ATTITUDES TOWARDS LEARNING AND PERFORMANCE IN MATHEMATICS AMONG STUDENTS IN SELECTED SECONDARY SCHOOLS IN BURETI DISTRICT, KENYA

BY

JACKSON KIPRONOH MUTAI
E55/10148/2007

A THESIS SUBMITTED IN PARTIAL FULFILMENT FOR THE AWARD OF MASTER OF EDUCATION DEGREE IN THE SCHOOL OF EDUCATION KENYATTA UNIVERSITY

APRIL 2010
Declaration

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

Signed ___________________________ Date __________________________

JACKSON KIPRONOH MUTAI

E55/10148/2007

SUPERVISORS

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

Signed ___________________________ Date __________________________

DR. SIMON M. RUKANGU
DEPARTMENT OF EDUCATIONAL COMMUNICATION AND TECHNOLOGY
KENYATTA UNIVERSITY

Signed ___________________________ Date __________________________

PROF. PETER K. MUTUNGA
DIRECTOR, RUIRU CAMPUS
KENYATTA UNIVERSITY
Dedication

This work is dedicated to my wife Georgina Mutai and our children Stephen Kipngetich, Mercy Chepkemoi and Immanuel Kipyegon.
Acknowledgement

I acknowledge all the people who contributed to the accomplishment of this research thesis. Special thanks go to my supervisors Dr Simon Rukangu and Prof Peter Mutunga for their enabling guidance, support and patience from the developing of research topic to the completion of the study.

I am greatly indebted to my beloved wife Georgina Mutai and our dear children Stephen Kipngetich, Mercy Chepkemoi and Immanuel Kipyegon who encouraged and supported me morally and spiritually. Also acknowledged are my loving dad Erick Chepkwony and mum Alice Chepkwony who have been a source of inspiration to me throughout my life. Much gratitude also goes to all the principals, teachers and students for their cooperation in filling the questionnaires. I appreciate the DEO officials, Bureti district for their prompt response in allowing me access the academic records.

My appreciation also goes to Mr. Patrick Andere and Mr. Peter Mureithi who provided support during typing and editing of the research report.

I also thank all the lecturers in Educational Communication Department who insightful taught us during course work period. Also worth appreciating are my colleagues; Josephine Wagura, Ben Musyoka, Monica Adhiambo, Audrey Matere and Patrick Mose for their resourceful discussions on my research work.

I thank all the people who assisted me in one way or the other towards the successful completion of my studies.
# Table of Contents

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Declaration</td>
<td>ii</td>
</tr>
<tr>
<td>Dedication</td>
<td>iii</td>
</tr>
<tr>
<td>Acknowledgement</td>
<td>iv</td>
</tr>
<tr>
<td>Table of Contents</td>
<td>v</td>
</tr>
<tr>
<td>List of Tables</td>
<td>viii</td>
</tr>
<tr>
<td>List of Figures</td>
<td>ix</td>
</tr>
<tr>
<td>List of Abbreviations and Acronyms</td>
<td>x</td>
</tr>
<tr>
<td>Abstract</td>
<td>xi</td>
</tr>
<tr>
<td>CHAPTER ONE: INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>1.1 Introduction</td>
<td>1</td>
</tr>
<tr>
<td>1.2 Background to the study</td>
<td>1</td>
</tr>
<tr>
<td>1.3 Statement of the problem</td>
<td>5</td>
</tr>
<tr>
<td>1.4 Purpose of the study</td>
<td>6</td>
</tr>
<tr>
<td>1.5 Objectives of the study</td>
<td>6</td>
</tr>
<tr>
<td>1.6 Research questions</td>
<td>6</td>
</tr>
<tr>
<td>1.7 Significance of the study</td>
<td>7</td>
</tr>
<tr>
<td>1.8 Limitations of the study</td>
<td>7</td>
</tr>
<tr>
<td>1.9 Assumptions of the study</td>
<td>7</td>
</tr>
<tr>
<td>1.10 Conceptual framework</td>
<td>8</td>
</tr>
<tr>
<td>1.11 Organization of the thesis</td>
<td>10</td>
</tr>
<tr>
<td>1.12 Operational definition of terms</td>
<td>10</td>
</tr>
<tr>
<td>CHAPTER TWO: LITERATURE REVIEW</td>
<td>12</td>
</tr>
<tr>
<td>2.1 Introduction</td>
<td>12</td>
</tr>
<tr>
<td>2.2 Reinforcing factors of attitudes</td>
<td>12</td>
</tr>
<tr>
<td>2.2.1 Genetic predisposition</td>
<td>13</td>
</tr>
<tr>
<td>2.2.2 Individual student’s experience</td>
<td>14</td>
</tr>
<tr>
<td>2.2.3 Societal influence</td>
<td>17</td>
</tr>
<tr>
<td>2.2.4 School influence</td>
<td>18</td>
</tr>
<tr>
<td>2.2.5 Mathematics teachers</td>
<td>20</td>
</tr>
<tr>
<td>2.2.6 Gender factor</td>
<td>22</td>
</tr>
</tbody>
</table>
4.5.2 Years of experience in teaching mathematics ........................................... 46
4.5.3 Extent to which teachers liked teaching mathematics ............................... 47
4.5.4 Teachers’ opinions on mathematics as a subject ..................................... 48
4.5.5 Teachers’ opinions on what students like about mathematics .................. 49
4.5.6 Strategies to create interest in mathematics among students .................... 50
4.5.7 Methods used in teaching to enhance learning of mathematics ............... 51
4.5.8 Methods used by mathematics teachers to motivate students ................. 52
4.6 Discussions of the findings ........................................................................ 54

CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS .......... 59
5.1 Introduction .................................................................................................. 59
5.2 Summary ..................................................................................................... 59
5.3 Conclusions .................................................................................................. 61
5.4 Recommendations ......................................................................................... 62
5.5 Recommendations for Further Research .................................................... 63

REFERENCES .................................................................................................. 64
APPENDICES .................................................................................................... 70
APPENDIX A: Mathematics Teachers’ Questionnaire (MTQ) ............................ 70
APPENDIX B: Mathematics Students’ Questionnaire (MSQ) ............................ 73
APPENDIX C: Authorization Letter ................................................................... 74
APPENDIX D: Permission Letter ....................................................................... 75
APPENDIX E: Bureti District Map ..................................................................... 77
APPENDIX F: Bureti District Secondary Schools ............................................... 78
List of Tables

Table 1.1: Students’ Performance in KCSE in Bureti District, 2004-2007 ..................................3
Table 1.2: Students performance in mathematics in KCSE, 2005-2007 ..................................3
Table 2.1: Candidates Performance by Gender in the Year 2005 and 2006 KCSE Examination in Mathematics ........................................................................................................22
Table 3.1: Sample Grid of School Types and Categories, Students and Teachers in Bureti District ........................................................................................................................................33
Table 4.1: Students’ attitudes towards learning and performance in mathematics ...............42
Table 4.2: Factors influencing attitudes towards learning and performance in mathematics ...44
List of Figures

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1</td>
<td>Study process</td>
</tr>
<tr>
<td>4.1</td>
<td>Gender distribution</td>
</tr>
<tr>
<td>4.2</td>
<td>Types of schools</td>
</tr>
<tr>
<td>4.3</td>
<td>Problems associated with attitudes affecting learning and performance in mathematics</td>
</tr>
<tr>
<td>4.4</td>
<td>Number of lessons taught by mathematics teacher</td>
</tr>
<tr>
<td>4.5</td>
<td>Years of experience in teaching mathematics</td>
</tr>
<tr>
<td>4.6</td>
<td>Extent to which teachers liked teaching mathematics</td>
</tr>
<tr>
<td>4.7</td>
<td>Teachers’ opinions on mathematics as a subject</td>
</tr>
<tr>
<td>4.8</td>
<td>Teachers’ opinions on what students like about mathematics</td>
</tr>
<tr>
<td>4.9</td>
<td>Strategies to create interest in mathematics among students</td>
</tr>
<tr>
<td>4.10</td>
<td>Methods used in teaching to enhance learning of mathematics</td>
</tr>
<tr>
<td>4.11</td>
<td>Methods used by mathematics teachers to motivate students</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Description</td>
</tr>
<tr>
<td>--------------</td>
<td>-------------</td>
</tr>
<tr>
<td>ASEI</td>
<td>Activity Student-centre Experiment Improvisation</td>
</tr>
<tr>
<td>APU</td>
<td>Assessment of Performance Unit (in Britain)</td>
</tr>
<tr>
<td>BOG</td>
<td>Board of Governors</td>
</tr>
<tr>
<td>DES</td>
<td>Department of Education &amp; Science (in Britain)</td>
</tr>
<tr>
<td>HMI</td>
<td>Her Majesty Inspectorate (in Britain)</td>
</tr>
<tr>
<td>JAB</td>
<td>Joint Admission Board</td>
</tr>
<tr>
<td>JICA</td>
<td>Japanese International Co-operation Agency</td>
</tr>
<tr>
<td>KESI</td>
<td>Kenya Education Staff Institute</td>
</tr>
<tr>
<td>KCPE</td>
<td>Kenya Certificate of Primary School</td>
</tr>
<tr>
<td>KCSE</td>
<td>Kenya Certificate of Secondary Education</td>
</tr>
<tr>
<td>KIE</td>
<td>Kenya Institute of Education</td>
</tr>
<tr>
<td>KNEC</td>
<td>Kenya National Examination Council</td>
</tr>
<tr>
<td>MSQ</td>
<td>Mathematics Students’ Questionnaire</td>
</tr>
<tr>
<td>MTQ</td>
<td>Mathematics Teachers’ Questionnaire</td>
</tr>
<tr>
<td>PDSI</td>
<td>Plan Do See Improve</td>
</tr>
<tr>
<td>PTA</td>
<td>Parents Teachers Association</td>
</tr>
<tr>
<td>SMASSE</td>
<td>Strengthening Mathematics and Science in Secondary Education</td>
</tr>
</tbody>
</table>
Abstract

The purpose of this study was to investigate the attitudes’ influence towards learning and performance in mathematics by students in secondary schools in Bureti District. The objectives of the study were: a) to determine the attitudes formed by the students towards learning and performance in mathematics, b) to find out whether such attitudes contributed to inappropriate learning of mathematics and consequently poor performance in secondary schools and c) to establish factors which influence attitudes towards learning and performance of mathematics among secondary school students. The study adopted a descriptive survey design and data was largely descriptive by nature. Data was collected using Mathematics Teachers Questionnaires (MTQ) for teachers and Mathematics Students Questionnaires (MSQ) for students. These were administered on a sample of 24 teachers and 359 students respectively selected from six secondary schools in Bureti district. Data collected were coded and subjected to a Statistical Package for Social Science (SPSS) analysis. Findings indicated that the major problem associated with attitudes in the learning of mathematics in the secondary schools included lack of confidence and interest in the ability to learn and perform well in mathematics as reported by 45% of the respondents. Lack of interest in mathematics was mentioned by 24% of the respondents. With regards to attitudes towards mathematics as a subject, 56% of the respondents strongly agreed that they enjoyed learning mathematics as a subject. In addition, the same percentage (56%) strongly disagreed that Mathematics classes/lessons were not interesting. Out of the students respondents 49% of them strongly agreed that they would like to continue doing mathematics after secondary school. Only 38% of the respondents strongly disagreed that understanding mathematics was difficult while 70% of the respondents strongly agreed that Mathematics was a very useful subject in life. The following recommendations are made from the study: a) positive attitudes towards learning and performing well in mathematics are necessary ingredients in secondary school mathematics education. There is need for teachers, parents, and any other education stake holder to enhance these positive attitudes, b) there is a successive connection between attitudes, learning, performance and practical utility of mathematics. This connection should be established early enough in students’ mathematics education curriculum; c) mathematics teachers particularly should know precisely how students learn mathematics. This will help them organize and plan for effective teaching and learning of any mathematical concept. d) Language used while students learn mathematics should be purposively geared towards enhancing favourable attitudes towards mathematics education, e) mathematics departmental counseling should be undertaken regularly to assist students with persistent negative attitudes towards learning and performance in mathematics. The unfavourable attitudes should be curtailed professionally and early enough before students utterly drop learning and/or performance in mathematics, f) mathematics teachers should wisely utilize available learning resources to enhance positive attitudes, reinforce neutral attitudes, if any, and neutralize any negative attitudes towards learning and performance of mathematics, g) efforts should be made to ensure gender does not hinder learning and/or performance in mathematics among students. Teachers, parents and siblings of the students should encourage both the female and male learners to equally embrace mathematics.
CHAPTER ONE

INTRODUCTION

1.1 Introduction

This chapter includes an overview of the background to the study, statement of the problem, purpose of the study, objective of the study and research questions. The chapter also discusses significance, limitation and assumptions of the study. Finally, a conceptual framework model is presented.

1.2 Background to the study

Mathematics is a compulsory subject for all students at the secondary school level in Kenya KNEC (2005). This is necessitated by the fact that knowledge of mathematics is essential for all members of society Stanic et al in (Secanda, 1995), (Mutunga and Breakell, 1992) and (Cockcroft, 1982). When students in secondary schools complete their secondary school education, they will not be limited in career choice and advancement. This view is held by curriculum developers, teachers, parents and students alike. While this may be true, selection of students to join universities in Kenya by Joint Admissions Board (JAB) has been so prohibitive. Cases are many of students who did so well in mathematics in Kenya Certificate of Secondary Education (KCSE) examinations but are not necessarily selected to pursue competitive courses in the public universities in Kenya. This is because of extremely few vacancies available for those competitive courses.

