select students where they were arranged according to their admission number in ascending order; thereafter students in even positions were selected.

According to Ary, Jacob and Razavieoh (1972), a sampling fraction of between 5-15 % of the total population in a descriptive research is acceptable. A total of nine public secondary schools were involved in this study. In each school, the headteachers, the HoDs of sciences/mathematics, mathematics teachers’ currently teaching forms three and students were involved. Generally, 9.5% of the population was involved in the study as shown in Table 3.1 and Table 3.2

Table 3.1: Respondents by School Category

<table>
<thead>
<tr>
<th>Category</th>
<th>No of School</th>
<th>No of students</th>
<th>Mathematics Teachers</th>
<th>HoDs</th>
<th>Headteachers/Deputy Headteachers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mixed</td>
<td>7</td>
<td>236</td>
<td>7</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Girls</td>
<td>1</td>
<td>72</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Boys</td>
<td>1</td>
<td>36</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>344</td>
<td>9</td>
<td>9</td>
<td>9</td>
</tr>
</tbody>
</table>
Table 3.2: Respondents by gender

<table>
<thead>
<tr>
<th>Respondents</th>
<th>Pupils</th>
<th>Mathematics teachers</th>
<th>HoDs Mathematics/Sciences</th>
<th>Headteachers/Deputy Headteachers</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>Males</td>
<td>228</td>
<td>7</td>
<td>8</td>
<td>7</td>
<td>250</td>
</tr>
<tr>
<td>Females</td>
<td>116</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>121</td>
</tr>
<tr>
<td>Total</td>
<td>344</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>371</td>
</tr>
</tbody>
</table>

Percentage sample = \( \frac{\text{Total sample} \times 100}{\text{Population}} \)

= \( \frac{371 \times 10}{3914} \)

= 9.5 %

3.5 Research instruments

For this study, the data were collected using achievement test, questionnaires and interview schedule.

3.5.1 Achievement test for students

The test was given to sampled students. The purpose was to provide a common measure to assess students’ performance in mathematics. The mean score of the test provided information which was inferred to teachers’ qualifications, availability, experience, and attitude of the students towards mathematics.

3.5.2 Questionnaires

The researcher used three different questionnaires;
**Questionnaire for the HoDs Mathematics/Sciences**

The purpose of this questionnaire was to collect data on available resources, teacher-related factors and strategies used to improve mathematics performance in schools. Both closed-ended and open-ended questions were used as shown in appendix B. This enabled the HoDs to express their opinions freely hence reduced the possibility of obtaining unbiased data.

**Questionnaire for the Mathematics Teachers**

The purpose of this questionnaire was to collect data on the qualification, experience, availability, accessibility and attitude of the teachers as shown in appendix C. In addition, teaching methods, resources and strategies used by mathematics teachers to improve performance in mathematics. The instrument enabled the teachers to give their view at their own time.

**Questionnaire for Students**

The purpose of this questionnaire was to obtain data on students’ attitude towards mathematics and their teachers, students’ background and strategies to improve performance in mathematics. In addition, this instrument was used to give data on availability and accessibility of teachers as shown in appendix D. The instrument enabled the students to express their own opinions freely and the researcher could obtain a lot of information from a large number of students in a short time.
3.5.2 Interview Schedule

Interview schedules were used to obtain information from the headteachers as shown in appendix A. These people were in charge of monitoring the implementation of the government policies and curriculum in schools. Interviews provided data, to supplement the teachers’ questionnaire on factors influencing students’ performance in KCSE mathematics.

3.6 Pilot study

The instruments were piloted in one of the school in order to make correction or adjust any misconceptions available. The pilot school was excluded from the actual study. This was to ensure that instruments were refined, especially on language used in students questionnaires before final administration. According to Orodho (2005), a pilot study will enable the researcher to determine the validity and reliability of the instruments.

3.6.1 Validity

Validity is the degree to which a test measures what it purports to measure. The pilot study was carried out to check the appropriateness of the language used in the questionnaire as well as determine the difficulty of the items in the instrument. According to Orodho (2005), the content validity of research instrument can be determined by the panel of three judges competent in the area being investigated. In the study, the researcher, with the assistance of the research supervisors, made
necessary modifications to the tools thus ensuring that the instruments covered the content required.

3.6.2 Reliability

Reliability coefficient of the questionnaires and interview schedules was determined after the piloting stage. Test-retest method was used where the instruments were administered to the respondents from pilot school at different times. This was done after one week, thereafter correlation between the two sets of data was computed. On the test done, the correlation was determined using the formula for Pearson’s product-moment correlation coefficient (r) as shown below:

\[
r = \frac{N \sum XY - \sum X \cdot \sum Y}{\sqrt{[N \sum X^2 - (\sum X)^2] \cdot [N \sum Y^2 - (\sum Y)^2]}}
\]

Where

- \( r \) = the Pearson’s coefficient of correlation index.
- \( X \) = Scores obtained during the first trial.
- \( Y \) = Score obtained after a week.

The calculated value was \( r = 0.802 \). According to Orodho (2005) a correlation coefficient (r) of about 0.75 should be considered high enough to judge the reliability of the instrument. As the value obtained was above 0.75 hence the test for the study was reliable.

To measure reliability on attitude scales on instruments, the Cronbach’s alpha coefficient was used, which determined the internal consistency of items in the
instrument. Internal consistency estimate how consistently the respondents have responded to the items within the likert scale. The calculated alpha value of 0.742 and 0.812 was obtained for likert scale on students and teachers questionnaires respectively. Orodho (2005) notes that the alpha value closer to 1, the higher the internal consistency.

3.7 Data Collection Procedure

First, the researcher obtained a permit from the office of the President before visiting the schools to seek permission from the headteachers to collect data from their schools. On the second visit to the school, the questionnaires were issued to the HoDs of mathematic/sciences and mathematics teachers. In the case of the students, the form three mathematics teachers assisted in distributing the questionnaires. All the questionnaires given out were collected on the same day. The interview with headteacher or their deputies was arranged during the first visit to the school while seeking permission to collect data. On the second day, an interview with the available headteachers or their deputies at their own convenient time was carried and the interview process was recorded by researcher, thereafter decoded.

3.8 Data Analysis

Data analysis is the process of systematically searching and arranging obtained data from the field with the aim of increasing your own understanding of them and enabling you to present to others. This involves working with data, organizing
data, breaking into manageable units, synthesizing them and searching for patterns (Orodho, 2005). In this study, data from all the questionnaires and interview schedule were assembled and edited to identify those instruments which were left blank. Using the research objectives and research questions as guidelines; all the data from teachers questionnaires, HoD's questionnaires, students' questionnaires and the interview schedule were coded.

Teachers' questionnaires provided data to answer questions on qualification, experience, attitude, resource, teaching methods, other general factors influence performance and measure to improve performance. HoD's questionnaires provided data to answer questions on availability of teachers, resources, students' background, other general factors influencing performance and measure to improve performance. Interview schedule provided data to supplement various questionnaires on teacher-related, resources, students' background, other general factors influencing performance and measure to improve performance. Students' questionnaire provided data to answer questions on attitude, students' background, other general factors influencing performance and measure to improve performance.

