

**CAUSES OF POOR PERFORMANCE IN MATHEMATICS IN SECONDARY
SCHOOLS: A CASE OF NYANDARUA NORTH SUB COUNTY,
KENYA**

CHARLES NDIRITU WACHIRA

B.Ed

**A RESEARCH PROJECT SUBMITTED TO THE SCHOOL OF
EDUCATION AND SOCIAL SCIENCES IN PARTIAL FULFILMENT OF
THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF
EXECUTIVE MASTERS IN EDUCATIONAL MANAGEMENT IN
LEADERSHIP AND POLICY IN EDUCATION**

KARATINA UNIVERSITY

NOVEMBER, 2016

DECLARATION

This project is my original work and to the best of my knowledge, has never been presented to Karatina University or any other institution for any award. Where necessary, I have acknowledged the different authors whose books and articles I have cited.

Signature: Date:

Charles Ndiritu Wachira

Declaration by the Supervisors :

The project has been submitted for examination with our approval as University Supervisors.

Signature: Date:

Dr. Josiah Kinyua Murage

Department of Humanities

Karatina University

Signature..... Date:

Dr. Maurice Kimosop

Department of Planning, Administration and

Curriculum Development

Karatina University

DEDICATION

This work is dedicated to my siblings Sylvia Waihuini, Philomena Wangari, Eunice Mukami and Terry Nyambura who have been my greatest motivators, source of strength in my life and a pillar in times of need.

ACKNOWLEDGMENT

Many people have helped in the success of this work. However I would like to appreciate a few. I appreciate the devoted efforts and guidance of my supervisors Dr. Josiah Murage and Dr. Maurice Kimosop. Their guidance has contributed a lot in the production of this work and without them I would not have made it.

I acknowledge my colleagues in class Mr. Muchemi Nicholas, Mr. Wachira Richard, Mr. Mwinzi, Mrs. Waweru and Mrs. Lucy Akello. Their moral support and encouragement during this period of work came at a time when I really required it.

I also acknowledge the staff Ministry of Education through the Sub County Director of Education (SCDE) Nyandarua North Sub-County. They provided data on mathematics performance in the sub-county with a lot of ease. I appreciate the teachers of Rurii Secondary School for standing in for me when scouting for data and materials.

Lastly, I acknowledge my loving wife Janet Wangechi for allowing me to divert some of the family resources towards the achievement of this course. May God reward her abundantly.

ABSTRACT

Mathematics plays an important role in scientific advancement. It is the vehicle expected to move Kenya's economy to industrial status by 2030. However, KCSE Mathematics results show poor performance over the years and this is causing concern to all stakeholders. The purpose of the study was to investigate the causes of poor performance in Mathematics in secondary schools in Nyandarua North Sub County. The objectives of the study were to; assess attitudes of students towards Mathematics in secondary schools in Nyandarua North Sub County; explore the attitude of Mathematics teachers towards students of Mathematics in secondary schools in Nyandarua North Sub County; evaluate teaching methods used by teachers of Mathematics in teaching Mathematics in secondary schools in Nyandarua North Sub County and lastly, examine available resources for effective teaching of Mathematics in Nyandarua North Sub County. The study used descriptive research method. The target population for the study was 2133 respondents that comprised of 30 principals, 200 teachers and 1903 students. Nine schools from the 30 public schools were chosen for the study through simple random sampling method. The sample population for the study comprised nine principals, nine HODs, 18 Mathematics teachers and 189 students. The nine principals, nine HODs and eighteen teachers were purposively selected from the chosen schools. One hundred and eighty nine (189) students were sampled through simple random sampling method. Questionnaires and interview schedules were used as the instruments of data collection. A pilot study was done in two schools in Nyandarua Central Sub County which borders the research area. Validity was determined by presenting the research instruments to the research experts at Karatina University. Reliability of research instruments was tested using Pearson's Correlation Coefficient. Data was analyzed using Statistical Package for Social Science (SPSS) version 20 and presented in form of frequency tables and percentages. Descriptive narratives were used to analyze qualitative data. The study findings showed that the poor performance in Mathematics in Nyandarua North Sub County is brought about by poor attitude towards the subject by teachers and students, inadequate teaching resources and poor methods of assessment. There is need for teachers to develop and maintain positive attitude towards Mathematics by ensuring students get used to modern Mathematics learning by use of ICT in secondary schools. The study recommends that school stakeholders should avail modern teaching resources and methods of assessment should be heightened for students to improve performance in Mathematics.

TABLE OF CONTENTS

DECLARATION	ii
DEDICATION	iii
ACKNOWLEDGMENT	iv
ABSTRACT	v
TABLE OF CONTENTS	vi
LIST OF TABLES	ix
LIST OF FIGURES	x
ABBREVIATIONS AND ACRONYMS	xi
CHAPTER ONE: INTRODUCTION	Error! Bookmark not defined.
1.1 Background of the Study	Error! Bookmark not defined.
1.2 Statement of the Problem	Error! Bookmark not defined.
1.3 Purpose of the Study	Error! Bookmark not defined.
1.4 Objectives of the Study	Error! Bookmark not defined.
1.5 Research Questions	Error! Bookmark not defined.
1.6 Significance of the Study	Error! Bookmark not defined.
1.7 Assumptions of the Study	Error! Bookmark not defined.
1.8 Scope of the Study	Error! Bookmark not defined.
1.9 Limitations of the Study	Error! Bookmark not defined.
1.10 Theoretical Framework	Error! Bookmark not defined.
1.11 Conceptual Framework	Error! Bookmark not defined.
CHAPTER TWO: LITERATURE REVIEW	Error! Bookmark not defined.
2.1 Introduction	Error! Bookmark not defined.
2.2 Attitudes of Students towards Mathematics	Error! Bookmark not defined.
2.3 Attitude of Mathematics Teachers towards Students of Mathematics	Error! Bookmark not defined.
2.4 Teaching Methods and Mathematics Study	Error! Bookmark not defined.
2.5 Resources and Teaching of Mathematics	Error! Bookmark not defined.

CHAPTER THREE: RESEARCH METHODOLOGYError! Bookmark not defined.

3.1 Introduction	Error! Bookmark not defined.
3.2 Study Design	Error! Bookmark not defined.
3.3 Location of the Study	Error! Bookmark not defined.
3.4 Target Population	Error! Bookmark not defined.
3.5 Sample Size and Sampling Techniques	Error! Bookmark not defined.
3.6 Research Instruments	Error! Bookmark not defined.
3.6.1 Heads of Departments Questionnaire	Error! Bookmark not defined.
3.6.2 Students Questionnaire	Error! Bookmark not defined.
3.6.3 Interview Schedule.....	Error! Bookmark not defined.
3.7 Pilot Study.....	Error! Bookmark not defined.
3.8 Validity and Reliability of Instruments.....	Error! Bookmark not defined.
3.8.1 Validity of the instruments.....	Error! Bookmark not defined.
3.8.2 Reliability of instruments.....	Error! Bookmark not defined.
3.9 Ethical Considerations.....	Error! Bookmark not defined.
3.10 Data Analysis	Error! Bookmark not defined.

CHAPTER FOUR: DATA ANALYSIS AND INTERPRATATION **Error! Bookmark not defined.**

4.1 Introduction	Error! Bookmark not defined.
4.2 Demographic Analysis of respondents.....	Error! Bookmark not defined.
4.2.1 Gender of Respondents	Error! Bookmark not defined.
4.2.2 Type of School	Error! Bookmark not defined.
4.3 Students towards Mathematics.....	Error! Bookmark not defined.
4.4 Teachers' Negative Attitude towards Mathematics Students .	Error! Bookmark not defined.
4.5 Teaching Methods used by Teachers of Mathematics	Error! Bookmark not defined.
4.5.1 Teachers' Qualifications	Error! Bookmark not defined.
4.5.2 Teachers' Preparedness for the Lessons.....	Error! Bookmark not defined.
4.5.3 Teachers are Committed to their Work.....	Error! Bookmark not defined.
4.5.4 Mathematics Lessons are Lively	Error! Bookmark not defined.
4.5.5 Teaching Methods are Activity Oriented.....	Error! Bookmark not defined.

4.6 Resources Used in Teaching of Mathematics ...	Error! Bookmark not defined.
4.6.1 Teachers' Promptness in Lesson Attendance..	Error! Bookmark not defined.
4.6.2 Teachers have Adequate Teaching Resources	Error! Bookmark not defined.
4.6.3 Most Students have Textbooks	Error! Bookmark not defined.
4.6.4 Teachers are Fair in Issuing of Text Books.....	Error! Bookmark not defined.
4.6.5 Mathematics Assessment Strategies.....	Error! Bookmark not defined.
4.7 Interviews with Principals in Relation to Performance in Mathematics....	Error! Bookmark not defined.

CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS	Error! Bookmark not defined.
5.1 Introduction	Error! Bookmark not defined.
5.2 Summary	Error! Bookmark not defined.
5.3 Conclusions	Error! Bookmark not defined.
5.4 Recommendations	Error! Bookmark not defined.
5.5 Areas for Further Research	Error! Bookmark not defined.
REFERENCES	52
APPENDICES	58

LIST OF TABLES

Table 1.1 Performance in Mathematics in KCSE (2004 – 2007)	Error! Bookmark not defined.
Table 1.2: K.C.S.E Performance in Nyandarua North Sub County (2010-2014)	Error! Bookmark not defined.
Table 3.1: Population Size and Sample Size	25
Table 4.1: Gender of Respondents	Error! Bookmark not defined.
Table 4.2: Type of School.....	Error! Bookmark not defined.
Table 4.3: Students Response on Positive Attitude towards Mathematics	Error! Bookmark not defined.
Table 4.4: Teachers’ Response on Students’ Negative Attitude Towards Mathematics	Error! Bookmark not defined.
Table 4.5: Teachers have Negative Attitude towards Mathematics Students.....	Error! Bookmark not defined.
Table 4.6: Mathematics Teachers are Adequately Trained	Error! Bookmark not defined.
Table 4.7: Mathematics Teachers’ are Qualified	Error! Bookmark not defined.
Table 4.8: Teachers are prepared for the Lessons.....	Error! Bookmark not defined.
Table 4.9: Teachers are committed to their Work	Error! Bookmark not defined.
Table 4.10: Mathematics Lessons are lively	Error! Bookmark not defined.
Table 4.11: Teaching Methods are Activity Oriented .	Error! Bookmark not defined.
Table 4.12: Teachers are prompt in Lesson Attendance	Error! Bookmark not defined.
Table 4.13: Teachers have Adequate Teaching Resources.....	Error! Bookmark not defined.
Table 4.14: Most Students have Textbooks	Error! Bookmark not defined.