Mathematics need not be learned by students in secondary for the sake of career choice or advancement but students should be able to learn mathematics with understanding and therefore be able to apply mathematical ideas later in life (Cockcroft, 1982) and (Stanic, 1995).
The intention of curriculum developers at the Kenya Institute of Education (KIE) is to develop secondary schools mathematics syllabus that will help students become numerate, accurate and precise in thought KIE (2002). This is in line with National Goals of Education of Kenya KIE (2002). As much as this could be a noble desire of curriculum developers, a student may complete his/her secondary school education without necessarily being numerate, accurate and precise in thought, in the strict sense of the words. But that does not mean such a student has not learnt mathematics at all in his/her secondary education Mac nab and Cummine (1986). Learning of mathematics is a continuous process and is not limited to the classroom experience only.

In secondary schools, more lessons of mathematics are taught than those of sciences. Despite concerted efforts of teachers, school administrators, parents and all other education stakeholders to enhance learning of mathematics among secondary students, performance and success in learning mathematics is still not satisfactory. According to SMASSE Project Report (1998), the reasons for poor performance in mathematics examination resulting from poor learning of the subject are likely to be due to formed attitudes towards the subject by the students; teaching methods which are not appropriate and lack of resources among others. However, the SMASSE Project Report (1998) failed to address how the formation of unfavourable attitudes among students can be curtailed and how favourable attitudes towards learning of the subject can be encouraged. In Bureti district of Rift Valley province, students’ performance in KCSE has not been good. Table 1.1 indicates fluctuating district mean scores from 2004 – 2007.
Table 1.1 Students’ overall subject performance in KCSE in Bureti district, 2004-2007

<table>
<thead>
<tr>
<th>YEAR</th>
<th>ENTRY</th>
<th>A</th>
<th>A-</th>
<th>B+</th>
<th>B-</th>
<th>C+</th>
<th>C-</th>
<th>D+</th>
<th>D-</th>
<th>E</th>
<th>X</th>
<th>Y</th>
<th>Z</th>
<th>MS</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>2681</td>
<td>0</td>
<td>12</td>
<td>75</td>
<td>101</td>
<td>161</td>
<td>276</td>
<td>366</td>
<td>414</td>
<td>454</td>
<td>505</td>
<td>273</td>
<td>23</td>
<td>0</td>
</tr>
<tr>
<td>2006</td>
<td>3,251</td>
<td>1</td>
<td>12</td>
<td>54</td>
<td>144</td>
<td>185</td>
<td>276</td>
<td>356</td>
<td>458</td>
<td>597</td>
<td>657</td>
<td>370</td>
<td>25</td>
<td>11</td>
</tr>
<tr>
<td>2005</td>
<td>3,067</td>
<td>0</td>
<td>11</td>
<td>57</td>
<td>117</td>
<td>170</td>
<td>253</td>
<td>353</td>
<td>438</td>
<td>616</td>
<td>592</td>
<td>407</td>
<td>30</td>
<td>16</td>
</tr>
<tr>
<td>2004</td>
<td>2,908</td>
<td>0</td>
<td>12</td>
<td>46</td>
<td>78</td>
<td>173</td>
<td>266</td>
<td>303</td>
<td>401</td>
<td>513</td>
<td>596</td>
<td>373</td>
<td>23</td>
<td>18</td>
</tr>
</tbody>
</table>

Source: District Education Office, Bureti

Table 1.1 indicates the highest mean score as 4.69 (2005) and drops to 4.35 in the following year, 2006. Even though it improved slightly to 4.537 in 2007, the mean score is still low and a majority of the students do not qualify for the competitive university vacancies. SMASSE Project Report (1998) attributes poor learning and consequently poor performance in mathematics to teachers reinforcing negative attitudes towards the subject among the students. The teachers may knowingly or unknowingly depict high achievers as the probable achievers in mathematics examinations but low-attainers to be the automatic failures in examinations and they show it openly Wasiche (2006). This may create a negative attitude towards the subject among the low achievers, who may not learn the subject effectively. Teachers’ influence on student’s attitudes and students’ positive attitudes are very important factors needed in order to enhance students learning of any subject and more specifically mathematics. KCSE mathematics results in Bureti indicate poor performance among students as shown in Table 1.2

Table 1.2: Students performance in mathematics in KCSE in Bureti district, 2005-2007

<table>
<thead>
<tr>
<th>YR</th>
<th>ENTRY</th>
<th>A</th>
<th>A-</th>
<th>B+</th>
<th>B-</th>
<th>C+</th>
<th>C-</th>
<th>D+</th>
<th>D-</th>
<th>E</th>
<th>X</th>
<th>Y</th>
<th>Z</th>
<th>U</th>
<th>M/SC</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>2681</td>
<td>33</td>
<td>29</td>
<td>39</td>
<td>57</td>
<td>65</td>
<td>119</td>
<td>170</td>
<td>200</td>
<td>197</td>
<td>240</td>
<td>582</td>
<td>927</td>
<td>23</td>
<td>0</td>
</tr>
<tr>
<td>2006</td>
<td>3251</td>
<td>39</td>
<td>40</td>
<td>43</td>
<td>89</td>
<td>93</td>
<td>112</td>
<td>173</td>
<td>202</td>
<td>214</td>
<td>507</td>
<td>760</td>
<td>969</td>
<td>14</td>
<td>0</td>
</tr>
<tr>
<td>2005</td>
<td>3067</td>
<td>34</td>
<td>27</td>
<td>37</td>
<td>52</td>
<td>55</td>
<td>71</td>
<td>140</td>
<td>170</td>
<td>190</td>
<td>585</td>
<td>868</td>
<td>838</td>
<td>46</td>
<td>1</td>
</tr>
</tbody>
</table>

Source: District education office, Bureti

Table 1.2 indicates that performance in mathematics in KCSE has been fluctuating. At the same time, the mean score for the three consecutive years is below mean grade D+ (4.0). This was a worrying trend of performance and the root course need to be sought. It may be attributed to
poor learning of the subject among students. Consequently, poor learning could be a result of many factors among them being the attitudes formed by the students towards the learning process itself.

KCSE data available from Bureti district education office indicated mathematics was the worst performed subject in 2006. Data for other years showing similar comparisons were not available in the DEO’s office. This scenario is evident in the scores shown in Table 1.3 below.

**Table 1.3: Students’ performance in science and mathematics in Bureti district, 2006**

<table>
<thead>
<tr>
<th>SUBJ</th>
<th>ENT</th>
<th>A</th>
<th>A-</th>
<th>B+</th>
<th>B</th>
<th>C+</th>
<th>C</th>
<th>C-</th>
<th>D+</th>
<th>D</th>
<th>D-</th>
<th>E</th>
<th>X</th>
<th>Y</th>
<th>M/S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math</td>
<td>3251</td>
<td>39</td>
<td>40</td>
<td>43</td>
<td>89</td>
<td>93</td>
<td>112</td>
<td>173</td>
<td>202</td>
<td>214</td>
<td>507</td>
<td>760</td>
<td>969</td>
<td>14</td>
<td>0</td>
</tr>
<tr>
<td>Chem</td>
<td>3005</td>
<td>29</td>
<td>54</td>
<td>76</td>
<td>86</td>
<td>103</td>
<td>149</td>
<td>185</td>
<td>223</td>
<td>248</td>
<td>801</td>
<td>832</td>
<td>209</td>
<td>11</td>
<td>1</td>
</tr>
<tr>
<td>Phy</td>
<td>1025</td>
<td>14</td>
<td>8</td>
<td>44</td>
<td>53</td>
<td>51</td>
<td>103</td>
<td>132</td>
<td>111</td>
<td>85</td>
<td>202</td>
<td>170</td>
<td>52</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Bio</td>
<td>2727</td>
<td>5</td>
<td>19</td>
<td>70</td>
<td>109</td>
<td>150</td>
<td>187</td>
<td>265</td>
<td>287</td>
<td>341</td>
<td>833</td>
<td>403</td>
<td>58</td>
<td>11</td>
<td>9</td>
</tr>
</tbody>
</table>

Source: District Education Office, Bureti

Mathematics was the worst performed subject when compared with the sciences. The mean score for the subject is 1.576 points less than the best performed subject, physics, in that year. Approximately 51.1% of the students who sat for KCSE mathematics in that year scored between D- and E. Meaning, half of the candidates of that year did not do well in the mathematics examination as indicated by low grades.

Performance in mathematics examinations may not be good if the learning of the subject was not sufficiently adequate. The low grades may be improved if learning of the subject was enhanced by ensuring that students had favourable attitudes towards the subject and towards the learning process itself.
1.3 Statement of the problem

Attitudes formed by students when learning mathematics tend to remain for a long time and these attitudes may help him/her to learn mathematics better (Evans, 1965). This is so if the attitudes were favourable. But this may not always be the case. Students also form unfavourable attitudes as they learn mathematics in secondary schools. Findings of Orora (1986) indicate that pupils in primary schools who have very positive attitudes towards learning mathematics have interest to do more mathematics later. Most students join Form One with positive attitudes, only to change their attitudes towards learning mathematics later in secondary school. KNEC Report (2007) indicated that the most glaring weakness in students’ mathematics attainment in KCSE is the students’ lack of knowledge of elementary techniques and their ignorance of simple algorithms and processes. This could have resulted from students’ failure to learn these techniques, algorithms and processes while being taught in class. The Ministry of Education, in collaboration with JICA, KIE and KESI has initiated in-service training courses for mathematics teachers in secondary schools. This was in an effort to improve teacher’s teaching techniques. Despite these efforts, students still did not learn mathematics adequately to enable them perform better in KCSE, mathematics examinations. Failure to learn is an indication that there could be other factors such as inappropriate teaching methods, lack of resources and students’ negative attitudes among others hinder effective learning of mathematics Costello (1991). There could be other factors such as students’ attitudes which may hinder them to adequately learn mathematics that had not been fully studied in Kenya generally and Bureti district in particular. This study attempted to unravel the attitudes towards learning and performance of mathematics among students in secondary schools in Bureti district and the factors which reinforce such attitudes.
1.4 **Purpose of the study**

The purpose of this study was to investigate attitudes formed by students in secondary schools in Bureti District, towards learning and their influence in the performance of mathematics and find out whether such attitudes contributed to poor learning of mathematics and consequently poor performance in mathematics among students in secondary schools in the district. Specifically the study will be concerned with: the types of attitudes; whether negative, neutral or positive and factors enforcing such attitudes towards learning and performance of mathematics.

1.5 **Objectives of the study**

The objectives of this study were to:

i) Establish attitudes that secondary school students form towards learning and performance of mathematics.

ii) Find out whether attitudes form by students contributed to inappropriate learning of mathematics and consequently poor performance in the subject.

iii) Establish factors which influence formation of attitudes towards learning and performance of mathematics among secondary school students.

1.6 **Research questions**

The study was guided by the following research questions:

i) What attitudes do students in secondary schools form towards learning and performance in mathematics?

ii) Do attitudes formed by students contributed to inappropriate learning of mathematics and consequently poor performance in the subject?
iii) What factors influence attitudes towards learning and performance in mathematics among secondary school students?

1.7 Significance of the study

This study will assist in determining attitudes formed by secondary school students towards learning and performance in mathematics. The findings will enlighten teachers, parents and students on the effect of attitudes formed towards learning and performance in mathematics by students. Teachers particularly will be informed on the effect of attitudes formed by students on their achievement in mathematics examinations. On conclusion of the study and findings and recommendation made, teachers in secondary schools should be enlightened on the need to foster favorable attitudes towards learning and performance of mathematics amongst students. Parents and all other education stakeholders such as Board of Governors (BOG), Parent Teacher Association (PTA) among others will be enlightened on the need to provide an enabling environment for learning of mathematics.

1.8 Limitations of the study

Since the sample of the study comprised only Form Three students and not a cross section of all the students in all the forms, this was a limiting factor in this study. The study involved secondary schools drawn from one district in Kenya out of over seventy five (75) districts that were in existence in the research time; hence the sample is therefore not be representative of all the secondary schools in Kenya.

1.9 Assumptions of the study

The study assumed that:

i) The respondents provided accurate and honest responses to the questionnaire.

ii) The students in Form Three had learned the same amount of content of mathematics
as prescribed by Kenya Institute of Education (KIE) syllabus for mathematics.

iii) All teachers who were sampled were trained and had good mastery of subject content and teaching strategies.

iv) Among all other factors that influence learning of mathematics among secondary school students; attitudes played a major role in influencing learning of mathematics and the subsequent performance in mathematics examinations.

1.10 Conceptual framework

Mathematics learning and capability to achieve good grades in mathematics examinations was not only attributed to some unique talent, great effort or good discipline from an individual, but also to favourable attitudes and interest in mathematics (Kasimbu, 2004). Formation of such attitudes can depend on several factors to which the student got exposed while learning such as motivation he/she got from teachers or parents; readiness to learn; mathematical concepts and difficulty or organization of memory of what was learned.