The researcher tallied the responses and obtained frequency distribution tables. Frequency distribution tables were used to calculate the mean, mode and percentages. The data were presented with the aid of percentile, graphs and pie charts. On the basis of these, the researcher gave the summary
3.9 Logistical and Ethical Considerations

Permission was sought from the office of the president before data collection. During the initial visits to the sampled schools, permission was requested from the headteachers as shown in appendix E before involving the teachers and students. A good rapport was established with all the respondents by assuring them that the information they gave would be treated as confidential and was to be used for the purpose of the study.

3.10 Summary of the Chapter

This chapter has described the research design used in the study, issues on study locale, target population, sampling techniques, data collection procedure and analysis as well as logical and ethical considerations. The next chapter is on data presentation, analysis and interpretation.
CHAPTER FOUR
DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.0. Introduction

In this chapter, the results of the study are presented. The research explored the teachers and students’ perceptions of factors which influence students’ performance in KCSE mathematics in Tana River County. The information given was derived from the responses obtained from interview schedule and questionnaires issued to HoDs of mathematics/sciences, mathematics teachers and students.

4.1 Teacher-Related Factors that Influence Students’ Performance in Mathematics

Teachers are very important in students’ learning process. Their contribution to students’ performance in mathematics is significant; (Hyde & Jaffe, 1998). Hence, examining various characteristics of the teachers and their influence on students’ performance in KCSE mathematics was necessary.

4.1.1 Academic Qualification of Mathematics Teachers

The study sought to find out the academic qualification of mathematics teachers. The results are as shown in the Table 4.1.
Table 4.1: Academic qualification of Mathematics teachers (n=9)

<table>
<thead>
<tr>
<th>Respondents</th>
<th>Specialization in mathematics</th>
<th>Number of Teachers</th>
<th>Mathematics Mean score of the Test done during the study.</th>
<th>Maximum mean score expected</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.ED (Science)</td>
<td>Major</td>
<td>4</td>
<td>1.96</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2.48</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2.35</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2.94</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Minor</td>
<td>3</td>
<td>1.84</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1.75</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1.81</td>
<td>12</td>
</tr>
<tr>
<td>Diploma in Technical Education</td>
<td>Minor</td>
<td>2</td>
<td>1.76</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1.72</td>
<td>12</td>
</tr>
</tbody>
</table>

**Major**- Subject one took more unit among two teaching subject in secondary school in Kenya

**Minor**- Subject one took few unit among two teaching subject in secondary school in Kenya

The finding in Table 4.1 indicates that 7 out of 9 Mathematics teachers are holders of degree in education while 2 out of 9 are holders of Diploma in Education. It’s an indication that mathematics teachers have qualifications to teach Mathematics. Among the qualified teachers, 5 out of 9 took mathematics as a minor subject during their study in college. Despite the county having qualified teachers, students’ mathematics performance was very low but there is a relative good performance in schools taught by teachers who majored in mathematics. This is in
agreement with Kaur, (2004) who argues that; teacher’s qualification is significant and can be used to predict students’ performance in mathematics.

### 4.1.2 Teachers Experience and In-service Courses Undertaken

According to Bell (1998), a better trained and experienced teacher produces higher academic performance than the untrained. Based on the above views, the study established the teaching experience and in-service courses such as SMASSE attended by mathematics teachers in the county as shown in the Table 4.2.

**Table 4.2: In-service course attended by mathematics teachers for the last 2 years (n=9)**

<table>
<thead>
<tr>
<th>Response</th>
<th>Number of teachers</th>
<th>Response</th>
<th>Number of teachers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attended</td>
<td>8</td>
<td>Level of using the skill</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Adequate</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inadequate</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not at all</td>
<td>1</td>
</tr>
<tr>
<td>Not attended</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>9</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The study found that 8 out of 9 Mathematics teachers attended an in-service course within the past two years. It was also evident that 2 out of 8 teachers who attended the in-service course felt that they adequately used the skills acquired while 1 out of 8 teachers said they do not use the skills at all. Generally, teachers in the County received in-service training but 6 out of 8 felt that the cause was useless. A study by
Fuller (1985) reveals that there is a positive correlation between in-service training and performance.

A study by Fuller (1985) reveals that there is a positive correlation between years of experience and performance. The researcher was, therefore, interested in establishing the experience of teachers in teaching mathematics at the same station. Data was collected and the results tabulated as shown in Table 4.3.

**Table 4.3 Experience of mathematics teachers (n=9)**

<table>
<thead>
<tr>
<th>Respondents</th>
<th>Teaching mathematics</th>
<th>In the same station</th>
<th>Maximum mean score expected</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Class Score of the test</td>
<td>n</td>
</tr>
<tr>
<td>Less than 5 years</td>
<td>2</td>
<td>2.35</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.94</td>
<td></td>
</tr>
<tr>
<td>5 years- 10 years</td>
<td>2</td>
<td>1.96</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.48</td>
<td></td>
</tr>
<tr>
<td>11 years- 15 years</td>
<td>5</td>
<td>1.76</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.81</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.75</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.84</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.72</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The findings show that 7 out 9 teachers have an experience of 5 years and above teaching mathematics. Schools with teachers having an experience of less than 5 years and in same station for less than 5 years performed relatively better. Also 7 out 9 teachers have stayed in the same stations for 5 years and above. The study shows that the schools with teachers who have stayed long in the same station performed relatively low in comparison with those schools with teachers who have stayed for less than five years.

4.1.3 Availability of mathematics teachers.

The Table 4.4 shows the number of mathematics teachers in the sampled schools. The schools are categorized according to the number of teachers they have.

Table 4.4 Mathematics teachers and their workload in the schools (n=9).

<table>
<thead>
<tr>
<th>Number of teachers per school</th>
<th>Schools (n)</th>
<th>Teacher : Students Ratio in a class</th>
<th>Teachers required as per curriculum based establishment (CBE)</th>
<th>Number of lessons per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>1:51</td>
<td>2</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1:58</td>
<td>2</td>
<td>29</td>
</tr>
<tr>
<td>2</td>
<td>6</td>
<td>1:55</td>
<td>3</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1:50</td>
<td>3</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1:65</td>
<td>4</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1:56</td>
<td>3</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1:44</td>
<td>2</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1:52</td>
<td>3</td>
<td>27</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>1:65</td>
<td>4</td>
<td>28</td>
</tr>
</tbody>
</table>
The researcher, in an effort to establish why mathematics was performed poorly, considered the issue of availability of teachers. Table 4.4 reveals that 8 out of 9 had a shortage of mathematics teachers according to the schools CBE. Mathematics teachers had 27 and above lessons per week. According to Ministry of Education (1999), the number of lessons a teacher should have for effective planning should not exceed twenty seven. This implied that the teachers are overloaded especially with highly populated schools due to subsidized secondary education. In the sampled schools, teacher-student ratio was above 1:45. According to Eshiwani (1983), a teacher-student ratio of 1:40 is appropriate and manageable. The ratio of teacher-student ratio in Tana River County was above the recommended ratio of 1:45 by the Ministry of Education (1999).