Table 4.15: Teachers are fair in Issuing of Text Books**Error! Bookmark not defined.**

Table 4.16: Mathematic Teachers Assess Students Often **Error! Bookmark not defined.**

Table 4.17: All Students are Given the Same Work during each Lesson..... **Error! Bookmark not defined.**

Table 4.18: Majority of Students Do Extra Assignments **Error! Bookmark not defined.**

Table 4.19: Most Students Finish their Assignments in Time... **Error! Bookmark not defined.**

LIST OF FIGURES

Figure 1.1: Conceptual Framework**Error! Bookmark not defined.**

ABBREVIATIONS AND ACRONYMS

AIR	American Institute of Research
DPC	District Planning Committee
FAWE	Forum for African Women Educationists
FPE	Free Primary Education
FDSE	Free Day Secondary Education
GOK	Government of Kenya
HOD	Head of Department
ICT	Information Communication and Technology
INSET	In-Service Education and Training
JICA	Japan International Cooperation Agency
KCPE	Kenya Certificate of Primary Education
KCSE	Kenya Certificate of Secondary Education
KNEC	Kenya National Examinations Council
NAEP	National Assessment of Education Progress
SCDE	Sub County Director of Education
SMASSE	Strengthening Mathematics and Science in Secondary Education

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Mathematics under the Kenya National Examination Council rules and procedures is a compulsory subject taken by learners in primary and secondary level of education. It involves manipulating of algorithms and axioms in mathematical investigations. Thus, learners must have logical and consistent thoughts that realize viable decisions given the underlying circumstances. Kenya National Examination Council (1987) noted that the goal of Mathematics according to the Kenya National Examination Council (KNEC) is to enhance acquisition of numerical and logical skills by learners and assist them to think in a logical, accurate and precise way.

Kakai (2006) argued that over the years, students' scores in Mathematics have been poor though they had impressive Mathematics entry marks when joining secondary schools. This could be apportioned to the fact that, in Kenya Certificate of Primary Education (KCPE) pupils are tested through multiple choice questions which is not the case in secondary schools where students must show the workings to earn marks. In secondary schools, Mathematics is tested in two papers in which learners are expected to answer questions from over 64 Mathematics topics in the four years of secondary schooling.

KNEC (2007) posited that in secondary schools the two papers, Mathematics paper one (121/1) and paper two (121/2) have 24 open ended items each. They complement each other over the entire syllabus where paper 1 (121/1) tests mainly forms one and two work while paper 2 (121/2) tests mainly forms three and four work. In each paper, section 1 has 16 compulsory short items with a total score of 50 marks. Section

II has eight long items of 10 marks each. A candidate is required to answer five items with a total of 50 marks. The two papers are equally weighted and each is marked out of one hundred percent. The results from the two papers constitute the final Mathematics grade for the candidate at KCSE level.

The KNEC (2008) report indicated that there were eighteen areas that students performed dismally in both Mathematics papers. The report also revealed that students faced challenges in areas such as construction and plotting. This trend was noted to be common over the years. The report is a pointer that teachers should orient their students in these two areas in order to record good performances in the subject. This view directly led to the concern of the study in that the challenges students face in adapting to Mathematics learning in secondary school could be the reason behind poor performance.

American Institute for Research (AIR, 2007) carried out a study on Mathematics performance among 4th and 8th grades in children in the United States of America. The study showed that majority of the children performed below average compared to their cohorts across the world. A study conducted by National Assessment of Education Progress (NAEP, 2007), assessed the progress in Mathematics of students in grades 4, 8, and 12. Again, the study showed that the pupils performed below the average. AIR (2007) noted that poor performance can be attributed to teachers who teach the learners. Schmidt, Houang and Cogan (2002) established that teachers follow text books which are too wide in terms of content topics without acknowledging the learners level of knowledge. As a result, teachers do not develop in their pupils a deep conceptual understanding of Mathematics topics and their applications.

Mackay (1981) noted that the education system in Kenya changed from 7-4-2-3 to 8-4-4. This system was intended to develop learners, create jobs, create self-reliance and have all round citizens for Kenya's development. Mackay report further advised that some secondary school topics be moved to the primary school. Mathematics and science subjects were also made compulsory in secondary schools. As a result, the system introduced some changes in Mathematics and science subjects. However, it was established that majority of the educational institutions were ill equipped and lacking in basic necessities for learning. The report noted that although the government was responsible for funding educational institutions, equipping them and providing the human resource, the amounts required for implementation was quite enormous. Thus cost sharing in education was introduced. The purpose was to bridge the financing gap created by the system in the education sector. However, experts had not put into consideration the effect that this had in access to education among the poor families and the strain it would exert on household incomes. This system was ineffective and in 2003 the government implemented the Free Primary Education and later in 2008 the subsidized secondary education. This was to achieve education for all under the millennium development goals. The structure of Kenyan education system places secondary education as a bridge between basic primary education and transition to tertiary and higher education. It allows learners to develop skills and competencies required for higher learning. It therefore acts as an important component where learners gain technological skills geared to the world of work. The aim therefore is to instill the learners with the pre-requisite values, attitudes and skills for socio-economic development of the country as it strives to achieve the vision 2030 (Republic of Kenya, 1982).

Mathematics is a key component in the World education systems. Salau (2000) noted that there was a significant relationship between achievement in Mathematics and sciences. He also pointed out that Mathematics is regarded as a science and that there is a relationship between Mathematics and students' overall ability outcomes. Nalianya (2011) noted that in the Kenyan education system, Mathematics is taken as a compulsory subject by all learners in secondary schools. Thus it is imperative for learners to post better results in the subject as it affects the final score or grade. However, though a compulsory subject, Mathematics performance in the national examinations has not been admirable as shown in table 1.1.

Table 1.1 Performance in Mathematics in KCSE (2004 – 2007)

Year	Candidature	Mean mark Out of 200	Grade
2004	221,295	37.20	D-
2005	259,280	31.91	D-
2006	238,684	38.08	D-
2007	273,504	39.46	D-

Source KNEC, 2007

The overall mean in Mathematics at KCSE in the country showed a slight improvement in the year 2007 compared to the previous years. The students' overall performance was low (grade D-). This situation is likely to compromise Kenya's efforts in achieving its goals of scientific and technological development. In Nyandarua, the situation is not different. Mathematics performance is low as depicted in Table 1.2.

The general low performance in national examinations in secondary schools in Kenya is contributed by low grades in Mathematics. The performance of candidates in the national examination has raised a red flag and become a case of discussion in social and political forums. Odhiambo (2013) argued that, the declaration of free primary education in 2003, schools experienced higher enrollment rates and called for urgent infrastructural and human resource interventions which were not given. This brought its share in the unending education problems.

The government has invested in educational reforms in the country with an aim of increasing access and completion as well as quality of education. The Government of Kenya (GOK) investment in education not only in FPE funding, subsidizing secondary education but also funding of the In-Service Education and Training (INSET (Ministry of Education, Science and Technology (MoEST, 2007). All these programmes are meant to improve access and quality of education in Kenya which also integrates Mathematics teaching in schools.

Republic of Kenya (2007) argued that Kenya intends to be transformed into a developed nation as outlined in the vision 2030. Therefore in attaining this dream the teaching of Mathematics plays a vital role in the enhancing the quality of human resource requirement by the year 2030. Towards this cause, the government of Kenya partnered with Japan International Cooperation Agency (JICA) and implemented the in-service education and training for Mathematics and sciences in education christened Strengthening Mathematics and Science in Secondary Education (SMASSE) project for teachers. The Kenya National Examinations Council (KNEC, 1998) noted that this programme instilled required practical approach skills to

Mathematics and science teachers across the education sector in order to raise the quality of teaching and learning Mathematics and sciences in Kenya.

In summary, the Mackay Report of 1981 which made Mathematics compulsory both in primary and secondary schools was implemented when schools were ill equipped in terms of teachers and text books. This had a negative effect on performance and this trend has continued to date. The government has had interventions to counteract this trend by employing more teachers, providing text books through FPE and FDSE and in-servicing of teachers in programmes such as SMASSE. Regardless of the efforts by the government, Mathematics has had no significant improvement year after year as reports from the Kenya National Examination Council (2008) indicate. Various education reports released by KNEC show a decline in the performance of learners in Mathematics. The reports also show that performance in Mathematics has remained low when compared to the other subjects offered in secondary schools. There seems to be some underlying factors that have prompted the researcher to investigate the causes of poor performance in Mathematics.

1.2 Statement of the Problem

The government and education stakeholders have invested heavily in education. The government releases funds to schools every year to cater for text books and teaching aids among others. In the year 2014 alone, the government released Ksh 20.8 billion for FDSE. However, the money disbursed since the FDSE started in 2008 in secondary schools is not commensurate to the results and this has been a major concern for the society. In Nyandarua North Sub County, over half of the students who sat for the KCSE Mathematics examination scored poorly. In the years 2010-2014 the grades are in D's as illustrated in Table 1.2. The highest mean score was 3.67 in the year 2012, a grade D+. The grades are low to the effect that those students

who take causes that require Mathematics knowledge have to undertake refresher courses in the subject.

Table 1.2: K.C.S.E Performance in Nyandarua North Sub County (2010-2014)

Year	Very good	Good	Average	Poor	Entry	Mean Score	Grade
2010	53	114	293	995	1455	3.36	D
2011	106	126	284	1109	1625	3.60	D+
2012	157	173	350	1367	2047	3.67	D+
2013	161	206	386	1409	2147	3.37	D
2014	170	202	331	1311	2014	3.45	D
Total	647	821	1644	6191	9288	3.49	D

Source: SCDE, 2015

Data in Table 1.2 shows that quality grades have improved over the years but there is no significant change in the poor grades. Out of 9288 students who sat for the KCSE exam in the years 2010-2014, 6191 students scored low grades (D, D- & E's). This constitutes 67% of the total number of students' entry which is a high wastage rate. This shows that majority of the students are wasted and this raises the stakeholders' concern. It is from this scenario that the researcher sets to find out what is ailing performance in Mathematics a case of Nyandarua North Sub County.

1.3 Purpose of the Study

The purpose of the study was mainly to find out the causes of poor performance in Mathematics in Nyandarua North Sub County. The study may enable the teachers and the administrators to come up with measures on how the trend can be reversed.

1.4 Objectives of the Study

The following objectives guided the study:

- i. To assess attitudes of students towards Mathematics in secondary schools in Nyandarua North Sub County.
- ii. To explore the attitude of Mathematics teachers towards students of Mathematics in secondary schools in Nyandarua North Sub County.
- iii. To evaluate teaching methods used by teachers of Mathematics in teaching Mathematics in secondary schools in Nyandarua North Sub County.
- iv. To examine the resources used in the teaching of Mathematics in Nyandarua North Sub County.

1.5 Research Questions

The following were the research questions that guided the study:

- i. What is the attitude of students towards Mathematics in secondary schools in Nyandarua North Sub County?
- ii. What is the attitude of Mathematics teachers towards students of Mathematics in secondary schools in Nyandarua North Sub County?
- iii. What are the teaching methods used by teachers of Mathematics in teaching Mathematics in secondary schools in Nyandarua North Sub County?
- iv. Do secondary schools have resources for effective teaching of Mathematics in Nyandarua North Sub County?

1.6 Significance of the Study

The findings in this study provide teachers, students and administrators the insight of what ails performance in Mathematics. School administrators may gain insight on how to reverse the trend of poor performance. Quality Assurance and Standards Officers in the Ministry of Education (MoE) may use the information to design appropriate interventions that may help in improving performance in Mathematics especially in secondary schools.

1.7 Assumptions of the Study

The study was guided by the following assumptions:

- i. All teachers were trained and had good mastery of the content.
- ii. Students had similar learning backgrounds in primary schools and any differences in learning, was as a result of classroom experiences in secondary schools.
- iii. Sampled schools followed the Mathematics syllabus provided by Kenya Institute of Curriculum Development (KICD).
- iv. Respondents gave true and accurate responses in the data collection instruments.

1.8 Scope of the Study

The study was confined to secondary schools in Nyandarua North Sub County in Nyandarua County. The study was concerned with attitudes of students towards Mathematics in secondary schools and attitude of Mathematics teachers towards students of Mathematics in secondary schools in Nyandarua North Sub County. It also dwelt on the teaching methods and resources available in schools to enhance effective teaching. Only public secondary school students and Mathematics teachers

participated in the study because public secondary schools have similar set up guided by policies from the Ministry of Education.