Attitudes formed by students were categorized into cognitive, affective and behavioral components Skinner (1953). From these components of attitudes a conceptual framework model of attitudes formation towards learning process of mathematics among students in secondary schools was developed. Learning of mathematics involved all the three components responsible for attitude formation. However, other factors come into play depending on student’s individual experience in his/her mathematics learning environment. The learning environment may comprise of sufficient learning resources or lack of it. It may include parental or teacher reinforcement or lack of it. Peer pressure and school experience may either reinforce a student to learn mathematics or may as well restrain effective learning of the subject. This
depends on the peer group the learner was in. If the group was motivated to learn mathematics, then a group member may be motivated to learn mathematics also and vice versa. Student’s day to day activities while in school may influence his interest in mathematics and in the long run develop favorable attitudes towards learning of mathematics. All these aspects contributing to attitudes formation are as shown in Figure 1.1.

**Figure 1.1:** Conceptual framework

**Source:** Adapted from (Grouwns and Koechler, 1988)

Figure 1.1 shows various possible causes of students’ poor learning of mathematics. They include students’ negative attitudes towards learning of mathematics; poor learning experience
of mathematics at primary school level among others. Also included is teachers’ lack of refined
teaching techniques; teachers own negative attitudes and lack of adequate learning resources
among others. Possible interventions as indicated include: teachers to motivate students to learn
mathematics; teachers to have positive attitudes towards learning of mathematics among others.
If mathematics teachers motivate students to have positive attitudes towards learning of
mathematics and they themselves portray positive attitudes towards the subject, they may in
turn provide a better learning classroom environment hence enhance students’ achievement in
mathematics.

1.11 Organization of the thesis

This Thesis is organized into five chapters. Chapter One is the Introduction, which outlines the
background of the study. Chapter Two is the review of the related literature. Chapter Three
outlines the design of the study and the methodology that was used in carrying out the study.
Chapter Four comprises of presentation and analysis of data that was collected. It also includes
the interpretations and discussion of the results. Chapter five is the summary of the findings
based on the study objectives, conclusion, recommendations and suggestions for further
research. References and appendices are presented at the end.

1.12 Operational definition of terms

1. Achievement: Reach or attain a certain level, especially by effort. Accomplishment.
Specifically it’s the level of academic performance in a given examination. It could be
very good, good or poor depending on a set pass mark. For example, grade B+ and above
in KCSE in mathematics is regarded as a very good achievement while D- and below is a
poor achievement in KCSE.

2. Attitudes: Opinion or way of thinking. Generalized feeling towards a particular
object, subject or situation. A perception that one forms towards an event, object or subject. It can either be favourable, neutral or unfavourable towards the event, object or subject.

3. **Performance:** Accomplishment in a particular subject area of a course, usually by reasons of skill, hard work or interest and attitudes. **Good performance** implies successfully attaining set cut-off marks in examination of a subject. While **poor performance** means attaining marks deemed to be far below a designed cut-off mark.

4. **Learning:** Gain skill. Relatively persistent change in an individual’s potential behaviour due to experience. The experience a student gets when he/she is exposed to mathematics activity or any other activity aimed at causing a change in an individual’s behavior.
CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction
This chapter reviewed literature related to the study on attitudes towards learning and performance in mathematics among secondary school students. Literature reviewed is cited both from within Kenya and from studies done outside Kenya. In particular, issues discussed include: Factors that are likely to reinforce attitudes such as genetic predisposition, students’ own experiences; societal influence, school setting; teacher influence and gender factor. Also discussed in more detail include: possible intervention, students/teacher interaction; possible expected results and achievement in mathematics examination.

2.2 Factors reinforcing attitudes
Oppenheim (1966) defines attitude as a state of readiness, a tendency to act or react in a certain manner when confronted with certain stimuli. More specifically to learning, Wasiche (2006) defines attitude as a feeling towards something or somebody which is sometimes reflected in a person’s behaviour. Attitudes formed by an individual mostly depends on his/her experience in the learning environment. Attitudes are further enhanced by interpersonal interaction. Heider (1946) and Njue (2005) explain that attitude is either positive or negative depending on whether a person likes or dislikes something or someone. The question which came to mind was what would be the likely sort of such attitudes among students in secondary schools and what could be the reinforcing factors? Sources of negative or positive attitudes may not be pin-pointed. Their source may overlap depending on an individual’s learning environment. For the purpose of this review, the following were the identified likely reinforcing factors of attitudes towards learning in general and learning and performance of mathematics in particular.
2.2.1 Genetic predisposition

Cockcroft (1982) refers briefly to theories indicating that different attitudes could be as a result of genetic factors or hormonal influences or even differences in brain lateralization. Despite the report being credible, this assertion may not exactly be verified as to how a student, either a girl or a boy may be pre-disposed to like something or dislike it. Twoli (1986) agrees that there is no clear-cut evidence that a learner is pre-disposed genetically. But Twoli (1986) cited cases of documented differences in cognitive ability between girls and boys which in one way or another, the learner may form attitudes towards learning a particular subject. Orton (1987) agrees with the view that ability especially in mathematics is not innate, and he qualifies his assertion by stating that:

“Mathematics abilities are not innate, but are properties acquired in life that are formed on the basis of certain inclination… some have inborn characteristics in structure and functional features to the development of mathematics abilities… anyone can become an ordinary mathematician, (but) one must be born an outstandingly talented one” (p. 111)

While he is not completely dismissing the genetic factor, he agrees that other pertinent factors come into play. This researcher’s interaction with some of the high school students has shown that there are students who do well in other subjects but not in mathematics. Some openly resisted learning mathematics but in internal and external examinations, they posted above average results in other subjects while performing dismally in mathematics.

Orton (1987) in his research indicates that males excelled in spatial ability whilst females excelled in verbal ability. These differences may predispose the students to view mathematics learning differently. But (Ying et al, 1991) disagreed that the difference in ability may not necessarily be genetic but could be due to other factors. This study intended to find out what attitudes these students have formed towards learning of mathematics which by the end of their

2.2.2 Individual student’s experience

Twoli (1986) asserts in his work that there is a relationship between achieved grades in earlier examinations at same level and attitudes formed by students towards learning sciences and mathematics. Repeated low academic achievement might lead to negative attitudes towards the subject which in turn may influence how a student will learn the subject in the subsequent years of education. The challenge though to this assertion is whether the repeated low grades achieved earlier influence attitudes formation or do attitudes formed earlier influence how a student learns mathematics and consequently how the student will perform in KCSE. But “learned helplessness” (Twoli, 1986:34) due to repeated low achievement in mathematics examination may lead to unfavourable attitudes towards mathematics learning. This study intended to identify existence of such cases among students in Bureti district.

Documented reports in Britain indicate that fewer girls than boys participate in mathematics courses in tertiary levels. HMI Survey (1977) indicates that girls on average score lower marks than boys at the end of course examinations. As boys and girls interact at school in general and particularly in class, they get to know of this scenario and form varied attitudes towards learning of mathematics. In support of this, a study by (Costello, 1991) on 11-16 year olds shows that students formed different attitudes towards mathematics. Some described mathematics as hard or difficult. Some girls in particular believed that mathematics is a boys’ subject. However there was little identifiable difference in attitudes towards learning of mathematics amongst girls and boys below 11 years old (Costello, 1991 and Beagle, 1973). Despite this assertion, examination results show disparities in performance among boys and
girls (KCSE, 2007). This implies that primary school children join Form One while having positive or neutral attitudes towards learning of mathematics. But one wonders what might be happening to these students as they learn in secondary schools. Such that by the time they prepare for KCSE, they seem to have formed unfavourable attitudes towards mathematics.

As students interact with each other in secondary schools, they influence each other with regard to their perception of mathematics. Peers may influence others, that mathematics is unfeminine (Costello, 1991). At this stage of learning, image issue is so pertinent that a student will not wish to be different from his/her peer group. This could lead to formation of attitudes which are also compounded by stereotyped slogan “bright girl fear success” or “nice girls don’t do mathematics” (Costello, 1991). Other unfounded statement is, “mathematics is done by real men”. This could be internalized in the students’ minds; hence they view mathematics differently from other subjects.

Similarly, provision of appropriate education for gifted children may not be easy. Her Majesty Inspectorate (HMI) Survey (1977) in Britain reported a variety of attitudes formed by very able students. They included; indifference and even hostility to any special attention exhibited in class by other students or by teachers. May be, they think that it is not them who need attention but the weak students. As these gifted students and low achievers interact, diverse attitudes towards learning of mathematics may be formed unless appropriate attention is given to each category of students and an adequate intervention made. In Kenya secondary schools, no special attention is given to students with specific learning needs hence a scenario similar to the one mentioned above is replayed frequently in classrooms and may result in formation of attitudes towards learning
Callahan (1981) stated that students are very important and that their feelings have a strong effect upon the amount of work, the effort put therein and the learning that is finally acquired. Students’ experience of negative feelings towards learning of mathematics may lead to unfavourable attitudes to the subject. Such negative feelings could be as a result of excess work load or poor teachers teaching method and the teacher’s failure to attend to individual difference. Stanic (1995) while quoting Fennema (1976) stated that some boys enjoy more learning mathematics than girls. This is so depending on their earlier experience. But he asserted that if the learning environment created by the teacher is enabling, both sexes persist in doing mathematics. The various attitudes formed by students as they interact in school, have determined how they learn mathematics. Consequently, this determines their achievement in secondary school mathematics examinations.

Whenever attitudes are formed, especially negative attitudes, girls are usually the ones who are on the receiving end. Research by Kaino (1998) in Botswana found out that girls had more negative attitudes than boys. He also found out that girls feel harassed by boys when they do not answer questions correctly in class. This was so in mixed classes. That they feel shy when with the opposite sex, learning mathematics together. Boys on the other hand indicated that they cannot concentrate when they learn while sitting next to girls. Worse still, they claim girls make noise (Kaino, 1998). While this may be challenged, differences in achievement in mathematics amongst the sexes bear witness that attitudes formed may differently influence learning among the two sexes. This study attempted to identify attitudes formed by students as a result of their own individual experience.
2.2.3 Societal influence

By the time a student joins Form One, he/she will have interacted with his/her parents, who to a great extend, influence his/her perception of learning in school in general and specifically learning of mathematics. (Orton, 1994) attributed the noticeable difference in learning among boys and girls to “societal attitudes and expectations”. He asserted that influences of society and from the environment affect mathematical development of students at various levels amongst boys and girls. Boys and girls are socialized differently while playing children games. Boys are engaged in more vigorous activities while girls take more passive roles. This scenario is replayed in school and in class while learning. If no deliberate steps are undertaken to counter this mind-set, students may form unfavourable attitudes towards any learning activity and this may lead to variation in what is learned in a subject.

On the other hand difference in parental expectations and desires and pressure they exert at home on their sons and daughters has been attributed for attainment variations among the sexes (Orton, 1994). Society views mathematics as a male subject as Costello (1991) found out. This is especially when parents react and reinforce daughters and sons differently. When their children do something mathematical, daughters are told “you’ve really tried” meaning nothing much is expected from the female child. But to their sons, they are told “you can do far much better” (Costello, 1991). Meaning male children are expected to do a lot more in mathematics. Such comments said by parents consciously or without much thought are registered in the sub-consciousness of a child and may influence how he/she perceives mathematics. Hence formation of attitudes among students may have been unconsciously registered from parents particularly and from the society in general.
Dislike of mathematics found in both adults and students is associated with anxiety and fear. This anxiety and fear may elicit negative attitudes towards the subject among adults and these general unfavourable perceptions and attitudes about mathematics are passed on to children from adults. Society treats and views mathematics as an unknown territory made up of x’s and y’s. Society also views mathematics teachers as sarcastic and impatient, didactic and scornful (Mac nab and Cummine, 1986). These views are unconsciously picked by students and they come to mathematics classroom with an already distorted perception and attitudes towards learning of mathematics. Ying et al (1991) did a study comparing 894 students from 26 schools in Hong Kong. They undertook a study to identify correlations between mathematics achievement and expectations from parents and of students themselves. After conducting multiple regression analyses, they revealed that the parental expectation and students’ achievement in mathematics had a strong correlation. Whether societal and parental expectations influence attitudes formation amongst secondary school students was the contention of this study.

2.2.4 School influence.

In any given year of learning a student spends more time in school than at home. Much influence on a student’s learning could in school given this much time spend therein. While at school he/she goes through a planned school program. He/she is subjected to a curriculum of mathematics which is administered in a classroom. Eshiwani (1984) emphasized the need to have adequate resources in school to ensure students effectively learn mathematics. These resources include adequate and appropriate 3-dimensional models, geo-boards, and textbooks among others. Access to these learning resources will determine how students learn mathematics. National schools are well equipped but district schools lack basic resources (Twoli, 1986). If the school administration has not provided sufficient number of these
resources, learners, especially girls, are likely to resent mathematics as being too involving and too much competitive. Russell (1983) also found out that manipulative teaching models are preferred by boys. Hence in a mixed classroom, boys ‘lord’ over them while girls ‘lose out’ in the use of these apparatus and materials (Twoli, 1986). Use of textbooks with sexist orientation has not helped things either (Costello, 1991). Textbooks written by some authors have examples of boys doing very well. Frequent use of boys names in the end-of-topic exercises make girls to feel that they are ‘passengers’ in mathematics learning. While in school, girls are given less airtime to express themselves while boys can rumble and mumble and yet the teacher stills waits for him to finish (Twoli, 1986). Fennema and Sherman (1976) while discussing on gender-difference in mathematics achievement suggested that successful programs need to be established in schools to ensure adequate access to learning resources. They assert that clubs and symposiums in school increase hands-on activities during mathematics session and suggest more mathematical questions asked should be from the hands-on activities. The two authors also suggest that the subject should be gender neutral activity especially in school.