The study found it necessary to establish whether the available teachers can handle the current students population in schools. The results are as shown in Figure 4.1
The study found that 8 out of 9 headteachers said that mathematics teachers were not enough to handle the current student population especially in form one and two. Eshiwani (1983) found that; teacher-student ratio had some effect on performance of students in western province of Kenya. If the ratio is too high, teachers do not mark student books regularly. Such observation lowers the students’ performance in mathematics examination as evidenced in Tana River County.

4.1.4 Accessibility of Mathematics Teachers
Barnhart (1998) defines accessibility as a state at which an individual can be reached, talked to and get to know them. To determine whether teachers are accessible and ready to assist their students, the views of students and form three
mathematics teachers were gathered and analyzed as shown in Figure 4.2 and Table 4.5.

Figure 4.2: Teachers consultation according to students (n=344)

Figure 4.2 shows that 74% of the students were free to consult their teacher while 7% did not consult. Consultation forms the basis of teachers and students interaction. Vygosky (1978) says interaction forms the social context in which children participate; mediate student’s thinking and also significant in learning mathematics.

Table 4.5 Consultation according to teachers (n=9)

<table>
<thead>
<tr>
<th>Questions</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Not Sure</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students are free to consult me in case of a problem</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Students ask questions in class</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>4</td>
<td>2</td>
</tr>
</tbody>
</table>
Table 4.5 shows, 1 out of 9 Mathematics teachers felt that their students are free to consult them in case of problem while 2 out of 9 said their students ask questions in class. The study revealed that, despite the students claiming there is consultation between the teachers and students, such consultation have a little impact on performance which is still very low as shown in Table 1.3

4.1.5 Commitment of Teachers on their Work

It was also worth establishing the views on commitment of teachers towards their work. The results are as shown in Table 4.6:

<table>
<thead>
<tr>
<th>Response</th>
<th>Marking student work</th>
<th>Assisting students after class</th>
<th>Lessons attendance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>n</td>
<td>n</td>
</tr>
<tr>
<td>Very committed</td>
<td>1</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>Committed</td>
<td>8</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Not committed</td>
<td>0</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>9</td>
<td>9</td>
<td>9</td>
</tr>
</tbody>
</table>

The findings indicated that all HoDs felt that their teachers were committed to marking students work and attending their lessons regularly, while 4 out of 9 were committed to assisting the students after class.
The study also found the views of students on commitment of teachers in attending their lessons. The results were as shown in Figure 4.3.

![Figure 4.3: Students’ views on teachers’ attending lessons (n=344)](image)

It was found that 67.4% of students reported that, mathematics teachers attend all the lessons when in school. Only 30.2% of the students said that their teachers rarely attend all the lessons. As noted in Figure 4.4, teachers were committed to attending their lessons except 2.4% who did not attend their lessons. The absence of mathematics teacher would affect syllabus coverage. This in turn would affect the performance of mathematics.

4.1.6 Teachers’ Attitude Towards Teaching Mathematics

Teachers’ attitude is a significant predictor of pupils’ mathematics performance (Smith, 1996).
To establish the attitude of teachers in the County, their opinion about teaching mathematics was sought as shown in Table 4.7.

**Table 4.7: Teachers’ opinion on teaching mathematics (n=9)**

<table>
<thead>
<tr>
<th>Questions</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Not Sure</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
</tr>
<tr>
<td>I teach mathematics because I have no option</td>
<td>2</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Mathematics is the best subject to teach</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>I enjoy teaching mathematics in school</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Teaching mathematics is difficult in my school</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 4.7 shows that 8 out of 9 teachers teach mathematics because they don’t have any option while 6 out of 9 said they find difficult to teach mathematics in their schools. In addition, only 1 out of 9 teachers enjoy teaching mathematics in their schools and 3 out of 9 felt that mathematics was their best subject to teach in their schools. This indicates negative attitude towards teaching mathematics. This forms the basis for further study to establish the reasons of such attitude among the teachers in Tana River County. Negative attitude towards mathematics affects the commitment of the teachers in preparation and teaching mathematics (Bell, 1981) and eventually the students’ performance.
4.1.7: Teaching Methods and Their Influence on Mathematics Performance.

The researcher sought to establish the teaching method used by mathematics teachers during their teaching. According to NCTM (2000), students' understanding of mathematics, their ability to use it to solve problems, their confidence in and disposition towards mathematics are well-shaped by the teaching methods used in class. This was achieved by analyzing the views of teachers and students as shown in Table 4.8, Table 4.9 and Figure 4.5.

Table 4.8 Teaching methods used by the teachers (n=9)

<table>
<thead>
<tr>
<th>Respondents</th>
<th>Very Often</th>
<th>Often</th>
<th>Rarely</th>
<th>Not at All</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
</tr>
<tr>
<td>Lecture</td>
<td>2</td>
<td>6</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Demonstration</td>
<td>6</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Small group Discussion</td>
<td>0</td>
<td>1</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>Practical</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Drill &amp; Practice</td>
<td>2</td>
<td>5</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Problem Solving</td>
<td>0</td>
<td>2</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Question &amp; Answers</td>
<td>9</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

From Table 4.8, it was revealed that 8 out 9 Mathematics teachers use lecture method, all teachers use demonstration and 7 out 9 teach using drill and practice often. These are teacher-centered approaches. Other teaching methods used according to the study were question and answer as cited by all the teachers, problem solving cited by 2 out of 9 and small group discussion by 1 out of 9 teachers.
Improvement of mathematics by all students requires effective mathematics teaching in class. Effective teaching and learning occurs when students are actively involved in class activity. The study sought the opinion of students in relation to teaching and learning as shown in Table 4.9 and Figure 4.5.

Table 4.9. Students’ opinion on mode of teaching. (n=344)

<table>
<thead>
<tr>
<th>Respondents</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Not sure</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>My teacher uses models and chart while teaching.</td>
<td>9.3</td>
<td>20.4</td>
<td>2.9</td>
<td>67.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Teachers do not revise elementary ideas before teaching.</td>
<td>16.5</td>
<td>41.7</td>
<td>16.3</td>
<td>19.5</td>
<td>6.0</td>
</tr>
<tr>
<td>Most examples and illustrations used are locally available.</td>
<td>7.5</td>
<td>11.6</td>
<td>21.5</td>
<td>51.2</td>
<td>8.2</td>
</tr>
<tr>
<td>I am not able to cope with the teaching pace of my teacher</td>
<td>37.8</td>
<td>29.1</td>
<td>15.5</td>
<td>6.1</td>
<td>11.5</td>
</tr>
<tr>
<td>Mathematics idea taught in class are linked to daily life issue</td>
<td>10.7</td>
<td>12.8</td>
<td>8.5</td>
<td>40.9</td>
<td>27.1</td>
</tr>
</tbody>
</table>

From Table 4.9, 67.4% of students said their teachers teach without resources while 58.2% accepted that the teachers do not revise the previous ideas related to the topic taught before teaching. Another 59.4% noted that the teachers do not use illustrations and locally available materials as examples and 66.9% said that they don’t cope with the teaching speed of their teachers. In addition 68% of students responded that the concepts taught are not linked to their daily life issue.
The findings in Figure 4.4 indicate that 80% of the students like small group discussions and 40% like teacher explanations while 34.3% like homework. An indication that students preferred learning in small groups which is rarely used by the teachers as revealed in Figure 4.7. This indicates that, teachers rarely involved learners in their teaching approaches in class. According to Miheso (2002), the type of teaching approach used has an effect on students’ performance. The study revealed that the teachers in Tana River County prefer to use teacher-centred approaches, hence a possible reason for poor performance in mathematics examinations.