1.9 Limitations of the Study

Limitations of the study are those aspects that the researcher has no direct control but may affect the results of the study. Among the limitations is that some respondents failed to give the answers to the questionnaires or no answers at all due to fear of victimization even after the researcher had explained the purpose of the research. The study dwelt with the emotional and cognitive components but failed to cover the social and value expressions.

1.10 Theoretical Framework

The Systems Theory by Bertalanffy (1968) formed the basis of this study. Under the theory, Mathematics is viewed as a system with objectives and goals that learners should achieve after undergoing the learning process. The systems theory denotes an instructional process that has various interrelated processes that work cohesively to assist the learners to achieve the desired goals (Gamble, 1984). The components in teaching and learning Mathematics are interrelated and comprise of exogenous and endogenous variables. In this study, the attitude of Mathematics teachers, the student attitudes, the teaching methods as well as the teaching and learning resources are the endogenous variables that influence the performance of Mathematics in secondary schools. These factors among others affect the performance of Mathematics in one way or another. An effective and efficient learning process is not guaranteed outside the internal and external conditions of a learner. Therefore according to the systems theory the learning environment influences the accomplishment of learners.

The systems theory therefore is important to school administrators who are dealing with several departments whose aim is good performance. The different departments have different objectives all geared towards the achievement of the institutional goals. Learners should be given the opportunity to interact with the environment. Teaching resources should be sought from the surroundings. In the classroom, teachers should ensure that lessons are activity oriented, necessary resources are availed during the lesson and students learn from known to unknown.

1.11 Conceptual Framework

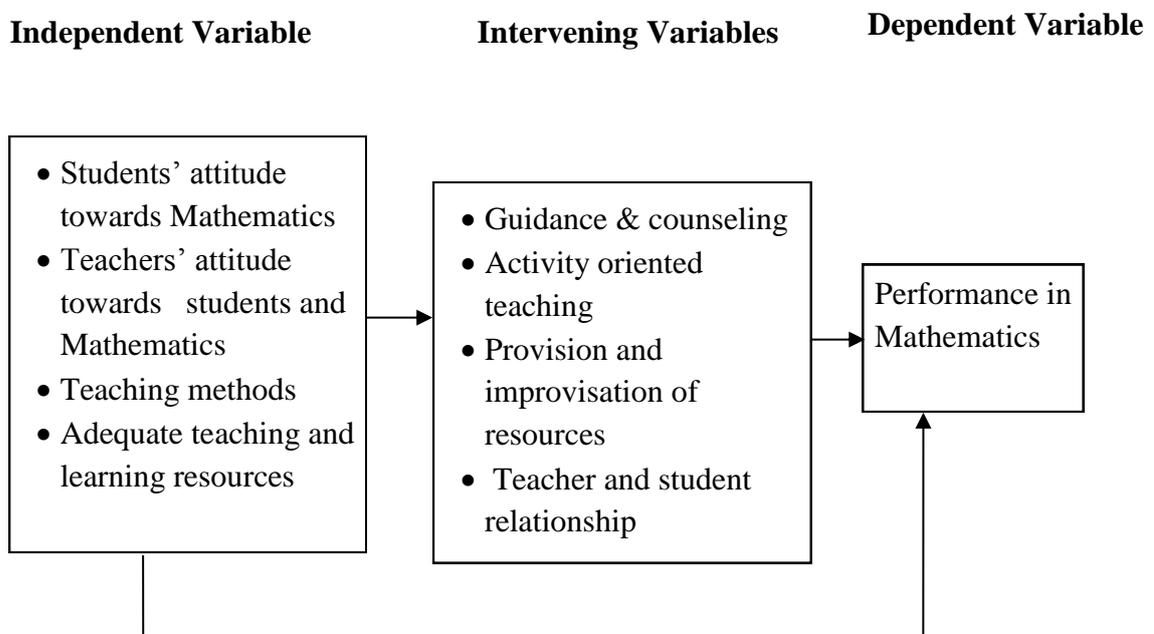


Figure 1.1: Conceptual Framework

Conceptual framework shows the dependent, independent and the intervening variables. Performance in Mathematics may be brought about by activities that take place in the classroom. These could be students' attitude on the subject, teaching methods used by the teachers, teacher/student relationships and teaching resources among others. However, these can be counteracted to bring about better results. Among the intervening variables is guidance and counseling. The teacher should

counsel students at class level and show them the importance of Mathematics as a subject. Teachers should improve the teacher /student relationships so that students can ask teachers questions without fear. Teaching methods should be those that are student activity oriented. Students should be given guidelines on the activity to undertake and the teacher only acts as a guide. In schools where teaching resources are scarce, improvisation is a remedy.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter provides a review of the studies that have been done on causes of poor performance in Mathematics. It deals with attitude of students towards Mathematics, attitude of teachers towards Mathematics students, the teaching methods and resources used by teachers of Mathematics.

2.2 Attitudes of Students towards Mathematics

It is generally believed that students' attitude towards a subject determines their success in that subject. Bekee (1987) noted that positive attitude among students was a precipice for good academic results in Mathematics and related sciences. Constant poor results in Mathematics lead to students losing hope and also losing interest in the subject. On the other hand, students who excel in Mathematics develop positive attitudes towards the subject and acts as a motivator towards Mathematics related career. Bekee thus suggested that a student's attitude play a pivotal role in enhancing performance in the subject and through effective teaching strategies. A teacher can therefore enhance a learners' performance in the subject through encouragement.

Newbill (2005) argued that students' attitudes are psychological, emotional, cognitive and behavioural constructs that serve as functions such as expressions, value expressions, utilitarian and defensive functions for learners. Newbill holds that to change the learners' attitude, the old attitude must be eliminated first and therefore teachers should emphasize on instructional designs to create instructional environments and effect attitude change. In social psychology, attitudes are affective domains that form a large part of motivation. According to Bandura (1977) social

cognitive theory, attitudes are personal factors that are inborn and influence ones behavior.

Barton (2000) noted that positive attitude towards Mathematics play a crucial role towards learning Mathematics. Teachers teaching methodologies should incorporate support structures for learners' environment and hence affects students' positive attitude towards Mathematics.

Furinghetti and Pekhonen (2002) argued that the way learners perceive an object, a learning component or a subject is important in shaping their attitude towards the same. Current students in a school especially the way they perceive a subject at most times influences behavior and performance. Teachers' attitudes and the way they talk about a subject influences learners. It determines students' acceptance of a subject and overall influence on their academic performance. Again, the way teachers present the mathematical components influences students' perception towards the subject.

Burton (2000) and Furinghetti and Pekhonen (2002) noted that teacher's positive attitude influences learners' performance in subjects and overall learning. Schenkel (2009) noted that attempts should be made to improve academic performance of learners in Mathematics and science related subjects. Teachers should be made to improve learners' performance in academics and thus, this would provide a better base for academics in secondary schools and conversely in tertiary institutions.

Arnot, David and Weiner (1989) posited that female learners are more discouraged from pursuing Mathematics and related sciences at secondary level. This is due to negative attitude towards Mathematics. Girls have a negative attitude towards Mathematics in secondary schools. Girls not only post low marks in Mathematics but also have high dropout rates compared to boys. As a result, employment in science

related industries have less feminine class of workers. However, it has been noted that the few females who score highly record almost the same as their male counterparts when exposed to the same mathematical work and the performance gap between the genders have been reducing over the years.

Shiefele and Csikszentmihalyi(1995) noted that gender differences in Mathematics test scores is prominent in complex mathematical tasks. This was attributed to attitude differences between the genders. A person's attitude is based on value beliefs that vary according to age which consequently influences behavior and performance. Poor attitude towards Mathematics is a common determinant towards learner's achievement and success in Mathematics. Student attitude and interests therefore plays a pivotal role in determining their achievement and test scores in a subject. Therefore they are predictors of learner participation and success.

Costello (1991) reported that there is a common held belief that performance in Mathematics is a macho thing consistent with male self-image and inconsistent with a female self-image. This concept is propagated with peer pressure. Male students are inclined towards pursuing Mathematics since it's perceived as a male dominated area. Ethington (1992) posited that based on this notion it was observed that due to Mathematics stereotyping as a male subject, girls have been negatively influenced and thus post poor scores.

2.3 Attitude of Mathematics Teachers towards Students of Mathematics

The beliefs teachers have upon their students play a very great role on performance of students in Mathematics. This determines the level of preparation, the level of lesson delivery and even the commitment of marking the students work. Charalambos, Philippou and Kyriakides (2002) argued that the system of teaching and approach to

mathematical concepts has a great impact on the learners' achievement. Negative beliefs alienate learners away from the subject as compared to positive attitudes that increase the interest of a learner to understand the subject. Askew (1997) agreed that teachers believe on their learners' capability to learn influences the learners performance in Mathematics. A teacher who have positive belief on their learners ability to perform better in Mathematics motivate their learners by tapping in the learners innate behavior which translates into positive self-image and belief in one self. Conversely, teachers who do not belief in their learners' capability to perform in Mathematics transfer the negative energy to their learners and this de-motivates the learners.

Abuseji (2007) argued that teachers' commitment to work has an impact on the learners learning ability. The level of commitment that teachers show in their work is an influencer to learners' perception and success in what they undertake. A teachers' commitment towards work determines work performance, influences burn out level and to a great extent influences a students' academic performance. The performance of learners in Mathematics largely depends on teachers' commitment in the way mathematical concepts are presented. The sole responsibility of teachers is to impart knowledge to learners. To achieve this, teachers should give assignments, projects and tests to their pupils and discuss the results with them.

Schmidt, Houang and Cogan (2002), found out that USA teachers practiced text book teaching which meant that they strived to complete work in the text books which were wide and hard to be completed given the limited teaching time. Teachers therefore ended up chasing wide books at the expense of learners learning vital concepts. This resulted to teachers not developing deeper concepts in Mathematics.

Opolot-Okurut (2008) in a study conducted in Uganda noted that poor performance in mathematics in the national examinations was attributed to teachers. Among the teacher related factors identified in the study were; poor teaching methodologies, weak background in Mathematics, poor attitudes and lack of experience. The study argued that with constant teacher professional development strategies, teachers of Mathematics would contribute to higher academic scores.

MoEST (2001) decried poor performance in Mathematics at the primary school level. The report alleged that teachers' of Mathematics were the cause of poor scores in the subject. The report further sought to establish school based teacher development programmes with the aim of ensuring that teachers' were well trained and had the required level of content mastery. The aim of school based programmes was to help teachers understand how pupils learn Mathematics and to equip teachers on how to provide support for the pupils' learning of Mathematics. School based programs are on the rise especially in the primary schools as compared to the secondary schools. However few are training in the area of Mathematics. Therefore this might not have a significant effect in improving performance in Mathematics as a subject.

Ngirachu (2010) study commissioned by Uwezo covering 70 districts in Kenya found that majority of the learners in upper primary level could not handle mathematical concepts based in lower primary level. The study further noted that teachers largely contributed to low performance through high absenteeism and lack of commitment in the work place.