While these are good suggestions, and that hands-on activities have also been recommended for secondary school teaching and learning of mathematics, the students still perform dismally. The in service training that all mathematics teachers underwent in Bureti district in ASEI/PDSI program (SMASSE, 2004) has not improved mathematics performance among secondary school students (KNEC Report, 2007). This required a study to find out whether students’ experience in secondary school has contributed to formation of attitudes towards learning of mathematics.
2.2.5 Mathematics teachers

New curriculum implementation and syllabus re-arrangement become a challenge to teachers to acquaint themselves and this impacts negatively on how students learn mathematics while in class (Russell, 1983). Fishbein and Ajzen (1975) argue that whenever a new concept is introduced in the syllabus or taught for the first time in class, an attitude towards it is formed both by the students and the teachers. The teacher’s attitudes reinforce the attitudes formed by the students towards learning of the new concept or the consequent similar concepts. Twoli (1986) in his work on sex-difference in science achievement, found out that teachers’ characteristics influence learning. A teacher’s way of looking at issues generally and in particular, mathematical concepts influence the learner. A student would like to learn a new concept depending on how the teacher presents it. Flanders (1965) also found that students of teachers who vary their teaching style have positive attitudes and these teachers are able to teach a concept (in mathematics) better and learning is made easier. She added that it is paramount for such a teacher to have a mastery of content being taught. If this be the case students’ attitudes towards learning of mathematics may be enhanced.

Flanders (1965) adds that teachers who show acceptance, clarifications of students’ feelings and praise have been associated with more positive attitudes towards a higher achievement by the students. Costello (1991) agrees that many teachers often unconsciously reinforce and validates students’ perceptions of appropriate gender-related behaviour. He further asserts that boys are assigned assertive roles and when they do well they are told they have a talent. But girls may be assigned less assertive roles and when they do well in mathematics, they are reminded that they have at least worked hard to achieve such grades. Because of this unconscious reinforcement from teachers, boys and girls form different attitudes towards
learning of mathematics. Costello (1991) also found out that advice given to girls by teachers is too restricted in scope, usually too little and given too late when a female student is almost completing her secondary school education.

Teacher’s gender may determine how he/she portrays mathematics. Unconsciously male and female teachers form attitudes towards the subject they are teaching. These attitudes formed by teachers depending on their own gender influence how their students will learn the subject being taught, mathematics included. Fennema and Sherman (1976) assert that teachers are a major determinant in students’ learning of mathematics and to a large extend determine what the students might achieve (Eshiwani, 1984). This is because of the teacher’s inherent attributes; his/her qualification and training, his/her general behaviour and attitudes towards mathematics, other subjects and towards the students themselves.

Worth noting is that most female teachers prefer to teach language subjects and in arts subjects. But male teachers mostly prefer science and mathematics. This scenario is consciously registered in minds of the students and in the process they unconsciously form attitudes towards learning in general and particularly learning mathematics (Oketch, 1982), (Mwangi, 1983), (Cockcroft, 1982) and (Onyango, 2003). Cockcroft (1982) noted aptly that there is no area in knowledge, where a teacher has more influence over the attitudes as well as the understanding of his/her pupils than he/she does in mathematics. During his/her professional life, a teacher of mathematics may influence for good or bad the attitudes towards mathematics of several students and decisively affect many of their career choices.
Orton’s (1987) work found out that teachers pay more attention to boys than girls while teaching mathematics because of their own prejudiced believe that boys achieve better than girls in mathematics. This could be so in a mixed class, but not in a single-sex class. Regardless of this misconception, girls achieve more in mathematics in single sex schools than in mixed schools while boys perform better in mixed schools than in single sex schools KNEC Report (2007). Hence the type of class set up became this study’s contention.

2.2.6 Gender factor

Stanic (1995) identified that sex-difference in achievement in mathematics was related to a sex-difference favoring males in terms of confidence in doing mathematics. He asserts that teachers consciously or unconsciously reinforce the confidence of students while teaching mathematics. He further asserts that girls are reinforced differently from boys, an idea similarly shared by Costello (1988). Consequently, this will determines how the students will learn the subject and in turn reflect how they achieve in their end of the course examinations. What Stanic (1995) is expressing regarding sex-difference may be reflected by the values in Table 2.1

**Table 2.1: Candidates performance by gender in the year 2005 and 2006 KCSE examination in mathematics nationally**

<table>
<thead>
<tr>
<th></th>
<th>2005</th>
<th></th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td></td>
<td>Male</td>
<td></td>
</tr>
<tr>
<td>Candidates</td>
<td>Mean (%)</td>
<td>Candidate</td>
<td>Mean (%)</td>
</tr>
<tr>
<td>118,898</td>
<td>12.97</td>
<td>140,414</td>
<td>18.49</td>
</tr>
<tr>
<td>113,802</td>
<td>15.78</td>
<td>128,280</td>
<td>21.87</td>
</tr>
</tbody>
</table>

**Source:** KNEC, (2007)
Table 2.1 indicates that boys performed better than girls in both years. But worth noting though is that both girls and boys improved by an average of 3% in KCSE 2006. Hence the assertion of Stanic (1995) may not necessary mean that teacher reinforcement on students learning is the sole reason for better achievement in examination. Girls can perform as well as the boys, so long as they are given an enabling environment of learning of mathematics. Stereotyped perception of the gender should be discouraged by all education stakeholders. Attitudes may be formed by students particularly when they get to form one since research amongst 11 year olds and below indicate little or no difference in attitudes between boys and girls Costello (1991). By the time some girls prepare for KCSE in Form Four, they expect not to do well but are surprised by success or count themselves lucky to have passed when results are announced the following year. But when boys do well in KCSE, it is taken as expected and not as a surprise. More specifically, difference between sexes in achievement varies depending on topic. Girls do significantly better than boys on questions demanding computational skills. But on the other hand, boys do better in areas dealing with measurement and problem-solving (Costello, 1991).

Since marks in KCSE or in whichever examination are awarded in total regardless of the topics tested, girls and boys should on average be performing equally well. But this is not the case. This study attempted to identify this disparity. Gender difference in achievement in mathematics also comes as a result of sex difference in attitudes at secondary school where students’ views of the difficulty of mathematics vary. Boys tend to underrate the level of difficulty, and over rate their own competence. Consequently they do less well than they expected. But secondary school girls are more likely to over rate the difficulty and devalue their own expertise and they often achieve better results than they expected (Costello, 1991). Worth noting also is that students’ emotional response to mathematics is more evident in girls than
among boys. They exhibit intense anxiety and become vulnerable and may misunderstand questions in an examination. In general girls are doubtful of their competence in mathematics and are less confident in their mathematics ability (Heider, 1946 and Fennema et al, 1976). Any academic decline in mathematics has got to do with a drop in self-confidence especially in girls as confirmed by Fennema and Sherman (1976). This decrease in self-confidence and lack of interest leading to formation of attitudes towards learning of mathematics is as a result of the differential treatment of girls and boys receive while in school.

Females have been found to be superior in manual dexterity and in rote learning ability while males do well in tests involving divergent thinking (Orton, 1987). Hence success should not be viewed only on what grade one achieves in examinations but should rather be how much mathematics one has learned while in secondary school. The unfortunate thing though, is that mathematics is being used as a “filter” in career choices (Kaino, 1998). Those who opt out of mathematics when joining university are denied some important opportunities. This may influence attitudes towards learning of mathematics in secondary schools. More so with the girls who develop “learned helplessness” (Twoli, 1986). Whether gender determined students’ attitudes and consequently his/her achievement in mathematics was the contention of this study.

2.3 Possible interventions
Since attitude formation by students seems almost inevitable and since mathematics is one of the compulsory subjects in KIE syllabus and that the subject is examinable under KNEC regulations and policy; all education stakeholders might have no choice but to ensure that a better learning environment is created for the students.
2.3.1 Learning resources

Sufficient learning resources for mathematics and equal access to these resources by all students are important. They may include books, teaching aids, calculators and computers. The teacher concern may need to ensure proper utility of the equipment. Where there’s shortage, a well set programme should be made to ensure all students access library, mathematics practical rooms and any other facility meant to promote mathematics learning. The experience of this researcher in difference secondary schools indicate that, there are some well-equipped secondary schools, well organized class-rooms and students have enough books some at ratio 1:1 and yet in those schools, there are cases of students who perform dismally.

2.3.2 Role of the society

The general public should desist from viewing mathematics as if it were unknown territory where one is expected to venture without tools to guide. Mathematics should be viewed with a more positive attitude. The same public presumably views mathematics teachers as with little or no human feelings (Mac nab and Cummine, 1986). Since the students are first in the society before they are in school, they unconsciously form attitudes towards mathematics and towards anyone who teaches mathematics. Unless deliberate effort was made to counter any unfavourable attitudes being formed by students as they enter Form one (Orora, 1986), the attitudes may overshadow a student’s interest in mathematics.

Parents should deliberately attempt to treat their children equally, make unbiased comments regarding learning of mathematics and avail equal opportunities to both daughters and sons to pursue mathematics (Costello, 1991). This is with an effort to negate the unfavourable attitudes from being formed, especially by the girls. Parents who achieved well in education and other role models in the society should make deliberate effort to popularize the subject. They should
go out of their way to convince the young ones about the importance of the subject. This
withstanding, some students, especially boys know that mathematics is a very important subject
especially in choosing career and application later in life and yet fail to develop interest and
learn the subject while in school.

2.3.3 Teacher-students interaction
Students learning mathematics do so with assistance from their teachers. Teacher-learner
interaction in classroom should be geared towards achieving a goal; to learn mathematics,
teachers should be conscious of their own attitudes towards mathematics and other subjects and
towards his/her students regardless of their gender. He/she should provide guidance and
counseling to students with repeated under-achievement. He/she should reinforce them
accordingly and motivate them by providing for the individual differences. Teachers in Kenya
are recruited and posted to teach in secondary schools by ensuring that such teachers have
received adequate training; are in-serviced where necessary and proper supervision is done in
schools. Despite all these, learning of mathematics in secondary schools is wanting. Worst still
is the poor result being posted in several secondary schools in the republic of Kenya in general
and particularly in Bureti district.

2.4 Possible expected learning environment
Studies on attitudes towards learning of mathematics and achievement in the subject indicate
that attitudes play a major role in a student’s effort to learn. Attitudes formed could genetically
be predisposed (according to Orton, 1987) or being influenced by societal expectation
(according to Mac nab and Cummine, 1986), especially parents (Ying, 1991), as a result of
unconscious reinforcement by the teachers (Russell, 1983) or could be as a product of student-
student or teacher-students interaction while in school (Costello, 1991). These attitudes formed
could be positive or negative towards learning of mathematics. Whatever nature of attitudes formed by the students, they may determine their confidence in learning mathematics and may also help them perceive the usefulness of mathematics hence enjoy mathematics as they learn Fennema and Sherman (1976).

There may be no simple and clear relationship between specific attitudes and achievement as Stanic (1995) asserts. But it seems attitudes influence how a student learns mathematics. It becomes even more difficult to describe clearly the connection between attitudes and achievement in the subject. But attitudes can lead one to learn less mathematics and consequently achieve little in the KCSE or any other examination. Costello (1991) and Macnab (1986), both assert, though differently, that mathematics examinations are unique in providing the possibility of obtaining 0% or 100%. This, in the process of learning the subject, may cause much anxiety. Macnab (1986) and KNEC (2007) particularly stress the need to improve perceptions of mathematics in the minds of students by stressing on the creative aspect of mathematics and its applicability rather than on what one achieves in the examination.

When this study was conducted, the findings were an addition to findings on relationship between attitudes and learning and performance of mathematics. More specifically, the study concentrated on identifying attitudes influencing the learning process in mathematics class among secondary students and their effectual performance in the subject. The study investigated the sources of such attitudes and the factors reinforcing them. Whatever the attitudes formed and whether these attitudes influenced learning and performance of mathematics was the contention of this study.
CHAPTER THREE

METHODOLOGY

3.1 Introduction
This chapter outlines the procedures and strategies that were used to collect and analyse data. It focuses on research design, variables, location of the study, target population, sampling techniques and sample size, description of research instruments, description of pilot study and an outline of methods and techniques that were used to collect, analyse and present data.

3.2 Research design
This study used descriptive survey research design to investigate the associative relationship between students’ attitudes and learning/performance of mathematics. Descriptive survey was best suited to investigate if an association or relationship between the variables were strong enough that the researcher can conclude that independent variable caused the other dependent variables (Orodho, 2005). This descriptive research design involved making a description of students’ attitudes and was used to seek and discover possible enforcing factors of such attitudes towards learning and performance of mathematics (Gall et al, 1996), (Orodho, 2005) and (Mugenda, 1999). The stages of the research process that were used are shown in Figure 3.1
Figure 3.1: Study process

Source: Adapted and modified from (Cohen and Manion, 1994: 89)
Figure 3.1 shows the target population from which the sample of 6 schools was picked. Shown in the diagram also are the methods of sampling that were used. Instruments that were used have been identified and the entire process that was used in the research has been shown.