4.2 Teaching Resources and Their Influence on Performance in Mathematics.
The study sought to determine the available teaching and learning resources in Tana River County schools. Results are as shown in Table 4.1
Table 4.10: HoD’s views on availability of resources. (n=9)

<table>
<thead>
<tr>
<th>Resources</th>
<th>Available</th>
<th>Available but not Enough</th>
<th>Not Available</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>Textbooks</td>
<td>1</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>Models</td>
<td>0</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Charts</td>
<td>1</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Calculators</td>
<td>0</td>
<td>1</td>
<td>8</td>
</tr>
</tbody>
</table>

According to Kiragu (1986), textbooks, models, charts and calculators are known to strengthen the students command in mathematics. The study found that 8 out of 9 HoDs were on agreement that textbooks are available but not adequate while the same number also said that the calculators are not available. On models, 6 out of 9 respondents said they were available but not enough for teaching mathematics and 7 out of 9 respondents indicated that there is neither commercial nor teacher made charts in their schools. The findings indicate shortage of these resources in schools.

With such observation, it was worth finding out the effort made by mathematics teachers to teach with resources. To begin with, the study sought to establish whether teachers improvised the resources using the locally available materials. The results were as shown Figure 4.5.
Figure 4.5: Teacher’s improvisation of resources (n=9)

When resources are not available, 7 out of 9 teachers said they teach without while the rest improvise. Secondly, the researcher was interested in knowing the challenges experienced by teachers in the acquisition of resources and the result were as shown in Table 4.11.

Table 4.11: Challenges to acquire resources (n=9)

<table>
<thead>
<tr>
<th>Response</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administration not providing resources in time when requested</td>
<td>8</td>
</tr>
<tr>
<td>Poverty level; student not able to buy calculators</td>
<td>9</td>
</tr>
<tr>
<td>Students not co-operating if requested to bring some models</td>
<td>2</td>
</tr>
</tbody>
</table>

Table 4.11 indicate that 8 out of 9 teachers blamed the administration for being reluctant in buying resources in time while all teachers said due to high poverty
level student couldn’t acquire calculators. In addition 2 out of 9 cited that the students were not willing to bring resources from their locality if requested.

Headteachers and HoDs were to respond on resource utilization by their teachers. They were to rate how often teachers use resources as shown in Figure 4.7

**Figure 4.6 Headteachers and HoDs on resource utilization by teachers (n=18)**

Figure 4.6 indicate that the rate of using the resources by teachers is wanting as cited by 83% of the respondents. Only 17 % of the teachers use the resources while teaching according to HoDs and Headteachers.
In general, the study established that there was a shortage of resources with teachers unwilling to improvise where possible. If resources were not used, students would have little interest in mathematics, eventually affecting student’s performance (Mutunga & Breckwell, 1992). As resources are rarely used and teachers don’t improvise, hence a possible factor influencing students’ performance in mathematics examination.

### 4.3 Students-Related Factors that Influence Mathematics Performance

#### 4.3.1 Attitude and its influence on performance

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

**Table 4.12:-Headteachers’, HoD’s and teacher’s opinion on students’ attitude towards mathematics (n=27)**

<table>
<thead>
<tr>
<th>Response</th>
<th>Percentage (%)</th>
<th>Average mean score on each category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td>14.8</td>
<td>2.71</td>
</tr>
<tr>
<td>Neutral</td>
<td>18.5</td>
<td>2.05</td>
</tr>
<tr>
<td>Negative</td>
<td>66.7</td>
<td>1.76</td>
</tr>
</tbody>
</table>

Table 4.12 above reveals that, 66.7% of the respondents believed that their students had negative attitudes towards mathematics while 14.8% believe that their students’ had positive attitudes towards mathematics. The finding shows that there is low performance on the test done during the study but relative good
performance on schools were the respondent said the students’ had positive attitude towards mathematics.

In order to establish the attitudes of students; it was worth obtaining the opinion of students. The results are as shown in Table 4.13

**Table 4.13: Opinions of students’ towards mathematics and their teachers**

(n=344)

<table>
<thead>
<tr>
<th>Questions</th>
<th>Strongly Agree (%)</th>
<th>Agree (%)</th>
<th>Not Sure (%)</th>
<th>Disagree (%)</th>
<th>Strongly Disagree (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics is very easy subject</td>
<td>8.7</td>
<td>24.5</td>
<td>3.5</td>
<td>41.3</td>
<td>22.1</td>
</tr>
<tr>
<td>Mathematics is purely theoretical and abstract.</td>
<td>39.0</td>
<td>29.7</td>
<td>6.4</td>
<td>22.7</td>
<td>2.2</td>
</tr>
<tr>
<td>I dislike mathematics like my friend</td>
<td>28.0</td>
<td>43.0</td>
<td>4.1</td>
<td>19.1</td>
<td>5.8</td>
</tr>
<tr>
<td>My teacher is very harsh</td>
<td>6.4</td>
<td>22.7</td>
<td>10.4</td>
<td>47.1</td>
<td>13.4</td>
</tr>
<tr>
<td>I dislike my mathematics teacher</td>
<td>3.5</td>
<td>23.8</td>
<td>1.7</td>
<td>29.1</td>
<td>41.9</td>
</tr>
<tr>
<td>I like mathematics</td>
<td>6.1</td>
<td>12.4</td>
<td>21.2</td>
<td>45.3</td>
<td>15.0</td>
</tr>
</tbody>
</table>

Table 4.13 indicates that, 63.4% of students felt that mathematics was difficult while 33.2% said mathematics was easy to them. However, 68.7% of students find mathematics as purely theoretical and abstract subject, 71% of the students disliked the subject. Students’ opinions towards their teachers indicated that 60.5%
of them were friendly to their teachers while 79.0% said that their teachers were not harsh to them.

To obtain more information on attitude, the study sought the opinions of students on how often they studied mathematics during their free time at least one hour per session. The results are in Figure 4.7.

![Figure 4.7: Frequency of students’ studying mathematics (n=344)](image)

The study revealed that 36.6% of the students do self-study mathematics once a week and 23.8% during examinations; 21.5% studied twice a week while 15.9% revised on daily basis.