McBer (2000) argued that teacher's efficacy was a consideration in teaching. Teachers' efficacy was considered in terms of teacher's persistence, level of enthusiasm towards work, commitment and instructional behavior as well as students'

outcomes, which included achievements, motivation and self-efficacy belief. Teachers' efficacy influenced the classroom environment which in turn affected the learners' attitudes towards learning. Therefore teachers should therefore be encouraged to; find solutions for all challenges faced in the profession, always plan and set expectations, be flexible to change and to work as a team. Knowledge on its own did not account for teachers' ability to teach but that teachers experience, nature and personality contributed greatly to their classroom teaching. The study established that teachers with the same academic background posted different classroom results.

2.4 Teaching Methods and Mathematics Study

Lesson presentation is of paramount importance to learners' understanding of the concept being taught. When the lesson is presented from known to unknown, the learner is keen as compared to a lesson which is presented from the unknown to known. A teachers' organization of the lessons can increase or reduce the students' attention and concentration level. Butty (2001) observed that a teachers instruction strategies and instruction techniques influence the students' academic performance.

National Council of Teachers of Mathematics (2000) argued that although there has been fundamental shift in teaching and instruction techniques, teachers should not wholly forget the traditional instructional methods since they still impact on learners. New instructional techniques that have gained widespread attention in teaching such as peer teacher teaching and learner exploration should be merged with traditional methods such as group discussion, problem solving and student inquiry. Butty (2001) argued that it is in tandem for teachers to note the instructional methods that can be applied in particular class of learners.

Uusimaki and Nason (2004) held that instructional methods have an impact on student's capability and cognitive development. The quality of teaching strategies, influence how learners view a subject and learner involvement in tasks on the subject matter. The National Council of Teachers of Mathematics (NCTM, 2000) noted that application of inquiry based instructional methods greatly increases a learner's attention and involvement in the tasks. Therefore learners should be encouraged to carry out exploration particularly in teaching Mathematics. This study assumed that learners learn by finding solution to challenges they are exposed to.

Stein, Grover and Henninssen (1996) carried out an investigation study on application of enhanced instructional methods and its impact on learner's academic performance. They argued that use of enhanced methods builds capacity of learners to find solutions and explore mathematical concepts. The study holds that teachers should be pointers and not the actual road that students use to acquire knowledge. When learners are consistently involved in thinking and in activities that encourage cognitive thinking they tend to acquire knowledge. Application of mathematical tasks in class assists in development of socio-cognitive and problem solving skills. This is why majority of teachers apply questioning techniques in teaching Mathematics.

Jacqueline, Wanda and Berry (2010) noted that application of social justice instructional methods as well as culturally acceptable methods promotes acquisition of learning and skills in a deeper and long lasting manner. The study called for teachers to use relevant instructional strategies necessary for learning Mathematics. The teachers must assist learners to overcome the challenges in acquisition of learning and accessing mathematical knowledge.

2.5 Resources and Teaching of Mathematics

Mathematics lessons are more effective when resources required are made available. Such resources could be text books, teaching aids, computers, time and even human resource. Baldacchino and Farrugia (2002) argued that the quality of education is not only improved through availing physical resources such as text books, extending the teacher-student time but also by the way teachers and students apply the availed resources. The teacher should create a conducive learning environment and by guiding learners to use the resources in the best possible ways.

Marshalls (1995) holds that mathematical knowledge is important to be an effective societal living. The knowledge of Mathematics influences the performance of all subjects. It therefore becomes an imperative component in education including in subjects such as geography among others. Indeed Marshalls noted that Plato had integrated Mathematics in his pursuit of knowledge.

Butler-Por (1987) holds that some perceived weak student are actually very bright but have teachers and other people in their environment make them lose their self-confidence. They therefore lose confidence in their ability to cope with the mathematical concepts. Therefore weak learners can be very bright with little assistance and attention from teachers.

Ngetich, Wambua and Kosgei (2014) noted that the Kenyan education syllabus has a number of topics that should build a learners' capability to solve real life issues. They also noted that the Mathematics resources in the text books with drawings influence learners. Learners of Mathematics should be provided with adequate learning materials and time to understand and develop real interest in the mathematical

concepts. The Mathematics syllabus is organized in a sequential series that allows learners to integrate various scalable concepts wholesomely.

The Ministry of Higher Education, Science and Technology (2010) holds that there are close relationship between various mathematical concepts in a logical sequence. This builds capability and organization in learners. The curriculum allows teachers to build new topics and base the knowledge to previous lesson contents.

Optimal performance in academics is built on strong teacher presence, adequate provision of resources as well as close relationship between the content and teaching instructions (Republic of Kenya, 2005). Ngala (1997) said that scarcity of teachers and resources leads to poor academic performance. Teachers should therefore enhance learning by ensuring learners access the knowledge. Obwocha (2005) noted that lack of resources in schools contribute to poor performance across the country. He noted that in majority of schools that performed dismally in the national examinations had inadequacy in terms of teaching and learning resources including lack of enough teachers. In some cases, national cadre schools were trounced by small schools due to lack of teaching and learning resources and thus the government needed to provide the schools with funds to equip their learning departments.

Information communication technology (ICT) is a tool that can demystify the learning of Mathematics when integrated in the subject though not commonly used in Kenyan schools due to varying reasons. Equipments such as the interactive white board, digital projector, touch-screen among others are proving to ease the teaching of the subject. It enhances activity, and is thus a student centered way of learning

From the forgoing it is evident that students' attitudes, teachers' beliefs about students and Mathematics, teaching methods and resource availability affect performance in

Mathematics in a big way. The issue of attitude should be addressed by the administrators to reverse the trend. Even though the majority of teachers and students may not be using or even aware of the unique potential capabilities of computer technology in teaching and learning, the positive attitude towards computer use in education shows there is a bright future in teaching Mathematics. This will enhance improved performance in the subject.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter deals with methods that were used to carry out the study. The subsections includes research design, study location, target population, sampling procedures and sample size, research instruments and their validity and reliability, methods of data collection and data analysis.

3.2 Study Design

This study employed descriptive research design. Orodho (2005) noted that descriptive research design allows for gathering, summarizing and interpretation of information to understand a social concept. Mugenda and Mugenda (2003) on the other hand gave the purpose of descriptive research as determining and reporting the way things are. The design was appropriate because it enabled the researcher to obtain administrators, students and teachers opinion about causes of poor performance in mathematics in secondary schools. This method also enabled the researcher to obtain quantitative and qualitative data regarding adaptation to Mathematics learning in secondary schools. The study was carried out in four stages as follows: Stage one included the preparation of the proposal and development of research instruments. Stage two was piloting of the research instruments so that they could be improved and validated. Stage three was involving the actual data collection from the sampled secondary schools in Nyandarua North Sub County using validated instruments. The last stage was concerned with the analysis of the data collected from which conclusions and recommendations were made.

3.3 Location of the Study

The study was conducted in Nyandarua North Sub County, Nyandarua County. The sub County covers an area of 512 square kilometres and has three administrative divisions Ndaragwa, Mutanga and Shamata. The Sub County is chosen by the researcher because it is relatively new and no research has been carried out in the sub-topic chosen. The researcher developed interest from yearly KCSE analysis pitying Mathematics as the most poorly performed. The area is easily accessible to the researcher which makes it easy to develop immediate rapport with the respondents, hence making data collection less cumbersome. Singleton (1993) stated that the ideal setting is one that is related to the researchers' interest, easily accessible and that which allows the development of immediate rapport.

3.4 Target Population

The target population refers to an entire group of individuals, events or objects having common characteristics (Mugenda & Mugenda, 2003). The study had a target population of 2133 respondents. There are 30 public secondary schools in Nyandarua North Sub County with a population of 1903students, 200 teachers and 30 principals. In the study, the researcher intended to collect data from principals, Mathematics teachers and students in form two or three in the secondary schools in Nyandarua North Sub County. The HOD in the school made available either of the classes for the research exercise.

3.5 Sample Size and Sampling Techniques

The largeness of a sample is a function of the population parameter under study. In descriptive research a sample of 10 – 30% is acceptable (Gall & Borg, 2003).The sample comprised of 9 public secondary schools out of 30 schools in the sub county.

The schools were selected using simple random sampling technique where they were given numbers and then chosen after an interval of three. The sample size got from the sampled 9 schools is as follows; 9 Principals, 9 HOD's, 18 Teachers and 189 Students (21 students from each school). Thus, 225 respondents were expected.

Table 3.1: Population and Sample Size

	Population Size	Sample Size	Sample Percentage
Schools	30	9	30%
Teachers	200	36	18%
Students	1903	189	10%

Source: SCDE, 2015

The selection of mathematics teachers followed the purposive sampling. Cohen and Manion (1989) affirm that purposive sampling technique is acceptable in empirical surveys. Only one stream per form (class) was randomly chosen from sample schools with more than one stream. Sampling of students was done using simple random sampling technique. The names of the pupils in each class register were written each on a piece of paper. The papers were folded and shaken in a closed container from which the required number in each school was picked.

3.6 Research Instruments

The research instruments that were used in this study for data collection were questionnaires and interview schedule.

3.6.1 Heads of Departments Questionnaire

This questionnaire was designed for the heads of departments and comprised of two questions. Sections A sought background information. Section B consisted of closed questions which assessed factors influencing performance of Mathematics.

3.6.2 Students Questionnaire

This questionnaire comprised of Section A and Section B. Section A sought background information. Section B consisted of closed questions which assessed factors influencing performance in Mathematics.

3.6.3 Interview Schedule

An interview is a conversation initiated by the interviewer for the specific purpose of obtaining research relevant information. It is quite straight forward and a non-problematic way of finding things out, a situation where a person talks and another listens. Direct contact with the principals during the interview made it possible for the researcher to secure in depth information through a one on one interaction regarding causes of poor performance in Mathematics. The interview schedules made it possible to obtain data required to meet specific objectives of the study (Mugenda & Mugenda, 2003). It also helps to standardize the interview such that the interviewer can ask the same questions in the same manner.

3.7 Pilot Study

Pilot-testing in research plays a key role in ensuring the research instruments assist in elimination of vague and incomprehensible items to ensure relevant data is collected for use in the research. Pilot testing of the tools was done to make the instruments reliable. In this study, the questionnaires were pilot tested in two schools in Nyandarua central sub county away from the research area. This enabled avoiding contamination of the respondents. The objectives of the pilot study were: To establish the clarity, meaning and comprehensibility of each item in the tools, to validate the instruments by cross checking their validity and reliability and to gain basic administrative experience in conducting the research in preparation for the actual study.

3.8 Validity and Reliability of Instruments

The researcher tested the research instruments for validity and reliability as in sub-headings 3.8.1 and 3.8.2 respectively.

3.8.1 Validity of the instruments

Cooper (2008) defined validity as the extent to which a designed research instrument will capture the data for which the instrument was designed for. To uphold content validity, the researcher discussed the contents of the questionnaires with the experts in School of Education and Social Sciences at Karatina University before going to the field. This ensured that vague and unclear questions were eliminated or corrected.

3.8.2 Reliability of instruments

Mugenda and Mugenda (2003) denoted that reliability is the extent to which an instrument will generate the same data after multiple applications. The tendency toward consistency found in repeated measurements is referred to as reliability. The reliability of pilot study results was analyzed and tested using Pearson's Correlation Coefficient method. Pearson's correlation coefficient of 0.87 was obtained.

3.9 Ethical Considerations

A research permit was obtained from the National Commission of Science, Technology and Innovation (NACOSTI) after the approval by the University. A copy of the permit and an introductory letter from the County Commissioner and County Director of Education (Nyandarua County) was presented to the Sub County Director of Education Nyandarua North Sub County for authority to visit schools.