3.2.1 Variables
The dependent variable in this study was enhanced learning and performance in mathematics among secondary school students in Bureti district. The following were the main independent variables that were considered in the study.

i) **Student-related variables**: included their attitudes towards learning and performance in mathematics and their gender.

ii) **Teacher-related variables**: included their attitudes towards their student and the teacher’s gender.

iii) **School-related variables**: included the types of schools; boys, girls or mixed.

3.3 Location of the study
The study was carried out in Bureti district, which is one of the districts in Rift Valley Province of Kenya. The choice of the district was because it has been among the last 3 districts in Rift Valley Province in KCSE ranking for the last 4 years, as reports from District Education Offices (DEO) indicated. Despite the district being relatively endowed with learning resources, the district still performed dismally in KCSE and mathematics in particular. The choice of the district was also because of familiarity of the locality to the researcher. This made it easier to establish a rapport with the respondents hence making data collection effective. Accessibility to majority of the schools sampled was also considered.
3.4 Target population
The target population comprised of sixty nine (69) secondary schools in Bureti district. Three (3) of these were private girls’ schools, two (2) private mixed school. There were no private boys’ schools in the district. The rest sixty four (64) were public secondary schools. Out of the 64 public secondary schools, three (3) were provincial boys secondary schools; five (5) were provincial girls secondary schools, sixteen (16) mixed provincial schools, two (2) district girls’ and thirty eight (38) district mixed schools. There were no district boys’ schools in the district. There were hundred and ten (110) mathematics teachers and fourteen thousand six hundred and two (14,602) students of whom seven thousand five hundred and thirty five (7,535) were boys and seven thousand and sixty seven (7067) were girls. In private schools there were six hundred and fifteen (615) students, of whom one hundred and twenty six (126) were boys and four hundred and eighty nine (489) were girls.

3.5 Sampling Techniques and Sample Size

3.5.1 Sampling Techniques

Category of schools: both public and private secondary schools in Bureti district were purposively selected. They were considered since they all follow the same KIE syllabus and pursue the same curriculum offered under 8-4-4 system of education. Regardless of the category of school, all students sit for the same KCSE at the end of Form Four. Under public schools category the researcher further sub-divided them into provincial secondary schools and district secondary schools. This enabled better representation of all students in the district.

School type: stratified sampling technique was used to select the school type; that is boys, girls and mixed schools. The schools sampled were selected randomly from each type and category of schools.
**Form Three students:** Boys and girls were randomly selected from both categories of schools and the types of schools. This ensured that each student regardless of gender had equal chance of being selected for the study. From the four levels of secondary school; Form three classes were purposefully selected. This was because; the researcher contended that at this level, a student had formed attitudes towards learning and performance of mathematics. They would have been exposed to much of the mathematics content as stipulated in the syllabus. In Form three, students would have chosen their subjects in preparation for career choice. The career choice could be as result of how a student perceived mathematics.

**Mathematics teachers:** They were purposively selected from the sampled schools depending on whether they taught the selected class or not. Mathematics teachers were involved in the study because they could be a factor in influencing attitudes towards learning of mathematics amongst students. They were the ones charged with the responsibility of implementing mathematics curriculum.

**3.5.2 Sample size**

The sample size was determined by a prior calculation of the sample size required to meet specified confidence limits for the population values. According to Nkpa (1997) and Gorard (2001) a sampling fraction of between 10-20% of total population in descriptive research is acceptable. Therefore, a total of six (6) secondary schools: 1 provincial boys’ school; 1 provincial girls’ school; 1 provincial mixed school; 1 district girls’ school; 1 district mixed school and 1 private girls’ school were selected from the sixty nine (69) secondary schools in the district. Twenty two (24) mathematics teachers were selected for the study out of the 110 mathematics teachers in the district. This constituted approximately 22% of the total mathematics teachers’ population. Similarly, three hundred and fifty nine (359) Form Three
students were selected from the fifteen thousand, two hundred and seventeen (15217) of the student population. More specifically there are three thousand one hundred and twenty nine (3129) Form Three students. Hence the sample constituted approximately 11% of all the Form three students in the district. The distribution of the schools that were sampled and the respondents of the study are summarized in Table 3.1.

**Table 3.1: Sample grid of school types and categories, students and teachers in Bureti district**

<table>
<thead>
<tr>
<th>School type</th>
<th>Provincial schools</th>
<th>District schools</th>
<th>Private</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Boys</td>
<td>Girls</td>
<td>Mixed</td>
</tr>
<tr>
<td>Number of Schools</td>
<td>3</td>
<td>5</td>
<td>16</td>
</tr>
<tr>
<td>Student Population</td>
<td>2321</td>
<td>3021</td>
<td>6072</td>
</tr>
<tr>
<td>Selected No of Sch</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Form 3 Students</td>
<td>823</td>
<td>1050</td>
<td>317</td>
</tr>
<tr>
<td>Approx. Class Pop</td>
<td>61</td>
<td>62</td>
<td>64</td>
</tr>
<tr>
<td>Selected Teachers</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

**Key:**

+1* Pilot Secondary School (not included in the totals)

+39* Pilot Population (not included in the totals)

As indicated in Table 3.1, a total of three hundred and fifty nine (359) Form Three students were considered during the study out of three thousand one hundred and twenty nine (3129) Form three students in the district. Six (6) schools were sampled from the sixty nine (69) schools in the district.
3.6 Research instruments

Data were collected using the following two instruments:

3.6.1 Mathematics Teachers’ Questionnaire (MTQ)

MTQ was used to obtain data from mathematics teachers in secondary schools. The data were consequently used to identify attitudes formed by their students towards learning and performance in mathematics and also identify factors reinforcing such attitudes. MTQ (Appendix A) was divided into five sections. Section A contained items on background information of the respondents while the other sections had other items that were developed on the basis of the research questions. MTQ was administered to selected mathematics teachers. The purpose of this questionnaire was to find how frequent mathematics teachers encouraged their students to learn mathematics and identify which motivation methods they used to encourage students to participate in mathematics lessons. Their responses enabled the researcher to find out what they do to enhance students’ attitudes towards learning of mathematics.

3.6.2 Mathematics Students’ Questionnaire (MSQ)

MSQ was used to obtain data from mathematics students in secondary schools. The data were consequently used to identify attitudes formed by these students towards learning and performance in mathematics and also identify factors reinforcing such attitudes. This questionnaire was administered to the randomly selected Form Three students in the selected secondary schools. MTQ contains two major sub sections; general information about the student/school and students’ feelings towards mathematics. A 5-point Likert Attitudes Scale ranging from “strongly agree” to “strongly disagree” was used to determine students’ feelings. The Likert Scale contained three sub categories of items namely, items on mathematics as a
subject, items on mathematics teachers and their teaching methods and items on the students, peers and family members (Appendix B)

3.7 Pilot study
This was done to determine the validity and reliability of the instruments. The instruments were piloted in one randomly selected secondary school. The pilot school was not included in the main study. The researcher administered the questionnaires to the mathematics teachers and students of Form three in the selected school. The pilot study helped locate ambiguities, revealed flaws in the questions and inadequacies in the coding system. This in turn led to evaluation and improvement of the questionnaires. The pilot study helped the researcher to develop the necessary experience in using the instruments before the main study. Pilot data that were collected were analyzed and the results were used to modify the questionnaires.

3.7.1 Validity
The researcher was concerned with the degree to which MSQ and MTQ were measuring attitudes towards learning and performance in mathematics. Ascertaining the content validity involved consultations with my research supervisors and experts in this area of study especially lecturers in the department the researcher is from.

3.7.2 Reliability
Reliability of the questionnaires was determined by the use of split-half technique (Nkpa, 1997). The items of the instruments were split into two subsets after a single administration of the instruments. The total set of items was divided into two halves and the scores on the halves were correlated to obtain and estimate reliability. The Cronbach's alpha was used to measure the internal consistency and a value of 0.75 was arrived at, which indicated that the instrument was reliable (Nkpa, 1997)
3.8 Data collection Procedures

Data collection was done in the sampled schools. The researcher visited the sampled schools first to familiarize with the school authority and explain the purpose of the study and secondly make necessary arrangement for actual administration of the instruments and data collection. Repeated familiarization visits were done before the actual visit for data collection. During each visit the researcher intended to talk and mix freely with both teachers and students to try and minimize Hawthorne effect (Borg and Gall, 1971). The researcher then collected data by issuing the research instruments to mathematics teachers and Form three students. The two sets of questionnaires were administered when the teachers and students were relaxed enough to provide reliable information (Eggleston et al, 1975).

3.9 Data analysis

Data collected were analysed both qualitatively and quantitatively. Qualitative data were obtained from the open-ended items in both the students and teacher questionnaires. The data were grouped into different categories/themes consistent with the research objectives and deduction and generalizations made using patterns and trend of responses. Quantitative data were obtained from closed ended items in the student and teacher instruments. They were coded and entered in the computer using SPSS program. Specifically the data were analyzed using simple descriptive statistics: percentages, means and frequencies. The data was presented with the aid of tables, graphs.

3.10 Ethical considerations

A research permit was sought from the Permanent Secretary, Ministry of Higher Education, Science & Technology to allow collection of data in Bureti district secondary schools. Thereafter, permission was sought from Bureti District Education Officer (DEO). Once in the schools, permission was also sought from the respective school Principals before talking to
teachers and students. Before the actual issuing of questionnaires, the consent of mathematics teachers and students was also sought; the information that was collected was treated confidentially.
CHAPTER FOUR
DATA ANALYSIS, RESULTS AND DISCUSSIONS

4.1 Introduction

The findings of the study are presented in this chapter based on the data collected from the respondents and as per the research objectives. These included a) establishing the sort of attitudes that secondary school students form towards learning and performance in mathematics, b) to finding out whether the attitudes formed contributed to inappropriate learning of mathematics and consequently poor performance in secondary schools and c) finding out the factors which influence attitudes towards learning and performance in mathematics among secondary school students. Three hundred and fifty nine (359) questionnaires were filled out of the three hundred and sixty five (365) given out, giving a response rate of 98 per cent which was adequate for analysis. Discussion of the results was done as per the objectives of the study.

4.2 Background information

This section covers the gender distribution of the respondents, type of schools studied, and attitudinal problems affecting learning of mathematics according to the respondent students.

4.2.1 Gender distribution

The sample selected for the study constituted (66%) boys and the rest (34%) girls as indicated in Figure 4.1
Figure 4.1: Gender distribution

To be able to capture the students’ attitudes towards learning and performance in mathematics, the researcher selected respondents from the different school categories in the district. However, it emerged girls based schools were few as compared to boys’ schools leading to the higher percentage of boys in the sampled population. Despite that fact though, there were no private boys or district boys’ schools in the district while the area had 3 private girls and two district girls’ schools. In addition, there were 5 provincial girls’ schools as opposed to 3 in the case of provincial boys’ schools.

Several studies have reported that there are gender differences in attitude towards mathematics with girls showing more negative attitudes than boys. In general, most of the studies reported that, compared with boys, girls lacked confidence, had debilitating causal attribution patterns, perceived mathematics as a male domain, and were anxious about mathematics (Casey et al, 2001). This study though, found out that 79% of all the respondents disagree/strongly disagree that being a girl or a boy interfered with learning and performing in mathematics.
4.2.2 Types of schools

The study revealed that 50% of the respondents came from provincial schools, approximately 33% of the respondents were from district schools and approximately 17% were from private schools as shown in Figure 4.2

![Pie chart showing types of schools](image)

**Figure 4.2**: Types of schools

The study revealed that girls based schools (15%) in the area were more as opposed to boys based schools (5%) but mixed schools were the majority (80%). However, the sample gave the diversity required in terms of school types and category to be able to capture the students’ attitudes towards learning and performance in mathematics.

4.3 Problems associated with attitudes affecting learning and performance in mathematics

The respondents were asked to identify some of the problems they experienced that affected their learning of mathematics and eventually affecting their reformance in the subject. Their views are summarised in the Figure 4.3.
Figure 4.3: Problems associated with attitudes affecting learning and performance in mathematics

The major problems in the learning and performance in mathematics in the secondary schools included lack of confidence in the ability to learn and perform well in mathematics as reported by 40% of the respondents. Lack of interest in mathematics was mentioned by 24% of the respondents while lack of teaching facilities such as textbooks and learning resources was mentioned by 21% of the respondents. Difficult language used by the teacher was cited by only 4% of the respondents while 10% of the respondents reported that they experienced no problems learning mathematics.

Generally, confidence in learning mathematics has been associated with mathematics achievement with correlation coefficients ranging from 0.3 to 0.4 (Newman, 1990). (Ryan et al, 1997) showed that students who perceived themselves as cognitively competent were less likely to avoid seeking help, whereas, students who were unsure of themselves were more likely to feel threatened when asking their peers for help and more likely to avoid seeking help. Students with high confidence in mathematics do not attribute their need for help to lack of ability and thus are more likely to seek help when they need it.
4.4 Students’ attitudes towards learning and performance in mathematics

The study further sought to identify the opinions of students towards learning and performance in mathematics. This helped in detecting the kind of attitudes they had formed towards the subject. The responses were put under five categories of a five-point Likert-scale which included strongly agree, agree, undecided, disagree and strongly disagree, Table 4.1.