From Table 4.11, Table 4.12 and Figure 4.7, the results show that the students have negative attitude towards the subject and a positive attitude towards
mathematics teachers. Reys et-al., (2001) says that, negative attitude towards mathematics can be revealed by students in various classic symptoms of mathematics such as poor performance as evidenced in Tana River County.

4.3.2 Students’ Background and its influence on Mathematics

The study sought to establish whether the students’ background has an influence on students’ performance. The results were obtained from Headteachers, HoDs and mathematics teachers as shown in Figure 4.8

![Figure 4.8. Opinions on students’ background on performance (n=28).](image)

According to the study, gender stereotype was acknowledged by 92.5% of the respondents where girls are perceived inferior to boys and this affected their participation in class, especially in mixed schools. In addition 67.9% said early
marriage have an impact on performance to these girls while 59.3% recognized that nomadic life also had an influence on performance.

Language was another issue cited by 81.5% of the respondents as a factor having an impact on performance. It was noted that most students use their local language and rarely communicate in English. Only 7.4% of the respondents said religion had an impact on students’ performance.

In the study, it was worth establishing the commitment of parents in providing resources and encouraging their students while studying mathematics. Findings are as shown in Table 4.14.

**Table 4.14. Opinion of students’ on their parental Support (n=344)**

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

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

4.4. Suggested Solutions to Improve Students’ Performance in KCSE Mathematics

To establish the measures to take in order to improve students’ performance, the researcher gathered information on possible reasons for poor performance from all the respondents.

4.4.1 Reasons for Poor Performance in Mathematics

Respondents gave reasons for poor performance in mathematics examination in their schools; they gave more than one reason. The frequency of the suggested causes of poor performance in mathematics according to them were analyzed and compared among students and teachers. The suggested reasons are in Table 4.15:-

**Table 4.15 Reasons for poor performance in mathematics (n=371).**

<table>
<thead>
<tr>
<th>Reasons of poor performance</th>
<th>Percentages(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students (n=344)</td>
<td>All Teachers (n=27)</td>
</tr>
<tr>
<td>Understaffing of Mathematics teachers</td>
<td>66.6</td>
</tr>
<tr>
<td>Lack of interest to learn Mathematics</td>
<td>39.5</td>
</tr>
<tr>
<td>Inadequate resources</td>
<td>76.4</td>
</tr>
<tr>
<td>Harsh weather condition</td>
<td>64.0</td>
</tr>
</tbody>
</table>
Nomadic culture | 47.1 | 13.3
---|---|---
Truancy and absenteeism | 35.5 | 83.7
Very Strict teachers | 23.8 | 0.0
Influenced by peer pressure | 18.0 | 60.0
Unsupportive administration | 0.0 | 33.2
Lack of revision | 60.5 | 87.6
Low entry marks in form one | 7.2 | 93.3
Not covering the syllabus in time | 54.1 | 23.4

All teachers:- Includes Headteachers, HoDs and Mathematics teachers.

Table 4.15 indicates 64% of the students and 67.0% of all teachers attributed poor performance in mathematics to harsh weather condition, characterized by high temperature in the region. The data were collected in November and the students may have been emotional due to high temperature of 31°C -38°C experienced in the region at that time. The temperature during KCSE period is normally high.

Inadequate resource as a factor was cited by 76.9% of students and 89.1% of the teachers. Negative attitude towards mathematics; characterized by lack of interest to study mathematics among students was mentioned by 39.5% of the students and 87.5% of the teachers. In addition lack of revision was mentioned by 60.5%of students and 87.6% of the teachers.
Another reason cited was, nomadic culture by 47.1% of the students and 13.3% of teachers while only 23.8% of students said that the few available teachers are very strict hence the students fear to approach them. Truancy and absenteeism was also mentioned by 35.5% of the students and 83.7% of teachers as a reason for poor performance in mathematics while peer pressure was cited by 18.0% of students and 60.0% of the teachers. Only 33.0% of teachers blamed the administration for being unsupportive in handling indiscipline among students.

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

4.4.2 Suggested Solution to Improve Students’ Performance in Mathematics Examination.

All the respondents were required to give suggestions on how to improve students’ performance in mathematics examination in secondary schools of Tana River County. The following were suggested solutions in Table 4.16.

Table 4.16: Suggested solution to improve students’ performance

<table>
<thead>
<tr>
<th>Suggested solutions to improve performance in mathematics</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government to employ more teacher</td>
<td>65.8%</td>
</tr>
<tr>
<td>Teacher should use students-centered approach</td>
<td>63.1%</td>
</tr>
<tr>
<td>School administrators to provide resources in time</td>
<td>69.5%</td>
</tr>
<tr>
<td>建议</td>
<td>反映百分比</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>------------</td>
</tr>
<tr>
<td>由于高温，学校应采用热带时间表</td>
<td>81.4%</td>
</tr>
<tr>
<td>社区领导应向家长普及教育重要性</td>
<td>51.8%</td>
</tr>
<tr>
<td>指导和辅导以改变学生的消极态度</td>
<td>77.5%</td>
</tr>
<tr>
<td>要求标记KCSE数学的教师给考生提供建议</td>
<td>23.5%</td>
</tr>
</tbody>
</table>

研究发现，77.5%的受访者表示，为了改变学生对数学的消极态度，指导和辅导会议应由数学部门在各个学校组织。在这样的论坛中，县内表现优秀的数学模范应被邀请。

由于高温，81%的受访者建议学校该地区应采用热带时间表。在这种安排下，学校课程开始时间早，早晚课程时温度高的时间被更换。在资源方面，69.5%的受访者建议学校管理层应建造更多教室，购买更多书籍，教师可就地取材。

为解决教师短缺问题，65.8%的受访者表示，政府应招聘和派遣更多教师到该地区。

为了解决问题，65.8%的受访者表示，政府应招聘和派遣更多教师到该地区。
all recruitments should be done at TSC headquarters. Recruitments should not be
decentralized in schools as the region has shortage of qualified teachers and those
from other region rarely apply for advertised post.

It was also suggested by 63.1% of the respondents that the teachers should use
teaching approaches which were students-centred. John and Raising (1972)
suggested that teachers should always make the students feel they are friendly to
the teacher regardless of success or failure. Eventually, students participate in the
learning process.

To involve the parents, it was suggested by 51.8% of the respondents that
community leaders and school administrators should regularly organize seminars
to enlighten the parents on the importance of their involvement in their child
education. Ethington, (1992) says that parents play an important role in
influencing their children’s performance in mathematics.

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

In this chapter, findings of the study were presented and factors influencing students’ performance in mathematics in Tana River County were identified. Next chapter summarizes the findings; give conclusion and recommendations to be adopted if mathematics performance is to improve at school level and national examinations.
CHAPTER FIVE
SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

In this study the views of students, mathematics teachers, HoDs of mathematics/sciences and headteachers on factors influencing students’ performance in KCSE mathematics in Tana River County were sought. Most occurring reasons were recorded. The information was obtained using questionnaires for students, mathematics teachers and HoDs of mathematics/sciences. In addition interview schedule was also used.