During the visits to each of the schools, permission was sought from the principal before involving the teachers and students. The consent of both the teacher and the students was sought before being given questionnaires to fill. The researcher also established a good rapport with the respective Forms two and three students. They

were assured that the information would be treated confidentially and used only for the purpose of the study.

3.10 Data Analysis

The data collected was coded and analyzed using descriptive statistics. This involved presentation of statistical data in form of frequency distribution tables and percentages. Percentages have a considerable advantage over more complex statistics because they are easy to interpret. Data was analyzed through Statistical Package for Social Sciences (SPSS) version 20 and presented descriptively. The advantage about SPSS is that it was able to handle large amounts of data, is time saving and quite efficient. The responses from interview schedule (qualitative data) was analyzed and reported by descriptive narrative as affirmed by Mugenda and Mugenda (2003). The information obtained from the analysis was discussed and this aids in the drawing of conclusions.

CHAPTER FOUR

DATA ANALYSIS AND INTERPRATATION

4.1 Introduction

The chapter covers data analysis, results and discussion of the study findings. The study sought to investigate the causes of poor performance in Mathematics in Nyandarua North Sub County. The structured questions generated quantitative data, while the unstructured questions generated qualitative data. The quantitative data was analyzed using descriptive statistics and presented in the form of frequency tables and percentages. The qualitative data was analysed through the use of content analysis. Results of the data analysis provided information that formed the basis for interpretation of the findings, discussions, conclusions and recommendations of the study. The study had the following research objectives.

- i. To assess attitudes of students towards Mathematics in secondary schools in Nyandarua North Sub County.
- ii. To explore the attitude of Mathematics teachers towards students of Mathematics in secondary schools in Nyandarua North Sub County.
- iii. To evaluate teaching methods used by teachers of Mathematics in teaching Mathematics in secondary schools in Nyandarua North Sub County.
- iv. To examine the resources used in the teaching of Mathematics in Nyandarua North Sub County.

To obtain data for the study, questionnaires were distributed to 27 Mathematics teachers and 189 students. An interview schedule was also administered to 9 principals. Out of the targeted 225 respondents, 9 principals, 26 teachers and 188

students responded. Thus the respondents were 223, giving a response rate of 99.11% which was quite high and likely to give a true picture of the targeted population. Some questions were common to both teachers and students. In such cases in the analysis, the respondents were 214 excluding the principals.

4.2 Demographic Analysis of respondents

The researcher collected some background data on the respondents in order to understand the demographic composition and analysis of components such as gender spread, types of school captured in the study.

4.2.1 Gender of Respondents

The researcher wanted to know the constitution of the respondents. The results were as in Table 4.1

Table 4.1: Gender of Respondents

Gender	Frequency	Percent
Male	126	58.9
Female	88	41.1
Total	214	100.0

From the study findings, it was found out that majority of the respondents were male with 58.9% while female were 41.1%. The findings of males being the majority may be attributed to the fact that males progress more in secondary school than the females hence a higher number in secondary education.

4.2.2 Type of School

The researcher wanted to know the respondents were from which type of school namely boys boarding, girls boarding, mixed boarding or mixed day. The results were as in Table 4.2

Table 4.2: Type of School

Type of school	Frequency	Percent
Mixed boarding	28	12.8
Girls boarding	6	3.2
Mixed day	188	84.0
Total	214	100.0

The study sought information from teachers and students on the distribution of the sampled schools by type. The study findings showed mixed day schools were 84%, mixed boarding at 13% and girls boarding had 3% of the total respondents. This was necessary to provide a good foresight for understanding the constitution of secondary schools in the sub county. These results showed that majority of the schools in Nyandarua North Sub County were mixed day schools.

4.3 Students Attitude towards Mathematics

The first study objective was to assess attitudes of students towards Mathematics in secondary schools in Nyandarua North Sub County. One of the questionnaires required teachers and students to give ‘yes’ or ‘no’ responses on whether students have a positive attitude towards Mathematics. The responses were as in Table 4.3.

Table 4.3: Students Response on Positive Attitude towards Mathematics

Response	Frequency	Percent
Yes	87	40.7
No	127	59.3
Total	214	100.0

The study investigated respondents' positive attitudes towards Mathematics. It found out that 87 (40.7%) had positive attitude while 127 (59.3%) had negative attitude towards Mathematics. The study shows that students had a negative attitude towards mathematics subject. The findings concur with Newbill (2005) that majority of the students' possessed negative attitude which does not encourage learning and comprehension of mathematics concepts.

Teachers were also made to respond to the statement that most students have negative attitude towards Mathematics' and the results are summarized in Table 4.4.

Table 4.4: Teachers' Response on Students' Negative Attitude Towards Mathematics

Response	Frequency	Percent
Strongly agree	5	19.2
Agree	14	53.8
Undecided	1	3.8
Disagree	1	3.8
Strongly disagree	5	19.2
Total	26	100.0

From the teachers' perspective, it was found out that students had negative attitudes towards Mathematics as those who strongly agreed and disagreed made a percentile of 73.1%. The undecided, disagreed and strongly disagreed had 26.8%.The findings discussed above confirmed that students in secondary schools had a negative attitude towards mathematics. The findings are in line with observations made that negative attitude towards mathematics hamper learner's progress in the subject. Barton (2000) concluded that positive attitude leads students towards success in mathematics. Mathematics leads students towards success in the subject.

Consequently, Ryan (1997) noted that students who perceive themselves as cognitively competent seek assistance from their teachers and peers. 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 Teachers' Negative Attitude towards Mathematics Students

The second objective of this study was to explore the attitude of mathematics teachers towards students of Mathematics in secondary schools in Nyandarua North Sub County. This is a factor that the researcher was investigating and posed a questionnaire based on attitude towards Mathematics students. The study findings were as in Table 4.5.

Table 4.5: Teachers have Negative Attitude towards Mathematics Students

Response	Frequency	Percent
Strongly agree	34	18.1
Agree	18	9.6
Undecided	11	5.9
Disagree	27	14.4
Strongly disagree	98	52.1
Total	188	100.0

Teachers' negative attitude towards Mathematics students was a factor the study investigated and it found out that most of the respondents strongly disagreed and agreed with the statement with 98 (52.1%) and 27 (14.4%) respectively while the undecided were 11 (5.9%). Those who agreed with the statement were 18 (9.6%) and lastly those who strongly agreed were 34 (18.1%). It is often declared that the attitude of a teacher could influence their actions in the classroom, which becomes critical to

student learning. The study finds that teachers had a positive attitude towards mathematics subject.

The findings concur with Charalambos, Philippou and Kyriakides (2002) that teacher's attitude towards a subject influenced the learners performance. In other words, a teacher's attitude regarding Mathematics and students is relative to attitudes towards the teaching of Mathematics, which in turn, has a powerful impact on Mathematics teaching (Ernest, 1989). According to Ernest, there should be a shift to a problem solving approach that requires a deeper change that greatly depends on the teacher's beliefs. He further expressed that the teaching of Mathematics depends on the attitudes and practices that are mainly affected by beliefs, emotions, social context and content knowledge.

4.5 Teaching Methods used by Teachers of Mathematics

The third objective of this study was to evaluate teaching methods used by teachers of Mathematics in teaching Mathematics in secondary schools in Nyandarua North Sub County. The researcher wanted to know the methods used by teachers in the teaching of Mathematics. The study analysed several aspects concerning the teacher and the teaching methods.

4.5.1 Teachers' Qualifications

A question on qualifications was posed to both teachers and students. The purpose of posing to the students is to gauge the perception they had on teachers' qualification. The findings were as in Table 4.6 and 4.7 respectively.

Table 4.6: Mathematics Teachers are Adequately Trained

Response	Frequency	Percent
Strongly agree	17	65.4
Agree	7	26.9
Undecided	1	3.8
Disagree	1	3.8
Total	26	100.0

The findings showed that teachers are trained as 24 (92.3%) strongly agreed and agreed. Only 1 (3.8%) was undecided and 1 (3.8%) disagreed. The findings established that teachers are trained for the tasks they perform in schools. The findings are divergent from Karanja (2010) that poor performers have been recruited into the teaching profession. Karanja had further noted that poor training of teachers inflicted permanent damage on learners.

Table 4.7: Mathematics Teachers' are Qualified

Response	Frequency	Percent
Strongly agree	134	71.3
Agree	43	22.9
Undecided	4	2.1
Disagree	2	1.1
Strongly disagree	5	2.7
Total	188	100.0

Students' perspective on teacher qualifications was being assessed by the study. It found out that 134 (71.3%) of the respondents strongly agreed with the statement, those who agreed were 43 (22.9%), undecided were 4 (2.1%), those who disagreed

were 2 (1.1%) and 5 (2.7%) strongly disagreed with the statement. The findings show that teachers were adequately trained and qualified for teaching mathematics in secondary schools.

The findings concurs with Gitonga (1990) who pointed out that, the potential of an education system is directly related to the ability of its teachers. Most of the teachers and the students that were involved in the study had the conviction that teachers are trained and qualified. 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).

4.5.2 Teachers' Preparedness for the Lessons

This entails preparation of schemes of work, making lesson notes and lesson plans. A teacher requires to have good mastery of the content and present it using the language of the learners' level. The researcher wanted to get information on teachers' level of preparedness. The findings were as in Table 4.8.

Table 4.8: Teachers are prepared for the Lessons

Response	Frequency	Percent
Strongly agree	97	51.6
Agree	41	21.8
Undecided	18	9.6
Disagree	20	10.6
Strongly disagree	12	6.4
Total	188	100.0

The study assessed whether teachers are prepared for lessons and the findings showed that 97 (51.6%) strongly agreed, those who agreed were 41 (21.8%), undecided were 18 (9.6%), disagreed were 20 (10.6%) and lastly strongly disagree were 12 (6.4%).

Indimuli, Mushira, Kuria, Ndung’u and Waichanguru (2009) pointed out that teacher preparation is vital for effective teaching and learning processes. Effective teaching referred to preparation, implementation and evaluation. In preparation, a teacher takes time to refer to the syllabus, make schemes of work and lesson plans.

4.5.3 Teachers are committed to their Work

One of the most important factors in the development of passion for teaching is teachers’ ongoing commitment and dedication to students and learning. The summary of findings is as in Table 4.9.

Table 4.9: Teachers are committed to their Work

Response	Frequency	Percent
Strongly agree	81	43.1
Agree	65	34.6
Undecided	18	9.6
Disagree	15	8.0
Strongly disagree	9	4.8
Total	188	100.0

From the study findings, it was found out that teachers are committed to their work as 81 (43.1%) of the respondents who were students strongly agreed with the statement while 65 (34.6%) agreed, undecided were 18 respondents (9.6%), agreed were 15 (8.0%) and those that strongly disagreed with the statement were 9 (4.8%). Fried (2001) argued that there was a significant relationship between teaching and quality of student learning. Elliott and Creswell (2002) argue that teacher commitment and engagement have been identified as amongst the most critical factors in the success and future of education.

4.5.4 Mathematics Lessons are lively

The alertness of a student in class is determined by how lively a lesson is. Liveliness of a lesson ensures that the learners' attention is within the designated area. The research study wanted to find out the moods in the classrooms. The summary of the findings were as in Table 4.10.