<table>
<thead>
<tr>
<th>Students’ feelings/opinions</th>
<th>Responses (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I enjoy learning mathematics</td>
<td>Strongly Agree</td>
</tr>
<tr>
<td>I would like to continue doing mathematics after secondary school</td>
<td>49</td>
</tr>
<tr>
<td>To understand mathematics is difficult</td>
<td>7</td>
</tr>
<tr>
<td>Mathematics is very useful in life</td>
<td>70</td>
</tr>
<tr>
<td>among the subjects taught mathematics is my favorite</td>
<td>35</td>
</tr>
<tr>
<td>I feel extremely anxious and fearful when math exams are mentioned or brought</td>
<td>19</td>
</tr>
<tr>
<td>Mathematics should not be a compulsory subject</td>
<td>6</td>
</tr>
<tr>
<td>The best way to learn math is to discover a concept by yourself</td>
<td>36</td>
</tr>
<tr>
<td>My grades are always low in mathematics</td>
<td>17</td>
</tr>
<tr>
<td>I do mathematics for the sake of it</td>
<td>4</td>
</tr>
<tr>
<td>Learning mathematics is remembering what the teacher says and does</td>
<td>23</td>
</tr>
</tbody>
</table>

Findings indicated that 56% of the respondents strongly agreed that they enjoyed learning mathematics as a subject. Forty nine per cent (49%) of the respondents strongly agreed that they would like to continue doing mathematics after secondary school citing reasons such as Mathematics was easy to study and that it was a logical subject (and that it needed no cramming). Further to this only 38% of the respondents strongly disagreed that understanding mathematics
was difficult while 70% of the respondents strongly agreed that Mathematics was a very useful subject in life. Only 35% of the respondents strongly agreed that among the subjects taught, mathematics was their favorite. This is indicative of favourable attitudes towards learning mathematics and consequent better performance in the subject. Worth noting was that there were a few students who did not like the subject by stating that mathematics was difficult (18% who strongly agreed or just agreed) and that some topics were not applicable to daily life problems.

In addition, up to 58% of the respondents strongly disagreed that Mathematics was impossible to learn. Those who agreed that the subject was impossible to learn said that Mathematics was for intelligent students since it was a tough subject and that few students managed to study the subject to higher levels. They added that the subject needed sharp and fast thinking students. The study also revealed that 26% of the respondents agreed that they felt extremely anxious and fearful when math exams were mentioned or brought while 21% strongly disagreed. High level anxiety in students had negative influence on their learning and performance of the subject. 45% of the respondents either strongly agreed or agreed with the statement. This has been associated with increasing test stress, low self-confidence, fear of failure, and negative attitudes towards learning mathematics (Besant, 1995). When asked whether Mathematics should be a compulsory subject up to 62% disagreed. 36% thought that the best way to learn mathematics was to discover a concept by oneself. A high percentage however (65%) strongly disagreed that they did mathematics for the sake of it.

4.5. Factors influencing attitudes towards learning and performance in mathematics

The study also sought to establish the contributing factors which influence formation of attitudes by students towards learning and performance in Mathematics. The findings are presented in Table 4.2.
Table 4.2: Factors influencing attitudes towards learning and performance in mathematics

<table>
<thead>
<tr>
<th>Students’ feelings/opinions</th>
<th>Responses (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Strongly Agree</td>
</tr>
<tr>
<td>Mathematics classes/lessons are not interesting</td>
<td>2</td>
</tr>
<tr>
<td>I am given a lot of unnecessary mathematics assignments</td>
<td>3</td>
</tr>
<tr>
<td>I am well provided with mathematics textbooks and other learning materials</td>
<td>35</td>
</tr>
<tr>
<td>Being a girl or a boy interferes with my learning and my performance of mathematics</td>
<td>5</td>
</tr>
<tr>
<td>I think it is the teacher who can make mathematics learning easier</td>
<td>31</td>
</tr>
<tr>
<td>My parents and siblings encourage me to learn Mathematics and to perform well in the subject</td>
<td>60</td>
</tr>
<tr>
<td>My friends don’t like learning mathematics</td>
<td>60</td>
</tr>
<tr>
<td>I like my mathematics teacher</td>
<td>60</td>
</tr>
<tr>
<td>I learn mathematics well regardless of the gender of my teacher</td>
<td>38</td>
</tr>
<tr>
<td>I do a lot of mathematics exercises on my own or with a friend</td>
<td>38</td>
</tr>
</tbody>
</table>

Notably, 61% of the respondents strongly disagreed that being a girl or a boy interfered with their learning and performing well in mathematics. (Lafortune, 1989) observed that girls and boys performed equally well despite that girls had still some more negative attitude towards mathematics due to their greater anxiety when learning the subject. With regards to attitudes related to mathematics teachers, 69% of the respondents either agreed or strongly agreed that it was the teacher who could make mathematics learning easier for them. In addition, about 56% of the respondents strongly disagreed that Mathematics classes/lessons were not interesting. 59% of the respondents strongly disagreed that they were given a lot of unnecessary mathematics assignments while only 35% of the respondents were of the opinion that they were well provided with mathematics textbooks and other learning materials. This lack of adequate
textbooks and learning materials was a contributing factor to negative attitudes towards learning and performance in mathematics among the students. For 23% of the respondents, learning mathematics was remembering what the teacher said and did while 38% strongly agreed that they understood Mathematics regardless of the gender of their teacher.

The sex of the teacher was an influencing factor in learning of mathematics where for example an assessment of boys by a female teacher could produce a generous mark or marking of girls' work by a male teacher (Goddard-Spear, 1989). Some students’ dissatisfaction on how some mathematics teachers taught the subject was related to the fact that 68% of the respondents felt there were not enough reference books and textbooks, making students perform poorly in mathematics and loose interest in the subject. Sixty per cent (60%) of the respondents reported that their friends did not like learning mathematics with them which meant that, that percentage of respondents were intrinsically motivated to learn and perform in mathematics. This further meant these students had formed favourable attitudes towards learning and performance of mathematics. Equally so, 60% stated that their parents and siblings encouraged them to learn Mathematics. Parents’ and siblings’ level of education influence how students perceive learning and performance in mathematics (Costello, 1991). Thirty eight per cent (38%) of the respondents reported that they did a lot of mathematics exercises on their own or with a friend hence enhancing their learning and performance in mathematics.

4.5.1 **Number of lessons taught by mathematics teachers**

Fourty two per cent (42%) of respondent teachers had a teaching load of up to 11 - 15 lessons per week while others had 6 or less lessons per week and the rest had lessons ranging from 16 to 30 lessons per week as indicated in Figure 4.4.
Teachers with 16 to 20 lessons constituted 17% of the total respondent teachers while those with 21 to 25 lessons constituted 13%. Teachers with lighter teaching load such as less than six lessons per week, had time to plan for their lessons, had adequate time to plan for lessons, prepare tutorials and exercises as well as mark students work than those with more lessons per week. Overworked teachers claimed they had no time to plan for their lessons leading to poor teaching approach and thus development of negative attitude towards learning and performance in mathematics among the secondary school students.

4.5.2 Years of experience in teaching mathematics

The researcher carried out an investigation on the number of years of experience the mathematics teachers had in teaching the subject and the findings are presented in Figure 4.5.
Figure 4.5: Years of experience in teaching mathematics

Thirty three per cent of the teachers reported that they had been teaching mathematics for 11 to 15 years, while 33% said that they had taught mathematics for less than 5 years. Up to 13% of the respondents reported that they had been teaching mathematics for 6 to 10 years, while the remaining 4% had been teaching for more than 15 years. Teachers with many years of experience in teaching understood the subject matter as well as teaching methodologies that may positively influence students’ attitudes towards learning and performance of mathematics (Mondoh, 2005).

4.5.3 Extent to which teachers liked teaching mathematics

With regard to how much the teachers liked teaching mathematics, majority (51%) stated that they liked teaching the subject very much while the remaining 49% reported that they liked teaching the subject moderately as indicated in Figure 4.6.
For teachers to positively influence students’ attitudes towards learning and performing of mathematics, they need to like the subject themselves and be motivated in their teaching. (Sidhu, 1983)

### 4.5.4 Teachers’ opinions on mathematics as a subject

The study also sought to establish the teacher’s attitudes towards mathematics as a subject. Up to 70% of the respondents reported that the subject was interesting while 17% thought that it was very interesting as indicated in Figure 4.7.

![Pie chart showing teacher opinions on mathematics as a subject](image)

**Figure 4.7:** Teachers’ opinions on mathematics as a subject

Only 13% thought that the subject was tedious. The teachers’ positive attitudes towards the subjects as expressed in their interest tended to create positive attitude among the students
towards the subject. Hence leading to more interest in the subject. It must be noted that students’ attitudes towards mathematics tend to be more positive in classrooms where students perceive greater interest in the subject by their teachers who in turn give leadership and friendly helping hand in pursuing the subject. If the teachers find the subject less interesting, it becomes hard to motivate the students and create positive attitudes among them towards the subject (Scope, 1973).

4.5.5 Teachers’ opinions on what students like about mathematics

According to 75% of the respondent teachers, the students liked the subject content in mathematics while 13% thought that the students liked the teaching method as indicated in Figure 4.8.

![Figure 4.8: Teachers’ opinions on what students like about mathematics](image_url)

Only 8% thought that the students liked the teacher. Lack of time to cover thoroughly the mathematics content due to heavy teaching load was reported to be negatively affecting students’ performance and while students seemed to like the content taught, they were not confident with the material covered as some of it could not be related to their future career needs.
4.5.6 Strategies to create interest in mathematics among students

The most commonly used method of creating interest in mathematics according to 75% of the respondents was to organize internal symposia as shown in Figure 4.9.

![Figure 4.9: Strategies to create interest in mathematics among students](image)

Other strategies included demonstrating usefulness of mathematics according to 8% of the respondents by telling the students about the importance of mathematics and assisting them to put the learnt content in a societal context while encouraging them to draw conclusions from the lessons learnt. Only 13% of the respondents told the students the importance of mathematics especially in relation to other subjects and day to day life. A small percentage (4%) of the teachers made the effort of changing the teaching method by checking the accuracy, correctness, and depth of content as well as summarizing the content and giving follow up activities. Many students seemed to like mathematics more when they worked in groups as well as when given individual attention by their teachers to enable them to clearly understand the concepts being taught. Teachers also gave the students chance to ask questions on aspects they did not seem to understand as well as demonstrating the application of the
subject in everyday life especially when the teachers were teaching what was seen as challenging content. Teachers made deliberate efforts to motivate students by asking those questions that required reasoning and encouraging them to learn more on their own through assignments.

4.5.7 Methods used in teaching to enhance learning of mathematics

According to 42% of the respondents, lecture method was never used to enhance learning of mathematics but was sometimes used by 46% of the respondents as indicated in Figure 4.10.

![Bar chart showing methods used in teaching to enhance learning of mathematics](image)

**Figure 4.10: Methods used in teaching to enhance learning of mathematics**

Small group discussion was often used according to 54% of the respondents while student to student demonstration was often used by 38% of the teachers. Teacher assisting individual
student was adopted by 63% of the respondents while question and answer was very often used by 42% of the respondents.

Students seemed to like the subjects more when they worked in small group discussion as well as when given individual attention by their teachers to enable them to clearly understand the concepts as stated earlier. According to approximately 40% of teachers under the study, the students did not like the lecture method which was not participatory by nature. Increased cooperation of the students in class was attributed to the teacher’s friendly attitude where teachers gave the students chance to ask questions on aspects they did not seem to understand and demonstrating the application of the subject in everyday life especially when the teachers asked them more challenging questions in questions and answers sessions.

4.5.8 Methods used by mathematics teachers to motivate students

Mathematics teachers in the study area used several methods to motivate students in learning of mathematics as indicated in Figure 4.11
Figure 4.11: Methods used by mathematics teachers to motivate students

Sixty seven per cent (67%) of the teacher respondents *always* reinforced students with positive comments to help them improve their attitude towards learning and performance in mathematics. Sixty three per cent (63%) used teaching aids very often to enhance students understanding of the topics being taught. In addition, varying teaching methods was always adopted by 46% of the respondents. 42% always gave frequent feedback to students on questions and exercises done to help them know answers and enhance their understanding of the content. Providing individual attention was often adopted by 50% of the respondents and was aimed at addressing students’ specific weaknesses in learning the subject.

Offering incentives to any small progress was very often practiced by 48% of the respondents helped in creating positive attitude among students especially the poor performers. Knowing each student by name was adopted by 58% of the respondents and was intended to give a sense
of individual attention and enhance close relationship between the teacher and the students. The teachers tried to master the art of making the lessons quite interesting making the students to enjoyed the mathematics lessons. They specifically tended to use teaching aids. This way, they reported that students ended up understanding the content easily and discover new knowledge. The teachers indicated that students’ participation was wanting in classes and there was need for improvement through evaluating, identifying and rewarding the best performers, offering incentives and reinforcing any small achievements with positive comments.