5.1 Summary

The study was carried out in Tana River County. The researcher carried out the research using questionnaire and interview guides. 8 headteachers and 1 deputy headteacher were interviewed. Nine HoDs of mathematics/sciences, nine mathematics teachers currently teaching form three class during the study and three hundred and forty four students responded to the questionnaires.

The findings were presented in frequency distribution tables, percentile, bar graphs and pie charts. The following are perceived to influence students’ performance in KCSE mathematics in Tana River County.

1. Shortage of professionally trained teachers. This was suggested by 80% of the headteachers, HoDs and mathematics teachers. Despite that, the available teachers were professionally qualified. Seven out of 9
mathematics teachers had degrees in education while 2 out of 9 had
diploma in education. In addition, 8 out 9 available mathematics teachers
had attended the current in-service programme (SMASSE).

2. Insufficient teaching and learning resources. Despite the government effort
to provide subsidized secondary education, all the schools are experiencing
shortage of teaching and learning resources like models, calculators, charts
and revision textbooks. Teachers are also not willing to improvise
resources as mentioned by 8 out of 9 teachers.

3. Teaching methods used by teachers are teacher-centred, such as lecture
method as cited by the 8 out of 9 teachers, demonstration by the entire
sample of teacher, drill and practice by 7 out of 9 and question and answers
by all teachers sampled. Consequently, 80% of the students’ like teachers
to use group discussions which are rarely used by teachers. Teacher-
centred approaches are associated with less understanding of mathematics
structure and concept, resulting in little retention of what is learnt, MoE
Handbook for Mathematic Teachers (2006). Teaching approaches used by
teachers are teacher-centred hence a possible factor influencing students’
performance in mathematics.

4. Harsh climatic and weather conditions throughout the year. The study
revealed that 64% of the students and 67% of the headteachers, HoDs and
mathematics teachers noted that, harsh climate characterized by high
temperature make it non-conducive for learning mathematics.
5. Lack of commitment among parents towards their students’ learning mathematics and performance. It was suggested by 89.5% of students that their parents don’t provide resources if required, such as calculators and revision textbooks. In addition, 87.8% of students don’t have adequate space to revise at home while 79% of the student said that their parents are not committed to their performance in mathematics. There is also chronic absenteeism and truancy among students as cited by 73% of the teachers and 35% of the students.

6. The study also revealed the students’ negative attitude towards mathematics and laxity among students as reasons for poor performance in the county. This was suggested by 68% and 80% of teachers and students respectively. In addition, the study found that, only 15.9% of the students study mathematics regularly at their own free time.

7. The study has established that, gender stereotype where girls are perceived inferior to boys as a factor influencing students’ performance. 92.8% of the teachers cited this as a reason and also early marriage as mentioned by 67.9% of the teachers. The culture of the Cushitic community in the County considers girls to be inferior to boys and hence do not value educating them. Those who attended secondary schools believe that such affect their participation in class.
5.2 Conclusion

The current study has revealed the following as the possible factors influencing students’ performance in KCSE mathematics in Tana River County.

(i) Teacher-related factors

The study has established that the available teachers are qualified but most schools are understaffed to the extent of not being able to handle the current students’ population. All the sampled schools had a teacher-student ratio of more than 1:45, the recommended ratio by Ministry of Education (1999).

The study has established that 80% of the students like teaching methods which are activity oriented. Despite that, 8 out 9 mathematics teachers use teacher-centred approaches like demonstrations and lectures. The Ministry of Education Handbook for Mathematics (2006) notes that these approaches are associated with less understanding of mathematical concepts and structures, resulting into little retention of what is learnt. Teaching approaches used by teachers are teacher-centred, hence a possible reason for poor performance in the county.

Teachers’ attitude towards teaching mathematics was established to be negative. Eight out 9 teachers in the county teach mathematics because they have no option and the same number does not enjoy teaching mathematics, an indication of negative attitude towards teaching mathematics.
(ii) Availability of the resources

It was established that all the schools are experiencing shortage of teaching and learning resources like models, charts, revision and text books, despite government effort to provide subsidized secondary education. In addition teachers do not improvise resources hence they prefer to use teacher-centred approaches like lecture methods and demonstration while teaching.

(iii) Student-related factors

The study found that the students have negative attitude towards Mathematics, leading to poor performance in mathematics. Sixty-eight percent of the students and 86% of the teachers agreed to this. Only 15.5% of the students studied mathematics daily during their free time.

The study has also revealed from the students that 79% of their parents are not committed to their academic progress and their performance. According to Ethington (1992), parents play an important role in influencing children’s attitude towards mathematics and their performance. Therefore lack of commitment by parents on their children’s mathematics progress is also a reason for poor performance in Tana River County.

It was also found that gender stereotype; where girls are perceived to be inferior to boys has contributed to the poor performance among girls. Ninety-two percent of the teachers cited such view and 67.9% of teachers cited early marriage among the
girls. The Cushitic communities in the county consider girls to be inferior to boys and do not value educating them. To those who are lucky to join secondary schools, such belief affects their participation in class. Another reason that influences student’s performance in mathematics was truancy and chronic absenteeism.

(v) Climatic factor

The research has established that the harsh climatic condition characterized by high temperatures has contributed to the poor performance in mathematics. This was suggested by 64% of the students and 67% of the teachers. As the temperatures are high, ranging from 31°C to 38°C especially during the month of October and November when students sit for the KCSE.

5.3 Recommendations

1. As the schools are understaffed in the County the board of governors (BoGs) and government should employ more teachers. The recruitments should not be decentralized in schools as those from other regions rarely apply for advertised posts in the district.

2. To motivate teachers to improvise, the schools BoGs in conjunction with county quality and assurance standards officer (CQASO) should develop a county mathematics panel where teachers can present their improvised resources and how they can be used to teach various topics. If adopted,
these can be compiled and used to teach in future. There should be a token of appreciation like certificate for such hardworking teachers.

3. On attitude, mathematics department should form departmental guidance and counselling committee composed of HoD mathematics/science and two teachers. On weekly basis, they should advise the students on attitude change and ways to improve performance. On such forums, they should invite KCSE mathematics examiners and roll model from society who performed well in their KCSE mathematic to motivate the students.

4. The school administration, with the help of local leaders should sensitize the community on the importance of education and the role of parents on improving the students’ performance in mathematics. It is during such forums that role models to motivate girls should be invited. They might motivate them to learn and pursue mathematics with positive attitude.

5. Due to high temperatures, the schools should adopt ‘tropical’ timetable, where the lessons start very early and end in the afternoon. In the case of boarding schools, the school can organize to have some lessons late in the evening.

5.4. Recommendations for Further Research

The researcher would wish to recommend further research to be done on the following:
1. The study was done in Tana River County which is among ASAL region in Kenya. There is need to conduct the study in other Counties with similar geographical conditions in the Country where students perform poorly in mathematics.

2. Impact of subsidized secondary education on students’ mathematics performance in Tana River County.

3. There is need to investigate the factors that lead to negative attitude among mathematics teachers and students in Tana River County.