Table 4.10: Mathematics Lessons are lively

Response	Frequency	Percent
Strongly agree	3	11.5
Agree	14	53.8
Undecided	1	3.8
Disagree	6	23.1
Strongly disagree	2	7.7
Total	26	100.0

From the teachers perspective the study assessed whether mathematics lessons were lively and from the respondents 3 (11.5%) strongly agreed, 14 (53.8%) agreed, 1 (3.8%) undecided, disagree 6 (23.1%) and lastly 2 (7.7%) strongly disagreed. The findings concur with Miheso (2002) noted that creativity and enriched ways of teaching mathematics were pivotal in enhancing learning. This implies that the choice of any of these strategies depends on their purpose in teaching, their understanding of teaching-learning processes and considerations of cost effectiveness.

Mathematics teachers need to be more cautious when choosing teaching strategies to ensure a clear and harmonious link between syllabus contents. This link enables students to settle down fast and adapt to Mathematics learning. It was therefore, an important exercise to establish the teaching methods used to enable learners adapt to Mathematics learning in secondary schools at different levels.

4.5.5 Teaching Methods are Activity Oriented

The liveliness of a lesson is also determined by the activities within the classrooms. When students have a series of activities geared towards learning a certain concept, the learner's alertness is contained. The researcher carried out the study on whether lessons are activity oriented with a view of establishing the classroom climate. The results are as in Table 4.11.

Table 4.11: Teaching Methods are Activity Oriented

Response	Frequency	Percent
Strongly agree	5	19.2
Agree	15	57.7
Undecided	1	3.8
Disagree	5	19.2
Total	26	100.0

Teaching methods were found to be activity oriented as 20 (79.9%) of the respondents strongly agreed and agreed with the statement, those who disagreed were 5 (19.2%) and only 1 (3.8%) was undecided. This view is supported by Stigler and Perry (1988) who noted that students' involvement in classroom activities is a major factor affecting students' achievement. The classroom environment needs to be supportive of learning as well as setting high expectations, encouraging students to be self-regulating and articulating the criteria for quality of students' work.

4.6 Resources Used in Teaching of Mathematics

The fourth objective of the study was to examine the resources used in the teaching of Mathematics in Nyandarua North Sub County. The study examined whether resources used in the teaching of Mathematics such as time, text books, teaching aids and teachers among others are in place and are fully utilized.

4.6.1 Teachers' Promptness in Lesson Attendance

Time is quite essential in any given institution. Efficient use of instructional time within the classroom is of paramount importance. Table 4.12 summarizes the study as per students' perspective.

Table 4.12: Teachers are prompt in Lesson Attendance

Response	Frequency	Percent
Strongly agree	53	28.2
Agree	70	37.2
Undecided	31	16.5
Disagree	10	5.3
Strongly disagree	23	12.2
Missing	1	0.5
Total	188	100.0

The study investigated whether teachers are prompt in lesson attendance and it was found out that those who strongly agreed were 53 (28.2%), those that agreed were 70 (37.2%), undecided were 31 (16.5%), those that disagreed were 10 (5.3%) and strongly disagreed 23 (12.2%). Majority of the respondents were of the view that teachers are prompt in lesson attendance. Ngala, (1997) noted that enhancing learning time was pivotal in enhancing and improved academics. Mbiti (1974) argued that school management should firmly enforce working hours in order to enhance productivity and avoid idling.

4.6.2 Teachers have Adequate Teaching Resources

Among the teaching resources are text books, teaching aids, computers, time and even human resource. Thus the study done embraced all the mentioned resources and the finding were as per Table 4.13.

Table 4.13: Teachers have Adequate Teaching Resources

Response	Frequency	Percent
Strongly agree	6	23.1
Agree	8	30.8
Undecided	1	3.8
Disagree	9	34.6
Strongly disagree	1	3.8
Missing	1	3.8
Total	26	100.0

Teachers had adequate teaching resources as 14 (53.9%) of the respondents either strongly agreed or agreed with the statement while those who disagreed and strongly disagreed were 17 (38.4%). The undecided and missing had 1 (3.8%) each. This concurs with Anioke and Chigbou (2016) that well and purposed use of teaching and learning resources supplement and enhance teachers' ability and resources in class.

4.6.3 Most Students have Textbooks

Mathematics text books add flesh to the syllabus, determine sequence of teaching and provide exercises for mastery of concepts. They provide most of the required content in the syllabus.

Table 4.14: Most Students have Textbooks

Response	Frequency	Percent
strongly agree	10	38.5
Agree	10	38.5
Undecided	1	3.8
Disagree	4	15.4
Strongly disagreed	1	3.8
Total	26	100.0

The study investigated whether most students have textbooks. From the teachers' responses it was found out that those who strongly agreed were 10 (38.5%), those that agree were 10 (38.5%), undecided 1 (3.8%), those who disagreed were 4 (15.4%) and lastly strongly disagreed 1 (3.8%). Thus, most students were of the view that they had text books as 77% attested to this. Eshiwani (1981) argues that factors responsible for poor performance in Mathematics includes text books, teaching aids and teaching learning resources. He again said that use of text books among other materials raises academic standards and efficiency of a school system (Eshiwani, 1990).

4.6.4 Teachers are fair in Issuing of Text Books

In some schools there is always the complaint by students on issuing of books especially where they are not enough. Those bestowed with the responsibility of issuing, favour some students based on family ties, performance or gender. The researcher wanted to know the situation of the schools in the sub-county. The results are as in Table 4.15

Table 4.15: Teachers are fair in Issuing of Text Books

Response	Frequency	Percentage
Strongly agree	81	43.1
Agree	60	31.9
Undecided	6	3.2
Disagree	15	8.0
Strongly disagree	26	13.8
Total	188	100.0

From the study fairness in issuing textbooks by teachers was found to happen as those who strongly agreed were 81 (43.1%), 60 (21.9%) agreed, 6 (3.2%) were undecided, those that disagreed were 15 (8.0%) and strongly disagreed were 26 (13.8%). This shows that teachers are non-partisan in issuing of books and there is harmony concerning the same.

4.6.5 Mathematics Assessment Strategies

The researcher wanted to know the assessment strategies in place in schools. Assessment enables the teacher to know whether the intended objectives have been achieved. Several assessment strategies were used.

4.6.5.1 General Assessment

The researcher required to establish whether students are assessed often. The study summary is as in Table 4.16.

Table 4.16: Mathematic Teachers Assess Students Often

Response	Frequency	Percent
Yes	62	33.0
No	126	67.0
Total	188	100.0

The findings were that Mathematics teachers did not assess their students often as respondents who gave ‘yes’ were 62 (33.0%) and those who gave ‘no’ were 126 (67.0%). Cohen (1976) emphasized that collaborative efforts by learners allow problem solving to be effective when an individual member encounters a difficult situation. This implies that teachers need to provide external monitoring for individuals in a group leading to a less restrictive social environment in which students are enabled to pursue various mathematical ideas and techniques. Again Black and William (1998) noted that student feedback is important in learning.

4.6.5.2 All Students are Given the Same Work during each Lesson

This was mainly to establish whether there was differentiation of work given in class depending on individual potential or capabilities. The summary is as in table 4.17

Table 4.17: All Students are Given the Same Work during each Lesson

Respondents	Frequency	Percent
Yes	155	82.4
No	33	17.6
Total	188	100.0

The study investigated whether students are given same work during each lesson. The findings showed that majority of the respondents said ‘yes’ with frequency of 155 (82.4%). Those that said ‘no’ were 33 (17.6%). Assessment and evaluation are

essential components in Mathematics education. They help in monitoring students' readiness for new learning, gives teachers feedback on the success for their strategies and approaches and help to plan new learning (Kihara, 2002). Evaluation encompasses diagnostic assessment practices that enable teachers to discover difficulties in individual learners. Assessment is expected to focus on what students are able to do and how they think about Mathematics.

4.6.5.3 Extra Assignments

This was to establish whether students do other extra works through their own initiative or outside assignments apart from those given in class by teachers. The findings are as in Table 4.18.

Table 4.18: Majority of Students Do Extra Assignments

Respondents	Frequency	Percent
Yes	56	29.8
No	132	70.2
Total	188	100.0

The findings were that majority of the respondents don't do extra assignments as those respondents that said 'no' were 132 (70.2%) and those who said 'yes' were 56 (29.8%) of the respondents. Ballard and Johnson (2004), holds that assessment and application of quizzes exposes learners to further learning experiences by exposing components not well studied. They found significantly higher scores for students who experienced quizzes and concluded that frequent quizzing influences learning performance. The mean scores for these students were significantly higher than for students in the control group who experienced no quizzes. Similarly, students who engage in extra assignments perform better than those who don't.

4.6.5.4 Finishing Assignments in Time

Assessment and evaluation are essential components in Mathematics education. They help in monitoring students' readiness for new learning, gives teachers feedback on the success for their strategies and approaches and help to plan new learning. Students are given Mathematics assignments on daily basis. However, this must be done within a given time framework. The teacher has to know whether the students grasped the concept previously taught before he embarks on another. Thus, it's of essence that the assignment/homework given is done in time. The researcher wanted to establish whether students finish the assignments within the stipulated time. The results are as in Table 4.19.

Table 4.19: Most Students Finish their Assignments in Time

	Frequency	Percent
Strongly Agree	2	7.7
Agree	8	30.8
Undecided	1	3.8
Disagree	12	46.2
Strongly disagree	3	11.5
Total	26	100.0

The study found out that most Mathematics students don't finish their assignments on time as 12 (46.2%) disagreed with the statement and 3 (11.5%) strongly disagreed. The undecided was 1 (3.8%), those that agreed with the statement were 8 (30.8%) and strongly agreed 2 (7.7%). This means that in most schools majority of the students don't complete the assignments as expected. This concurs with Black and Wiliam

(1998) who said that assignments are essential components for classroom work and its development can raise standards of achievement.

4.7 Interviews with Principals in Relation to Performance in Mathematics

The first aspect established from the principals' interviews was that Mathematics was poorly done in KCSE examination. The study found out that students had negative attitudes towards mathematics, as some of the respondents who were interviewed said that *“most of the students have Mathematics phobia and believe that the subject is difficult”*. It also came out clearly that teachers had positive attitude towards Mathematics and were doing the best they could to improve the performance. The interviewees were of the view that Mathematics teachers are trained and have a bachelor's degree in education. It also came out clearly that schools do not have enough Mathematics text books as they were shared in the ratios ranging from 1:2 to 1:4 indicating the dire need of Mathematics text books in schools.

The interviewees were of the view that this trend could be reversed. Stakeholders were advised to motivate both teachers and students in order to appraise the attitude towards Mathematics. Every improvement by a student should be recognized and appreciated. They should also ensure that text book ratio is improved to the ratio 1:1 and more teachers are employed. Finally, more time and funds should be allocated to Mathematics to make it possible for teachers to go for workshops and enable students to interact and share skills through Mathematics symposiums.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter gives a summary of the main findings, conclusions and recommendations. The findings were presented according to the research objectives and the research questions. They were formulated from the objectives and the respondents' opinions on causes of poor performance in mathematics in Nyandarua North Sub County and what can be done to improve performance in Mathematics.

5.2 Summary

The study findings showed that majority of the respondents were male with 59%. Majority of the respondents who undertook the study were from mixed day secondary schools with 84%. The study investigated respondents' positive attitude towards Mathematics and the study found out that 59.7% had negative attitudes towards the subject while 40.7% pointed out that the attitude was positive. Teachers negative attitude towards Mathematics and Mathematics students was a factor the study investigated and it was found out that most of the respondents disagreed with the statement with 52.1% who were of this view.