4.6 Discussions of the findings

4.6.1 Challenges related with attitudes towards learning and performance in mathematics among secondary school students

The major feelings/opinions towards learning and performance in mathematics in the study area was a general feeling of extreme anxiety and fear. This was evident when (45%) of student respondents affirmed of such feelings when a new mathematical concept was introduced or exams were mentioned or brought. This in turn prompted lack of confidence among the students as confirmed by approximately (40%) of teacher respondents. It was noted that a noticeable 18% of the student respondents still believed that understanding mathematics was difficult. However, majority (93%) of student respondents strongly agreed or agreed that mathematics was a useful subject in life. (73%) among them agreed that of the subjects taught, mathematics was their favourite. The students’ poor performance in the subject was attributed to the fact that some topics were perceived not to be applicable to daily life problems and learning of such topics were greatly hampered resulting in another vicious cycle of poor performance in the subject. A considerable (61%) of the student respondents strongly disagreed that being a girl or a boy interfered with their learning and understanding of mathematics. It was clear that influence of the teachers, parents, siblings and peers on the students was not
confined to imparting of subject knowledge alone, but goes further to play a part in the total development of the students’ attitudes towards learning and performance of mathematics.

Education is a process of human enlightenment and empowerment for the achievement of a better quality of life. The need to improve quality in mathematics education is a great necessity bearing in mind the dismal performance in this subject in Bureti district and Kenya as a whole. Achieving this goal, positive attitudes towards mathematics should be enhanced and students motivated to like mathematics as a subject. Mathematics education is crucial to the entire developmental process of the country since teachers as well as students agree that the subject is multi disciplinary and can be applied everywhere else. The negative attitudes of students towards learning and performance in mathematics was due to existing learning methods that discouraged participation, as well as unfounded believes that mathematics was a difficult subject. Teachers, fellow students, siblings and parents also contributed to formation of attitudes. If the afore mentioned had negative attitudes themselves, the study found out that they in turn enforce the same on the learners. This led to poor performance in the subject which degenerated even into more desperation. Due to its role in the life hood of the nation, there is a need for teachers and all education stakeholders to enhance positive attitudes towards mathematics as a subject as well as enhancement of quality teaching of the subject.

The findings should enlighten teachers, parents, students and all education stakeholders to ensure they enhance positive attitudes towards learning and performance of mathematics among students. This is so because a connection between attitudes, learning and performance in mathematics was identified in the study. Also learning experiences provided in the classrooms should include such activities which provide opportunities for students to participate, bring out analogy, to draw inferences, arrive at generalizations and so on. Schools management should as
a matter of priority take steps to develop positive attitudes of students. In a nut shell it is important that schools management, government, parents and well wishers take active interest in the development of positive attitudes towards learning and performance of mathematics among students in secondary schools.

4.6.2 Factors influencing attitudes towards learning and performance in mathematics

Heavy teaching workload had a potential to compromise the quality of teaching since overworked teachers may not have time plan for their lessons, fail to attend classes, attend classes late or fail to mark students work. The resultant poor teaching methods and strategies enhance negative attitudes towards learning and performance of the subject making the students to term it as difficult. Slightly more than half (51%) of the teachers also reported that they liked teaching the subject moderately meaning that it was hard for them to adequately influence students positively towards learning and performance in mathematics. Only a limited number of teachers (8%) demonstrated usefulness of mathematics by telling the students about the importance of the subject or even told the students the importance of mathematics especially in relation to other subjects and day to day life, meaning that students learnt the lesson as routine to pass examinations.

A number of teaching methods had been employed by teachers to enhance learning and performance in mathematics without much success. They attributed this to desperation of some students, especially in cases where poor results in mathematics examinations were repeatedly attained by the students. Students worked in groups as well as being given individual attention by their teachers to enable them to clearly understand the concepts. However, it was not surprising to see that students were still anxious about their learning of mathematics and examination. In one aspect, one can view students’ relatively high level of anxiety as a positive
sign indicating that students were serious about the subject. However, a high level of anxiety in students can also have negative influence on their learning. These research findings were in concurrence with other researches associated mathematics anxiety with low self-confidence, fear of failure, and negative attitudes towards learning and performance of mathematics. Ma’s (1999) analysis of 26 studies on the relationship between anxiety toward mathematics and achievement in mathematics at the primary and secondary school levels revealed that there was a significant relationship between the two variables whereby lower mathematics anxiety gave the potential for higher mathematics achievement.

As some students said that they were encouraged by friends and relatives to study mathematics, the encouragement trend would definitely influence students’ performance in the subject. Students’ little interest in mathematics, that the subject had little application to real life situations (30% thought so) especially to their future careers and that that there were no mathematics reference books and textbooks, were major reasons which made students loose interest in the subject. Some students’ dissatisfaction on how some mathematics teachers taught the subject was related to the fact that some difficult topics were not thoroughly covered to involve applications which were to be acquired by students for future use either in daily activities or in their careers.

The importance of mathematics is for students to regard mathematics as a subject not only crucial to passing the examination but a practical tool for day to day use. The data on whether students will use mathematics a lot in life, to some extent, indicate that some students cannot see the functional aspect of mathematics in their later life despite students viewing mathematics as a subject being abstract and not applicable to real-life situation. There is a need to change
students’ attitudes from learning mathematics just as a compulsory requirement in schooling and for passing to realizing the functional value of mathematics by letting students see the vital connection between attitudes learning, passing well in mathematics examinations and application of mathematics to real life situation. This will need rewriting mathematics syllabus to include attitude change, precise reason for learning then go ahead and let students learn and expect to perform well in the study so that students could realize mathematics applications in their future careers. Though it could be difficult to relate some areas of Mathematics to real life situations, many topics in the subject could be taught by identifying certain areas which could be illustrated involving application aspects.
CHAPTER FIVE
SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction
This chapter gives a summary of the study, conclusions and recommendations, which can be made to help in improving students’ attitudes towards learning and performance in mathematics and therefore mitigate the negative impacts of such attitudes on learning of mathematics among students in secondary schools in Bureti district in particular and Kenya in general.

5.2 Summary
The purpose of this study was to determine the attitudes formed by the students towards learning and performance in mathematics and finding out whether such attitudes contributed to poor learning of mathematics and consequently poor performance in the subject in secondary schools in Bureti district. The study also sought to establish the contributing factors which influence attitudes towards learning and performance of mathematics among secondary school students. The study adopted a descriptive survey design and data collected was largely descriptive by nature.

Findings indicated that the major problem in the learning of mathematics in the secondary schools in Bureti district included lack of confidence in the ability to learn and perform well in mathematics as reported by 45% of the respondents. Lack of interest in mathematics was mentioned by 24% of the respondents. With regards to attitudes towards mathematics as a subject, up to 56% of the respondents strongly agreed that they enjoyed learning mathematics as a subject. In addition, the same percentage (56%) strongly disagreed that Mathematics classes/lessons were not interesting yet this percentage of students fail to post good performance in mathematics as indicated by teacher respondents. Out of those who registered
strong interest in mathematics 49% of the respondents strongly agreed that they would like to continue doing mathematics after secondary school.

Only 38% of the respondents strongly disagreed that understanding mathematics was difficult while up to 70% of the respondents strongly agreed that Mathematics was a very useful subject in life. Up to 59% of the respondents strongly disagreed that they were given a lot of ‘unnecessary’ mathematics assignments while only 35% of the respondents were of the opinion that they were well provided with mathematics textbooks and other learning materials. With regards to attitudes related to mathematics teachers, up to 69% of the respondents either agreed or strongly agreed that it was the teacher who could make mathematics learning easier for them.

Thirty three per cent of the teachers reported that they had been teaching mathematics for 11 to 15 years, while 33% said that they had taught mathematics for less than 5 years. Up to 13% of the respondents reported that they had been teaching mathematics for 6 to 10 years, while the remaining 4% had been teaching for more than 15 years. Teachers with many years of experience in teaching are more likely to understand the subject matter as well as teaching methodologies that my positively influence students attitudes towards learning of mathematics. With regards to how much the teachers liked teaching mathematics, the majority (51%) stated that they liked teaching the subject moderately while the remaining 49% reported that they liked teaching the subject moderately.

The study sought to understand the teacher’s attitudes towards mathematics as the subject. Up to 70% of the respondents reported that the subject was interesting while 17% thought that it was very interesting. The most commonly used method of creating interest in mathematics
according to 75% of the respondents was to organize internal symposia. Only up to 13% of the respondents told the students the importance of mathematics especially in relation to other subjects and day to day life. A small percentage (4%) of the teachers made the effort of changing the teaching method by checking the accuracy, correctness, and depth of content as well as summarizing the content and giving followup activities.

According to 42% of the respondents, lecture method was never used to enhance learning of mathematics but was sometimes used by 46% of the respondents. Mathematics teachers in the study area used several methods to motivate students in learning of mathematics. Up to 67% always reinforced students with positive comments to help them improve their attitudes towards learning and performance in the subject. Up to 63% very often used teaching aids to enhance students understanding of the topics being taught. In addition, varying teaching methods were always adopted by 46% of the respondents.

5.3 Conclusions
The results from this study suggest that secondary students know that mathematics is important and they seem willing to learn mathematics and learn it well. However, their attitudes acquired from previous experience in the subject, teachers, parents and peers influence affected their learning of the subject. In addition, school teachers must be aware that there are certain aspects of students’ learning in mathematics that need to be improved. In particular, students should be given more opportunities to work on non-routine and challenging mathematics problems so as to maximize their thinking skills and value the intrinsic essence of mathematics this will require teachers going the extra mile in leading students in that path of learning. The subject should not be limited to theoretical teaching and focused on passing examinations only. In this sense,
mathematics should be demonstrated in a more practical way, by which students can spontaneously associate mathematics knowledge with their everyday environment. By doing so, the engagement and exposure will result in students’ better perspective of mathematics and their mathematics learning, which in turn help students to develop more positive attitudes toward the subject and therefore further promote their learning ability and consequently perform better in mathematics examinations. Since the study identified the connection between attitudes, learning, performance and practical application of mathematics in real life the following recommendations are suggested.

5.4 **Recommendations**

The following recommendations are made from the study.

1. Positive attitudes towards learning and performing well in mathematics are necessary ingredients in secondary school mathematics education. There is need for teachers, parents, and any other education stake holder to enhance these positive attitudes.

2. There is a successive connection between attitudes, learning, performance and practical utility of mathematics. This connection should be established early enough in a students’ mathematics education.

3. The unfavourable attitudes should be curtailed professionally and early enough before students utterly give up in learning and/or performance of mathematics.

4. Mathematics teachers should wisely utilize available learning resources to enhance positive attitudes, reinforce neutral attitudes, if any, and neutralize any negative attitudes towards learning and performance in mathematics.
5. Efforts should be made to ensure gender does not hinder learning and/or performance in mathematics among students. Teachers, parents and siblings of the students should encourage both the female and male learners to equally embrace mathematics.

5.5 **Recommendations for Further Research**

Further research is recommended in the following areas.

i) The study was carried out in one district only. Similar studies could be carried out in other parts of the country to gather adequate information on the subject to be able to generalize.

ii) This study only focused on students' attitudes towards learning and performance in mathematics. It would be also interesting to know the attitudes held by teachers towards teaching and performance in mathematics, and whether this in turn affects students’ attitude towards learning and performance of the subject.
REFERENCES


APPENDICES

APPENDIX A: Mathematics Teachers’ Questionnaire (MTQ)

Dear Respondent,

I’m conducting a study on the students’ attitudes towards learning of mathematics. Please read the questions below and kindly give the appropriate response by either ticking in the bracket [√] or by giving further information in the spaces provided. This study is purely for academic purposes and all information given shall be treated confidentially.

Section A: Personal background information:

1. Gender: Male [ ] Female: [ ]

2. What is your professional qualification?
   - Graduate teacher [ ] Diplomat [ ] Untrained teacher [ ]
   - Others (specify) ––––––––––––––––––––––––––––––––––––––

Section B: Teaching information:

1. How many mathematics lessons do you teach per week? –––––––––––––––

2. How many years have you been teaching?
   - (a) Less than a year [ ] (b) 1 – 5 years [ ] (c) 6 – 10 years [ ]
   - (d) 11 – 15 years [ ] (e) more than 15 years [ ]

3. How many years have you been in the current station?
   - (a) Less than a year [ ]
   - (b) 1 – 5 years [ ]
   - (c) 6 – 10 years [ ]
   - (d) 11 – 15 years [ ]
   - (e) More than 15 years [ ]

4. Do you like teaching mathematics?
   - (a) Very much [ ]
   - (b) Moderately [ ]
   - (c) Very little [ ]
   - (d) Not at all [ ]
Section C: Information on mathematics:

1. Do your students attach a lot of value to mathematics as a subject?
   (a) Yes [ ] (b) No [ ]
   Why? -------------------------------------------------------------------------------------

2. What is your opinion on mathematics as a subject?
   a) Dull [ ] (b) Tedious [ ] (c) Interesting [ ] (d) Very Interesting [ ]
   e) Other (Specify) ………………………………………………………………………..