4. Tropical timetable and learning mathematics in Tana River County.
REFERENCE


Provincial Director of Education. (2012). Coast Province KCSE Annual Reports. Mombasa: PDE.


World educational forum. (April, 2000). Dakar, Senegal.

APPENDICES


1. Name of the school.
2. When was the school started?
3. What is the school’s current population?
4. What was the school’s mathematics mean score in the last year KCSE?
5. How many mathematics teachers does your school have?
6. Do you think they are adequate for current student’s population?
7. Are mathematics teachers attending lessons regularly?
8. How do you rate your students’ attitude towards mathematics?
10. Which type of mathematics resources does your school have?
11. How do you rate the use of resources by your teachers in the school?
12. Are there social and cultural issues influence students’ performance in mathematics?

Reason for your answer

<table>
<thead>
<tr>
<th>Reason</th>
<th>_______________</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender stereotype</td>
<td>__________________</td>
</tr>
<tr>
<td>Religion</td>
<td>__________________</td>
</tr>
<tr>
<td>Nomadic life</td>
<td>__________________</td>
</tr>
<tr>
<td>Early marriage</td>
<td>__________________</td>
</tr>
<tr>
<td>Language</td>
<td>__________________</td>
</tr>
</tbody>
</table>

13. Are there any other factors that influence mathematics performance in your school?
14. What strategies have you laid down to help improve KCSE performance in mathematics in your school?
Appendix B: Questionnaire for HOD mathematics/science.

The main purpose of this questionnaire is to seek information concerning factors influencing KCSE mathematics performance in Tana River County secondary schools. Your response will be confidential and anonymous and will be used for research purposes only. Kindly respond to all questions as honestly and accurately as possible. Put a tick (√) against the information most applicable to you and fill in the blank spaces. Your sincere cooperation is highly appreciated.

You may not write your name.

1. What was the mathematics mean score in last year KCSE in your school? -------

2. How many mathematics teachers do you have in your department?
   - One
   - Two
   - Three
   - More than three

3. (a) What is the approximate ratio of mathematics teachers to students per class in your school?
   (b) State the number of mathematics teachers according to CBE in your school?

4. Rate the commitment of mathematics teachers in your department with respect to:

<table>
<thead>
<tr>
<th></th>
<th>Very committed</th>
<th>Committed</th>
<th>Not committed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marking students work</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assisting students after class</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attending lessons</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5. (a) Mathematics teachers in your department, do they use activity–oriented teaching? Yes Yes
   (b) If No in (a) above, give reasons:-----------------------------------------------
(c) i. If Yes in (a) above, How frequently ?.

- Very Often
- Often
- rarely
- Not at all

ii. Do you think activity -oriented teaching used by mathematics teachers influence performance in your school?

- Yes
- No

(iii) Give reason

6. What is your students’ attitude towards mathematics?

- positive
- Neutral
- Negative

Give reason for your answer

7. What is the attitude of mathematics teachers towards their students?

- positive
- Neutral
- Negative

Give reason for your answer

8. (a) What do you consider to be the availability of resources in your department?

(You can add any resource not listed below but available in your school and comment on it)

<table>
<thead>
<tr>
<th>Resources</th>
<th>Available</th>
<th>Available but not enough</th>
<th>Not Available</th>
</tr>
</thead>
<tbody>
<tr>
<td>Text books</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Models</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Charts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calculators</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
(b) Among the resources above, are there any improvised by the teacher?

[ ] Yes  [ ] No

(c) If Yes, list the type made and the related topic?

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

9. How do you rate your mathematics teachers in using the resources?

[ ] Good  [ ] Satisfactory  [ ] Poor  [ ] Don’t use at all

10. Which of the following social and cultural factors influence student’s performance in mathematics?

Reason for your answer

Gender stereotype  [ ]

Religion  [ ]

Nomadic life  [ ]

Early marriage  [ ]

Language  [ ]

11. What do you think could be the reason for poor performance in mathematics in your school?

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

12. What do you think can be done to improve KCSE mathematics performance?

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

Thank you for finding time to fill this questionnaire
Appendix C: Questionnaire for mathematics teachers

The main purpose of this questionnaire is to get information concerning factors influencing performance in KCSE mathematics in Tana River County secondary schools. The information you give on this questionnaire will be confidential and anonymous and will be used for research purposes only. Kindly respond to all questions as honestly and accurately as possible. Put a tick (√) against the information most applicable to you and fill in the blank spaces. Your sincere cooperation is highly appreciated.

You may not write your name.

1) (a) Name of your school -------------------------------

(b) Your sex?

Male [ ]

Female [ ]

2) Your qualification

M.ED [ ]

B.Ed (Science) [ ]

B.Ed (Arts) [ ]

BSC [ ]

PGDE [ ]

Diploma in Science Education [ ]

Form IV certificate [ ]

Any other specify ----------------------------------------------
3) Indicate whether you did mathematics as

Major

Minor

4) What was mathematics mean score in last term?  

5) Current teaching load in mathematics per week?

6) Teaching experience in mathematics: (i) Total number of years

(ii) Total number of years at current school

7) (a) List the method do you often use in teaching mathematics?

(b) How often do you use the methods listed below?

<table>
<thead>
<tr>
<th>Method</th>
<th>Very often</th>
<th>Often</th>
<th>Rarely</th>
<th>Not at all</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demonstration</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small group discussion</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Practical</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drill and practice</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Problem solving</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Question and Answer</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Any other method (specify)  

8) Consider each of the following statements and indicate the response that shows your opinion by putting a tick in the appropriate column on the numbers. SA-Strongly Agree , A- Agree , NS – Not Sure, D – Disagree, SD – Strongly Disagree.

<table>
<thead>
<tr>
<th>Statements</th>
<th>SA</th>
<th>A</th>
<th>NS</th>
<th>D</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>i I teach mathematics because I have no option</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ii Mathematics is the best subject to teach.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>iii Students do not ask questions in class.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>iv I enjoy teaching mathematics in my school.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>v Students are free to consult me in case of a problem.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>vi Parents are available to discuss the problem of their child</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>vii Teaching mathematics is difficult</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9) What is your students’ attitude towards mathematics?

- Positive
- Neutral
- Negative

10) Which of the following social and cultural factors influence student’s performance in mathematics?

Reason for your answer

<table>
<thead>
<tr>
<th>Factors</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender stereotype</td>
<td></td>
</tr>
<tr>
<td>Religion</td>
<td></td>
</tr>
<tr>
<td>Nomadic life</td>
<td></td>
</tr>
</tbody>
</table>
11 (a) Have you attended any course (In-service, Workshop or Seminar) in mathematics? Yes ☐ No ☐

(b) If No. give reasons as SMMASE is compulsory and in progress:--------

(c) If Yes, is the course assisting in improving your mathematics teaching skills and eventually students performance?.

 Adequate ☐ Inadequate ☐ Not at all ☐

(d) Give reason for your answer in (iii) above?-----------------------------

12 (a) What resources are available in your school?