Teachers' qualification was being assessed by the study and it was found out that majority of the respondents 71.3% strongly agreed that teachers are well trained. The study assessed whether teachers are prepared for lessons and from the findings it was found out that 51.6% strongly agreed. The study assessed whether teachers were

committed to their work. The findings were that teachers are committed to their work as 43.1% strongly agreed and 34.6% agreed with the statement. The study assessed whether Mathematics lessons are lively and from the respondents 65.3% strongly agreed and agreed with the statement. Teaching methods were found to be activity oriented as 79.6% of the respondents strongly agreed and agreed with the statement. Teachers' promptness to lesson attendance was investigated by the study and it was found out that those that strongly agreed and agreed with the statement were 65.4%. Teachers had adequate teaching resources as 53.9% agreed with the statement but this is in conflict with principals interviewed who agreed that the ratio of text books ranged from 1:2 to 1:4. Teachers were fair on issuing of text books as 65% agreed with the statement.

It was established that students are not assessed often as 67% confirmed this. During each lesson it was found that students were given same work during each lesson as 84.1% attested to this. The study assessed on whether majority of the respondents do extra assignments and the findings were that majority didn't whose percentage was 70.2%. The study also tried to establish whether students finish the assignments in time. The findings were that students do not finish the assignments in time with a percentile of 57.7%.

5.3 Conclusions

The study was to investigate the causes of poor performance in Mathematics in secondary schools in Nyandarua North Sub County. The findings of this study confirmed the fact that students attitude, teacher' attitude and commitment, teaching resources, methods of teaching and assessments are to a great extent valid factors that influence students' poor performance in Mathematics in secondary education.

In Nyandarua North Sub County the findings showed that students' poor performance in Mathematics is mainly brought about by negative attitude, limited assessments and lack of teaching resources. These findings therefore would be of great help to the government, teachers, students, professional policy makers and parents in providing a solid springboard to launch a new template to finding a lasting solution to the perennial poor performance issues in mathematics at secondary level.

5.4 Recommendations

Students indicated negative attitude towards mathematics and that learning Mathematics was not interesting and fun to them. The researcher recommended the following:

- i. There is need for teachers to develop and maintain positive attitude towards Mathematics by ensuring students adapt to modern Mathematics learning by use of ICT.
- ii. Teachers should encourage students to do extra work apart from the work given in class and weaker students be given extra assignments in order to improve.
- iii. More assessments should be enhanced to keep students acquainted on the expectations of the mathematics department.
- iv. Stake holders should be encouraged to prioritize provision of resources required in the teaching of Mathematics.

5.5 Areas for Further Research

Further research is recommended in the following areas.

- i. The study was carried out in one Sub County. 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 specifically by male and females towards teaching and performance in Mathematics.

REFERENCES

- Abdulkafi, A. (2004). *Teachers' attitude towards information and communication technology: A case of Syrian EFL teachers*. Retrieved October 12, 2014 from https://etd.ohiolink.edu/!etd.send_file?accession=osu1092688797&disposition
- Abuseji, F. A. (2007). Student and teacher related variables as determinants of secondary school students' academic achievement in chemistry. *Jdu Vrnaarila Pbelensdidikan* 32(1), 3-18. Retrieved October 12, 2015 from [www.ukm.my/jurfpnd/journal/.../Jpend32\[01\].pdf](http://www.ukm.my/jurfpnd/journal/.../Jpend32[01].pdf)
- AIR. (2007). *New international benchmarking to measure state and district student math performance against the World*. Thomas Jefferson Street, Washington, D.C.: American Institute of Research. Retrieved June 10, 2015 from <http://www.air.org/news/press-release/new-international-benchmarking-measure-state-and-district-student-math>
- Anioke, C. L. & Chigbuo, A. C. (2016). The extent of teachers' use of library resources as instructional materials in teaching nursery and primary school pupils. *Journal of Educational Policy and Entrepreneurial Research*, 2 (7), 250-261. Retrieved August 12, 2016 from www.ztjournals.com/index.php/JEPER/article/viewFile/346/324
- Arnot, M., David, M. & Weiner, G. (1986). *Educational reforms and gender equality in schools*. Research Discussion Series No. 17. Manchester: Equal Opportunities Commission.
- Askew, M. (1997). *Effective teachers of numeracy*. London: King's College. Retrieved October, 10, 2015 from musicmathsmagic.com/page4/files/EffectiveTeachersofNumeracy.pdf.
- Avramidis, E., Bayliss, P. & Burden, R. (2000). A survey of mainstream teachers' attitude towards inclusion of children with special needs in the ordinary school in one educational authority. *Educational Psychology* 20(2), 193-213. Retrieved October 15, 2015 from www.tandfonline.com/doi/pdf/10.1080/08856250210129056
- Baldacchino, G. & Farrugia, C. J. (2002). *Educational planning and management in small states*. Geneva: International Labour Organisation. Retrieved October 23, 2015 from iles.eric.ed.gov/fulltext/EJ1000212.pdf
- Ballard, C. L., & Johnson, M. F. (2004). Basic math skills and performance in an introductory economics class. *Journal of Economic Education*, 35(1), 3-23. Retrieved January 14, 2015 from <https://scholars.opb.msu.edu/en/publications/basic-math-skills-and-performance-in-an-introductory-economics-cl-2>
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: W. H. Freeman and company.

- Bekee, F. (1987). *The effect of behavioral objectives and diagnostic teaching strategies on students' achievement in integrated science*. (Unpublished Doctorate dissertation). University of Ibadan, Ibadan.
- Bertalanffy V. L. (1968). *General System Theory: Foundations, development, applications*. New York: George Braziller.
- Black, P., & Wiliam, D. (1998). *Inside the black box: Raising standards through classroom assessment*. *Phi Delta Kappan*, 80(2), 120-122. Retrieved October 15, 2015 from www.rdc.udel.edu/wp-content/uploads/2015/04/InsideBlackBox.pdf
- Burton, A. C. (2000). Crafting multicultural science education with pre-service teachers through service-learning. *Higher Education*. Paper 110. Retrieved October 15, from <http://digitalcommons.unomaha.edu/slcehighered/110>
- Butler-Por, N. (1987). *Underachievers in school: Issues and interventions*. Chichester: Wiley.
- Butty, J. L. M. (2001). *Teacher instruction, student attitudes, and mathematics performance among 10th and 12th grade*. New York: Merrill Publishers.
- Charalambos, C. Philippou, G. & Kyriakides, L. (2002). *Towards understanding teachers' philosophical beliefs about mathematics*. Paper presented at the International Group. Retrieved October 14, 2015 from eric.ed.gov/?id=ED476093
- Cohen, L. (1976). *Educational research in classrooms and schools: A manual materials and methods*. London: Harper and Row.
- Costello, J. (1991). *Teaching and learning mathematics*. London: Routledge.
- Crosswell, L. & Elliott, B. (2002). *Teacher commitment and engagement, the dimensions of ideology and practice associated with teacher commitment and engagement within an Australian perspective*. Retrieved October 15, 2015 from eprints.qut.edu.au/968/1/cro04237.pdf.
- Ernest, P. (1989). *The impact of beliefs on the teaching of mathematics'*. *Mathematicsteaching: State of the Art*. London: Falmer Press.
- Eshiwani, G. S. (1990). *Implementing educational policies in Kenya*. Nairobi, Kenyatta University.
- Eteokleous, N. (2008). *Evaluating computer technology integration in a centralized school system*. Sydney: Computer and Education.
- Fried, R. L. (2001). *The passionate teacher: A Practical Guide*. Boston: Beacon.
- Furinghetti, F. & Pehkonen, E. (2002), *Rethinking characterizations of beliefs*. In: G.Leder, E.Pehkonen, and G. Toerner (eds.), *Beliefs: A hidden variable in mathematics education?* Kluwer Academic Publishers. Retrieved October 13, 2015 from http://link.springer.com/chapter/10.1007%2F0-306-47958-3_3

- Gamble, Belsky & Robins. (1984). *The determinant of parental competence: toward a contextual theory* In M. Lewis & L. Rosenblum (Eds.), *Beyond the dyad: Social connections*. New York: Plenum.
- Gay, L. R. (2006). *Educational research: Competencies for analysis and application* (5th ed.). Englewood Cliffs, NJ: Prentice-Hall.
- Gitonga, J. M. (1990). *A study of the problems that teacher trainers in primary teachers colleges in the eastern province of Kenya face in preparing trainees to teach mathematics*. (Unpublished Master Thesis). University of Nairobi, Nairobi.
- Griffin, P. (2008). *Developmental assessment: Lifting literacy through professional learning teams*. *Assessment in education principles policy and practice*. Retrieved June 14, 2015 from [www.aiz.vic.edu.au/.../Article-PGriffin-et-al-Lifting-literacy-through-Professional-Learnig teams.com](http://www.aiz.vic.edu.au/.../Article-PGriffin-et-al-Lifting-literacy-through-Professional-Learnig%20teams.com).
- Good, T. Grouws, D. & Ebmeier, H. (1983). *Active mathematics teaching*. New York: Longman, Inc.
- Hussein, T. (Ed). (1967). *International study of achievement in mathematics. A comparison of twelve countries*, Vol II. Stockholm: Almqvist & Wiksell. Retrived October 14, 2015 from <http://eric.ed.gov/?id=ED015130>.
- Indimuli, J., Mushira, N., Kuria, P., Ndung'u, R., & Waichanguru, S. (2009). *Teaching primary mathematics*. Nairobi: Jomo Kenyatta Foundation.
- Jacqueline, L., Wanda, B., Joy, B., & Berry, R. (2010). The Nuances and complexities of teaching mathematics for cultural relevance and social justice. *Journal of Teacher Education*, 5(2), 98-101. Retrieved June 13, 2015 from <http://jte.sagepub.com/content/61/3/261.refs>
- Kakai, M. (2006). *Challenges facing students in adopting to mathematics learning in secondary schools in Bungoma South District*. (Unpublished Master Thesis). Kenyatta University, Nairobi.
- Kenya National Examination Council. (1987). *The year 1987 examination report*. Nairobi: KNEC Research and Data Processing Department.
- Kenya National Examination Council. (2006). *The year 2005 KCSE examination report, with question papers and sample marking schemes*. Nairobi: KNEC Research and Data Processing Department.
- Kenya National Examination Council. (2007). *The Kenya Certificate of Secondary Education regulations and syllabuses 2007-2008*. Nairobi: KNEC.
- Kenya National Examination Council. (2008). *The Year 2007 KCSE examination candidate performance report*. Nairobi: KNEC Research and Data Processing Department.
- Mackay Report (1981). *Report on the presidential working party on the second public university in Kenya*. Nairobi: Government Printers.