3. What are the general attitudes of your students towards learning of mathematics?
   (a) Very positive [ ] (b) Positive [ ] (c) Negative [ ] (d) Very negative [ ]

4. Is the content of the current mathematics syllabus relevant to the needs of the society?
   (a) Not relevant [ ] (b) Somehow relevant [ ]
   (c) Relevant [ ] (d) Very relevant [ ]

5. Do you have any problem with the syllabus of mathematics?
   (a) Yes [ ] (b) No [ ]
   Specify them: -------------------------------------------------------------------------------------

6. What do you think your students like about mathematics?
   (a) The teaching [ ] (b) The teacher [ ]
   (c) The subject content [ ] (d) any other (specify) [ ]

7. What do students like in mathematics as a subject? -------------------------------

8. What reason(s) could you attribute to your answer in question 7 above?
   -------------------------------------------------------------------------------------

9. How can the students be encouraged to like mathematics?
   -------------------------------------------------------------------------------------

10. Suppose you realize that your students are not interested or do not like learning Mathematics, what do you do?
    (a) Tell them the importance of mathematics [ ]
    (b) Change teaching method [ ]
    (c) Organize internal (or external) symposia [ ]
    (d) Take them outside classroom and demonstrate usefulness of mathematics [ ]
    (e) Punish them [ ]
    (f) Nothing [ ]
    (h) Other (specify) ………………………………………………………………………..
Section D: Methods of teaching mathematics:
The following are different methods used to teach mathematics that may enhance learning of mathematics. Show by indicating against each method how frequent you use it. Rating of the method preferred is as follows:
1 – Never (N.) 2 – Sometimes (S) 3 – Often (O) 4 – very often (VO) and 5 – Always (A).

<table>
<thead>
<tr>
<th>Teaching methods</th>
<th>N</th>
<th>S</th>
<th>O</th>
<th>VO</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture method</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small group discussion</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student demonstrating to one another (or to others)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teacher assisting individual student</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Question &amp; and Answer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Any other, specify how frequent: --------------------------------------------------------------
-----------------------------------------------------------------------------------------------

Which of the above methods do you think enhance learning of mathematics and why?
................................................................................................................................................

Section E: Methods used by Mathematics Teachers to Motivate Students
1. The following are motivation techniques that enhance learning of mathematics among students. Show by indicating against each method that you strongly Disagree (D), Unsure (U), Agree (A) or Strongly Agree (SA). Rating scale is as follows SD=1, D = 2, U = 3, A = 4, SA = 5

<table>
<thead>
<tr>
<th>Techniques of motivation</th>
<th>SD</th>
<th>D</th>
<th>U</th>
<th>A</th>
<th>SA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reinforcing with positive comments</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Using teaching aids</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Varying teaching methods</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Giving frequent feedback</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Providing individual attention</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Offer incentives to any small progress</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowing each student by name</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Any other, specify how frequent --------------------------------------------------------------
-----------------------------------------------------------------------------------------------

2. Give suggestions that you think would improve learning of mathematics among Students
................................................................................................................................................

Thank you
APPENDIX B: Mathematics Students’ Questionnaire (MSQ)

Dear Student,

The purpose of this questionnaire is to find out students’ attitudes towards learning of mathematics.

Instructions
1. You may not write your name anywhere in this questionnaire.
2. The information you give concerning your feelings towards learning of mathematics will be handled confidentially. Please respond to the items below as honestly as is possible.
3. Put a [√] in the brackets corresponding to your answer.

Section A: General information about the student and school
1. Type of school: Boys [ ] Girls [ ] Mixed [ ]
2. Gender: Male [ ] Female [ ]
3. Which of the following problems do you think affect you most when learning Mathematics?
   (i) Lack of interest in mathematics [ ]
   (ii) Inadequate mathematics textbooks and learning resources [ ]
   (iii) Language used by the teacher is difficult to understand [ ]
   (iv) Lack of confidence [ ]
   Any other, specify  ---------------------------------------------------------------
   Adamankar Maharashtra State Board  ---------------------------------------------------------------

Suggest possible solutions to your problem:  ---------------------------------------------------------------
   ------------------------------------------------------------------------------------------------------

Section B: Your feelings towards learning and performance in mathematics
(1) Instructions: This section has statements that you are to decide carefully whether you strongly agree (SA), Agree (A), Unsure (U), Disagree (D), or Strongly Disagree (SD). Put a tick [√] against each statement depending on your feelings. If you make a mistake, cross by putting (X) through the tick [√] and then tick in the appropriate box in the table below

<table>
<thead>
<tr>
<th>Students’ Feelings</th>
<th>SA</th>
<th>A</th>
<th>U</th>
<th>D</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>I enjoy learning mathematics</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mathematics classes/lessons are not interesting</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I would like to continue doing mathematics after completing secondary school education</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
To understand mathematics is difficult
Mathematics is very useful in life
I think it is the teacher who can make mathematics learning easier
Among the subjects taught, mathematics is my favourite
I am given a lot of unnecessary mathematics assignments
I am well provided with mathematics textbooks and other learning resources
I feel extremely anxious and fearful, when mathematics examinations are mentioned or brought
Mathematics should not be a compulsory subject
I do a lot of mathematics exercises on my own or with a friend
Mathematics is impossible to learn
Learning mathematics is just remembering what the teacher says and does while in class
The best way to learn mathematics is to discover a concept by oneself
My grades (marks) are always low in mathematics
I do mathematics for the sake of it
I like my mathematics teacher
My friends don’t like learning mathematics
My parents and siblings encourage me to learn Mathematics and to perform well in the subject
Being a girl or a boy interferes with my learning and my performance of mathematics
I learn mathematics well regardless of the gender of my teacher

2. What according to you can make learning of mathematics interesting and easier to understand?  

3) What other comment do you have in regard to mathematics learning?  

Thank you
APPENDIX C: Authorization Letter

KENYATTA UNIVERSITY
GRADUATE SCHOOL
P.O. Box 43844,
NAIROBI
Tel. No: 810901/9 Ext. 57530
E-mail: kubps@yahoo.com

Our Ref: E55/10148/07
Your Ref:

Date: 13th May, 2009

The Permanent Secretary,
Ministry of Higher Education, Science & Technology,
P.O. Box 30040,
NAIROBI

Dear Sir/Madam,

RE: RESEARCH AUTHORIZATION

I write to introduce Mr. Jackson Kipronoh Mutai who is a Postgraduate Student of this University. He is registered for M.Ed. degree programme in the Department of Educational Communication & Technology.

Mr. Mutai intends to conduct research for a thesis entitled, "Attitudes' Influence Towards Learning and Performance of Mathematics among Students in Selected Secondary Schools in Bureti District, Kenya."

Any assistance given to him will be highly appreciated.

Yours faithfully,

JOHN M. ODONGI
FOR: DEAN, GRADUATE SCHOOL

JMO/cww
APPENDIX D: Permission Letter

MINISTRY OF EDUCATION.

Telegrams: Elimu Bureti Litein
Telephone: 052. 54292
When replying please quote
Ref.No. and Date

DISTRICT EDUCATION OFFICE,
BURETI DISTRICT,
P.O. BOX 758,
LITEIN.


TO WHOM IT MAY CONCERN.


The above name person is currently undertaking M.ED at Kenyatta University. You are kindly requested to assist him collect information in your school in connection to his research for two weeks in the district.
Any assistance given to him is highly appreciated.

Joseph K. Kipyegon
For District education Officer
BURETI.
APPENDIX E: Bureti District Map

Source: DEO’s Office, Bureti District
### APPENDIX F: Bureti District Secondary Schools

<table>
<thead>
<tr>
<th>No.</th>
<th>School Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Chemalal Secondary School</td>
</tr>
<tr>
<td>2.</td>
<td>St. Monica Chebangang Secondary</td>
</tr>
<tr>
<td>3.</td>
<td>Kimulot Mixed Secondary</td>
</tr>
<tr>
<td>4.</td>
<td>Kaptien Secondary</td>
</tr>
<tr>
<td>5.</td>
<td>Kaptebengwet Secondary</td>
</tr>
<tr>
<td>6.</td>
<td>Koiwa Secondary</td>
</tr>
<tr>
<td>7.</td>
<td>Kiptenten Secondary</td>
</tr>
<tr>
<td>8.</td>
<td>Ruseya Secondary</td>
</tr>
<tr>
<td>9.</td>
<td>Simoti Secondary</td>
</tr>
<tr>
<td>10.</td>
<td>Saseta Secondary</td>
</tr>
<tr>
<td>11.</td>
<td>Boito Secondary</td>
</tr>
<tr>
<td>12.</td>
<td>St. Brigids Secondary</td>
</tr>
<tr>
<td>13.</td>
<td>Ngererit Secondary</td>
</tr>
<tr>
<td>14.</td>
<td>Mogonjet Secondary</td>
</tr>
<tr>
<td>15.</td>
<td>Cheptabach Secondary</td>
</tr>
<tr>
<td>16.</td>
<td>Kaptembwo Secondary</td>
</tr>
<tr>
<td>17.</td>
<td>Koiwa Central Secondary</td>
</tr>
<tr>
<td>18.</td>
<td>Terek Secondary</td>
</tr>
<tr>
<td>19.</td>
<td>Cheluget Secondary (Private)</td>
</tr>
<tr>
<td>20.</td>
<td>Kabiangek Secondary</td>
</tr>
<tr>
<td>21.</td>
<td>Sotit Secondary</td>
</tr>
<tr>
<td>22.</td>
<td>Cheptalal Secondary</td>
</tr>
<tr>
<td>23.</td>
<td>Embomos Secondary</td>
</tr>
<tr>
<td>24.</td>
<td>Kipkorir Salat Secondary</td>
</tr>
<tr>
<td>25.</td>
<td>Meswondo Secondary</td>
</tr>
<tr>
<td>26.</td>
<td><strong>Roret Mixed Secondary</strong></td>
</tr>
<tr>
<td>27.</td>
<td>Kapchelach Secondary</td>
</tr>
<tr>
<td>28.</td>
<td><strong>Kapkishiara Secondary</strong></td>
</tr>
<tr>
<td>29.</td>
<td>Kabartegan Secondary</td>
</tr>
<tr>
<td>30.</td>
<td>Tulwet Secondary</td>
</tr>
<tr>
<td>31.</td>
<td>Kelunet Secondary</td>
</tr>
<tr>
<td>32.</td>
<td>Mabasi Secondary</td>
</tr>
<tr>
<td>33.</td>
<td>Tebesonik Secondary</td>
</tr>
<tr>
<td>34.</td>
<td>Kapminjeiwet Secondary</td>
</tr>
<tr>
<td>35.</td>
<td>Kabusienduk Secondary</td>
</tr>
<tr>
<td>36.</td>
<td>Siongi Secondary</td>
</tr>
<tr>
<td>37.</td>
<td>Kabitungu Secondary</td>
</tr>
<tr>
<td>38.</td>
<td><strong>Getarwet Secondary</strong></td>
</tr>
<tr>
<td>39.</td>
<td>Reresik Secondary</td>
</tr>
<tr>
<td>40.</td>
<td><strong>Roret Girls Secondary (Private)</strong></td>
</tr>
<tr>
<td>41.</td>
<td>Rehema Girls Secondary Private</td>
</tr>
<tr>
<td>42.</td>
<td>Light of God Secondary (Private)</td>
</tr>
<tr>
<td>43.</td>
<td>Litein Boys High</td>
</tr>
<tr>
<td>44.</td>
<td><strong>Tengecha Boys High</strong></td>
</tr>
<tr>
<td>45.</td>
<td>Ngesumin Girls Secondary</td>
</tr>
<tr>
<td>46.</td>
<td>AIC Litein Girls Secondary</td>
</tr>
<tr>
<td>School Name</td>
<td>Location</td>
</tr>
<tr>
<td>------------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>47. Sosit Girls Secondary</td>
<td></td>
</tr>
<tr>
<td>48. Tengecha Girls Secondary</td>
<td></td>
</tr>
<tr>
<td><strong>49. Chelilis Girls Secondary</strong></td>
<td></td>
</tr>
<tr>
<td>50. Cheborge Secondary</td>
<td></td>
</tr>
<tr>
<td>51. Kaminjeiwa Secondary</td>
<td></td>
</tr>
<tr>
<td>52. Arokyet Secondary</td>
<td></td>
</tr>
<tr>
<td>53. Mombwo Secondary</td>
<td></td>
</tr>
<tr>
<td>54. Chemoiben Secondary</td>
<td></td>
</tr>
<tr>
<td>55. Kapkatet Secondary</td>
<td></td>
</tr>
<tr>
<td>56. Kapsinendet Secondary</td>
<td></td>
</tr>
<tr>
<td>57. Kapkarin Secondary</td>
<td></td>
</tr>
<tr>
<td>58. Kaptele Secondary</td>
<td></td>
</tr>
<tr>
<td>59. Kusumek Secondary</td>
<td></td>
</tr>
<tr>
<td>60. Litein East Secondary (Private)</td>
<td></td>
</tr>
<tr>
<td>61. Cheptendeniet Secondary</td>
<td></td>
</tr>
<tr>
<td>62. Korongoi Girls Secondary</td>
<td></td>
</tr>
<tr>
<td>63. Kiptewit Secondary</td>
<td></td>
</tr>
<tr>
<td>64. Cheplanget Secondary</td>
<td></td>
</tr>
<tr>
<td>65. Kapsogut Secondary</td>
<td></td>
</tr>
<tr>
<td>66. Kapsogeruk Secondary</td>
<td></td>
</tr>
<tr>
<td>67. Kapmanamsim Secondary</td>
<td></td>
</tr>
<tr>
<td>68. Chebitet Secondary</td>
<td></td>
</tr>
<tr>
<td>69. Chebwagan Secondary</td>
<td></td>
</tr>
</tbody>
</table>

**Key:**

*Selected Secondary Schools

**Pilot Secondary School**