(You can add any resource not listed below but available in your school and comment on it)

<table>
<thead>
<tr>
<th>Resources</th>
<th>Available</th>
<th>Available but not enough</th>
<th>Not Available</th>
</tr>
</thead>
<tbody>
<tr>
<td>Text books</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Models</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Charts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calculators</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(b) If resources are not available and you require them, what do you do?
(c) If Improvise, list the type made and the related topic?

(d) What challenges do you face when acquiring resources in your school?

13). What factors do you think influences KCSE performance in mathematics in your school?

14). What measures are you taking to improve KCSE performance in mathematics in your school?

Thank you for finding time to fill this questionnaire.
Appendix D: Questionnaire for students

Mathematics is a compulsory subject in our secondary curriculum. However KCSE mathematics performance has not been encouraging in Tana River County. Please help the researcher to find out various factors that influence KCSE performance in mathematics. Respond to all questions as honestly as possible.

Your response will be confidential and anonymous and will be used for research purpose only. Put a tick (√) against the information most applicable to you and fill in the blank spaces. Some questions may have more than one answer. Please tick more than one option where possible.

NB: You may not write your name.

1. Name of your school.-------------------------------------------------------------

2. Sex :

   Male  □
   Female □

3. Marks/Grade obtained in mathematics examination during:

   KCPE------------------------

4.(a) Which aspect of mathematics teaching do you like?( Put a tick to all aspect).

   □ Teacher explanations  □ Group discussion  □ Homework

   Any combinations (specify) --------------------------------------------------------------

(b) Why do you like the aspect(s) above?------------------------------------------------------

-------------------------------------------------------------------------------------------
5. Consider each of the following statements and indicate the response that shows your opinion towards mathematics and mathematics teacher by putting a tick in the appropriate column on the numbers. **SA-Strongly Agree , A- Agree , NS – Not Sure, D – Disagree, SD – Strongly Disagree.**

<table>
<thead>
<tr>
<th>Statements</th>
<th>SA</th>
<th>A</th>
<th>NS</th>
<th>D</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics is very easy subject</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mathematics is purely theoretical and abstract.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I dislike mathematics like my friend</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My teacher is very harsh</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I dislike my mathematics teacher</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I like mathematics</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

6. Consider each of the following statements and indicate the response that shows your opinion towards parental support on mathematics by putting a tick in the appropriate column on the numbers. **SA-Strongly Agree , A- Agree , NS – Not Sure, D – Disagree, SD – Strongly Disagree.**

<table>
<thead>
<tr>
<th>Statements</th>
<th>SA</th>
<th>A</th>
<th>NS</th>
<th>D</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>My parents provide me with revision materials and calculators for mathematics.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My parents / Guardian are not bothered by my performance in mathematics</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>At home I don’t find comfortable place to do my homework</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

7. Consider each of the following statements and indicate the response that shows your opinion towards mode of teaching mathematic used for teaching by putting a tick in the appropriate column on the numbers. **SA-Strongly Agree , A- Agree , NS – Not Sure, D – Disagree, SD – Strongly Disagree.**
My teacher uses models and chart while teaching.

Teachers do not revise elementary ideas before teaching.

Most examples and illustrations used are locally available.

I am not able to cope with the teaching pace of my teacher.

Mathematics idea taught in class are linked to daily life issue.

8. How often do you study mathematics at least one hour at your own free time?
   Daily □ Once a week □
   Twice a week □ Don’t study unless Exam/Test time. □
   Any other times per week (specify) ------------------------------------------

9. How often do teachers attend lessons when in school?
   All the time □ Rarely □ Not at all □

10. What do you think contributes the kind of performance you obtain in mathematics examinations?
    -----------------------------------

11. In your opinion, what should be done to improve KCSE performance in mathematics examination in your school?
    • 
    -----------------------------------

Thank you for finding time to fill this questionnaire.
Appendix E: Achievement test for students

Mathematics is a compulsory subject in our secondary curriculum. However, KCSE mathematics performance has not been encouraging in Tana River County. Please help the researcher to find out various factors that influence KCSE performance in mathematics. Respond to all questions on the test to the best of your knowledge. The information you give in this test will be strictly confidential and will be used for research purpose only.

1. Name of your school.----------------------------------------

2. Sex:
   Male  [ ]  Female  [ ]

3. Marks/Grade obtained in mathematics examination during:
   KCPE---------------------------

4. Solve the quadratics equation using complete square method.
   \[ x^2 - 3x + 6 = 0 \]

5. Without using mathematical tables or calculator, evaluate
   \[ \sqrt{0.456} \] and give your answer correct to 3 s.f.

6. Given that \( a = 2i - 4j \) and \( b = 3i + 2j \). Find
   \[ (i) \quad a - b \]
   \[ (ii) \quad |a - b| \]

7. A sum of sh.6000 is invested at 8% per annum compound interest. After how long will this sum amount to sh.8250? Give your answer correct to months.

8. Find the equation of a line parallel to the line \( 2y + 6x = 7 \) and passes through point \( (2, -1) \).
Appendix F: Introductory letter to school

Evans M Makeo,
Kenyatta University,
Department of Comm. & Tech,
P.O. Box 43844,
Nairobi.

To,
The Principal,
-----------------
-----------------
-----------------

Dear Sir/Madam,

RE: INTRODUCTORY LETTER.

I am a post-graduate student at Kenyatta University currently conducting a study on “Student and teacher perceptions of factors influencing students’ performance in KCSE mathematics in Tana River County” for the award of the degree of Master of Education of Kenyatta University.

I intend to involve secondary school headteachers, HoDs of mathematics /science, mathematics teachers and form three students as respondent. The findings will assist in making recommendations aimed at improving mathematics performance of students’ in the County.

The purpose of this letter is to inform you that I wish to be in your school to collect data on ------------------. I look forward to receive assistance to accomplish my research.

Thanks in advance.

Yours sincerely,

Evans M Makeo.
Appendix G: Secondary School in Tana-River County

<table>
<thead>
<tr>
<th>KNEC CODES</th>
<th>NAME OF SCHOOL</th>
</tr>
</thead>
<tbody>
<tr>
<td>103101</td>
<td>Hola boys Secondary School</td>
</tr>
<tr>
<td>103102</td>
<td>Mau Mau Girls Secondary School</td>
</tr>
<tr>
<td>103103</td>
<td>Wenje mixed Secondary School</td>
</tr>
<tr>
<td>103201</td>
<td>Tarasaa mixed Secondary School</td>
</tr>
<tr>
<td>103202</td>
<td>Ngao Girls Secondary School</td>
</tr>
<tr>
<td>103203</td>
<td>Kipini mixed Secondary School</td>
</tr>
<tr>
<td>103204</td>
<td>Gadeni mixed Secondary School</td>
</tr>
<tr>
<td>103301</td>
<td>Hirimani mixed Secondary School</td>
</tr>
<tr>
<td>103401</td>
<td>Madogo mixed Secondary School</td>
</tr>
<tr>
<td>112102</td>
<td>Garsen mixed Secondary School</td>
</tr>
</tbody>
</table>
Appendix H: Tana River County Map.