- Marshall, S. P. (1995). *Schemas in problem solving*. New York: Cambridge University Press.
- Mbiti, D. (1974). *Foundations of school administration*. Nairobi: Oxford University Press.
- McBer, H. (2000). *Research into teacher effectiveness: A model of teacher effectiveness*. (Research Report 216). Nottingham, England: Department for Education and Employment.
- Miheso M. M. (2002). *Factors affecting mathematics performance among secondary students in Nairobi Province, Kenya*. (Unpublished Master Thesis). Kenyatta University, Nairobi.
- MoEST. (2008). *Ministry of Education, Science and Technology: Kenya National Examination Council report 2008: KCSE 2004, 2005, 2006, 2007*. Nairobi: KNEC.
- Mondoh, O. H. (2005). *Methods of teaching mathematics (A Handbook for Teachers and Students)*. Njoro: Egerton University Press.
- Mugenda, M. O. & Mugenda A. G. (2003). *Research methods: Qualitative and quantitative approaches*. Nairobi: ACT Press.
- Nalinya, R. S. (2011). *Factors influencing career choices by students in tertiary institutions in Kenya: A case of youth polytechnic in Bungoma County*. (Unpublished Master thesis). University of Nairobi, Nairobi. National Council of Teachers of Mathematics. (2000). *Principles and standard for school mathematics*. Retrieved October 19, 2015 from <http://www.nctm.org/standards/>
- Ndirangu, M., Kathuri, N. J., & Mungai, C. (2003). Improvisation as a strategy for providing science teaching resources: An experience from Kenya. *International Journal of Education Department*, 5(5), 101-105. Retrieved June 15, 2015 from eric.ed.gov/?id=EJ778816.
- Newbill, P. L. (2005). *Instructional strategies to improve women's attitudes towards science*. (Unpublished Doctorate Dissertation). Virginia Polytechnic Institute and State University, Virginia.
- Ngala, B. J. F. (1997). *Management of teachers by head teachers and its influence on pupils' achievement: A case study of primary schools in Eldoret Municipality*. (Unpublished Master Thesis). Moi University, Eldoret.
- Ngetich, S.K. Wambui, B.K & Kosgei, Z.K. (2014). Determining optimal size and cost efficiency of Nandi District secondary Schools. *European Scientific Journal*, 10 (16), 211-220 Retrieved from eujournal.org/index.php/esj/article/download/3522/3294
- Ngirachu, J. (2010, April 23). Children troop to school, but still illiterate. *Daily Nation*, p. 1.

- Obwocha, B. (2005, October 6). The sick man of the national schools. *The Standard*, p.11.
- Odhiambo, G. (2013). Academic Brain Drain: Impact and implications for public higher education quality in Kenya. *Research in Comparative and International Education*, 1(2), 98-102. Retrieved October 14, 2015 from <http://dx.doi.org/10.2304/rcie.2013.8.4.510>
- Opolot-Okurut, C. (2008). *Factors that hinder opportunities to learn mathematics in primary schools*. Retrieved October 24, 2015 from cees.mak.ac.ug/sites/default/files/publications/Paper-Opolot-Okurut.pdf
- Orodho, J. A. (2005). *Elements of education and social sciences research methods*. Nairobi: Kanezja Publishers.
- Pajares, M. H. (1992). Teachers' beliefs and educational research: Cleaning up a messy construct. *Review of Educational Research*, 5(5), 59-62. Retrieved October 15, 2015 from eric.ed.gov/?id=ej453784
- Republic of Kenya, (1981). *The presidential party on establishment of a second university (The Mackay Report, 1981)*. Nairobi: Government Printers.
- Republic of Kenya, (1988). *The presidential working party on education and manpower training for the next decade and beyond (The Kamunge Commission)*. Nairobi: Government Printers.
- Republic of Kenya, (1999). *The report of the commission of enquiry into the education system in Kenya (The Koech Commission, 1990)*. Nairobi: Government Printers.
- Ryan, R. M., Kuhl, J., & Deci, E. L. (1997). Nature and autonomy: Organizational view of social and neurobiological aspects of self-regulation in behavior and development. *Development and Psychopathology*, 9(2), 701–728.
- Salau, M. (2000). *Options in sustaining mathematics as a language science and technology in the 21st century*. Paper presented at the Annual Conference of Mathematics Association of Nigeria (MAN).
- Schiefele, U. & Csikszentmihalyi, M. (1995), Motivation and ability as factors in mathematics experience and achievement. *Journal for Research in Mathematics Education*, 226(2), 163-181. Retrieved October 12, 2015 from jwilson.coe.uga.edu/EMAT7050/Students/Dwyer/749208.pdf
- Schenkel, B. (2009). *The impact of an attitude toward mathematics on mathematics performance*. (Unpublished Master Thesis) Marrieta College, South Carolina.
- Sidhu, K. S. (1983). *The Teaching of Mathematics*. New Delhi: Sterling Publishers Pvtl Ltd.
- Schmidt, W., Houang, R., & Cogan, L. (2002). A Coherent curriculum. American educator *Summer* 4(2), 1–17. Retrieved May 16, 2015 from <http://www.aft.org/sites/default/files/.../curriculum.pdf>.

- SMASSE Project. (2008). *Statistical analysis on SMASSE project impact assessment survey*. Tokyo: JICA.
- Stein, M. K., Grover, B. W. & Henninssen N. (1996). Building student capacity for mathematics thinking and reasoning: An analysis of mathematical tasks used in reform classroom. *American Educational Research Journal*, 32(2), 455-466. Retrieved May 14, 2015 from [edu312spring13.pbworks.com/w/.../Stein,Grover,\[pct\]2520\[pct\]2526Henningsen.pdf](http://edu312spring13.pbworks.com/w/.../Stein,Grover,[pct]2520[pct]2526Henningsen.pdf)
- Stigler, J. W. & Perry, M. (2000). *Developing classroom process data for the improvement of teaching*. In N. S. Raju, J. W. Pellegrino, M. W., Bertenthal, K., Mitchell, & L. Jones (Eds.), *Grading the nation's report card: Research from the evaluation of NAEP* (229-264). Washington, DC: National Academy Press. Retrieved October 15, 2015 from peerryresearchgroupatillinois.weebly.com/michelle-perry-publications.html
- Uusimaki, L. & Nason, R. (2004). *Causes underlying pre-service teachers' negative beliefs and anxieties about mathematics*. Retrieved October 14, 2015. From emis.math.tifr.res.in/proceedings/PME28/RR/RR141_Uusimaki.pdf

APPENDICES

Appendix I: Questionnaire for Heads of Department (HOD)

I am a student of Karatina University carrying out a research on causes of poor performance in Mathematics in secondary schools, a case of Nyandarua North Sub-County. You are requested to participate in the study. The information given will be treated as private and confidential. Your name will not be required anywhere in this questionnaire.

PART A (*tick where appropriate*)

1) What is your gender?

(i) Male

(ii) Female

2) Type of school (*please tick where appropriate*)

	Type of school	Tick (✓)
1	Mixed boarding	
2	Boys day school	
3	Girls day school	
4	Girls boarding	
5	Boys boarding	

PART B

3) Do you think students have positive attitude towards Mathematics in your school?

(i) Yes

(ii) No

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

A	HODs' feeling about students and Mathematics	1	2	3	4	5
1	Mathematics lessons are very lively					
2	Students are always ready to learn					
3	Most students have Mathematics text books					
4	Most students finish their assignments in time					
5	Students are always active during the lesson					
6	Most students have a negative attitude towards Mathematics					
B	HODs' feeling about teachers and Mathematics	1	2	3	4	5
1	Mathematics teachers are trained					

2	Mathematics teachers go for their lessons in time					
3	Teaching methods are activity oriented					
4	Teachers have adequate teaching resources					
5	Teachers enjoy Mathematics lessons					
6	Teachers like their Mathematics students					

5) Are students assessed often?

(i) Yes

(ii) No

6) Which method is applicable to your school?(*tick only ones*)

		<i>Yes</i>	<i>No</i>
	Method of Assessment during Mathematics lesson		
1	All students do exercise from the class text during each lesson		
2	All my students are given the same work during each lesson		
3	Exercises done by my students are marked		
4	Extra lessons are given to weaker students		
5	challenging questions are given to brighter students		

Appendix II: Questionnaire for Mathematics Teachers

I am a student of Karatina University carrying out a research on causes of poor performance in Mathematics in secondary schools, a case study of Nyandarua North Sub-County. You are requested to participate in the study. The information given will be treated as private and confidential. Your name will not be required anywhere in this questionnaire.

PART A (*tick where appropriate*)

1) What is your Gender?

(i) Male

(ii) Female

2) Type of school (*please tick where appropriate*)

	Type of school	Tick (✓)
1	Mixed boarding	
2	Boys day school	
3	Girls day school	
4	Girls boarding	
5	Boys boarding	

PART B

3) Do you think students have positive attitude towards Mathematics?

(i) Yes

(ii) No

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

A	Teachers' feelings about students and Mathematics	1	2	3	4	5
1	Mathematics lessons are very lively					
2	Students are always ready to learn					
3	Most students have a Mathematics class text					
4	Most students finish their assignments in time					
5	Students are always active during the lesson					
6	Most students have a negative attitude towards Mathematics					

B	Teachers' feelings about Mathematics	1	2	3	4	5
1	Mathematics teachers are trained					
2	Mathematics teachers go for their lessons in time					
3	Teaching methods are activity oriented					
4	Teachers have adequate teaching resources					
5	Teachers enjoy Mathematics lessons					
6	Teachers like their Mathematics students					

5) Do you assess your students often?

(i) Yes

(ii) No

6) Which method is applicable to you? (*can mark more than once*)

	Method of Assessment during the lesson	Yes	No
1	All students do exercises from the class text during each lesson		
2	All my students are given the same work during each lesson		
3	I mark all exercises done by my students		
4	I give extra lessons to weaker students		
5	I give challenging questions to brighter students		

Appendix III: Questionnaire for students

I am a student of Karatina University carrying out a research on causes of poor performance in Mathematics in secondary schools, a case of Nyandarua North Sub-County. You are requested to participate in the study. The information given will be treated as private and confidential. Your name will not be required anywhere in this questionnaire.

PART A (*tick where appropriate*)

1) What is your Gender?

(i) Male

(ii) Female

2) Type of school (*please tick where appropriate*)

	Type of school	Tick (✓)
1	Mixed boarding	
2	Boys day school	
3	Girls day school	
4	Girls boarding	
5	Boys boarding	

PART B

3) Do you think students have positive attitude towards Mathematics in your school?

(i) Yes

(ii) No

4) The following are some of the feelings you may have about Mathematics.

Please indicate the extent of agreement using the words; Strongly Agree (SA)=1; Agree (A) =2; Undecided (UD)=3; Disagree (DA)=4; Strongly Disagree (SDA)=5. Put a tick only in one box for each statement. If you make a mistake, put a cross through the marked box and then tick the correct box.

	Students' feelings about teachers and Mathematics	1	2	3	4	5
1	Teachers are qualified					
2	Teachers are prompt in lesson attendance					
3	Teachers are fair in issuing of text books					
4	Teachers are well prepared for the lessons					
5	Teachers are committed to their work					
6	Teachers have a negative attitude towards Mathematics students					

5) Does your Mathematics' teacher assess you often?

(i) Yes

(ii) No

6) Which method is applicable to you?

	Yes	No
Method of Assessment during the lesson		
1) All students do exercise from the class text during each		

lesson		
2) All students are given the same work during each lesson		
3) Majority of students of the students do extra assignments		
4) Extra lessons are given to weaker students		
5) Challenging questions are given to brighter students		

Appendix IV: Interview Schedule to Principals

I am student of Karatina University carrying out a research on causes of poor performance in Mathematics in secondary schools, a case of Nyandarua North Sub-County. You are requested to participate in the study. The information given will be treated as private and confidential. Your name will not be required anywhere in this schedule.

i) Mathematics is a core subject. How is its performance in the school relative to other schools? -----

ii) What is the attitude of the students towards Mathematics in the school?----

iii) What is the attitude of the teachers towards students of Mathematics in the school?-----

iv) Are all teachers in the Mathematics department are trained?-----

v) Do students have enough text books?-----

vi) Roughly at what ratio are Mathematics text books issued?-----

vii) What advice would you give to school stake holders in order to have enhanced improvement in Mathematics-----

