

**FACTORS CONTRIBUTING TO DISMAL PERFORMANCE IN MATHEMATICS
AMONG SECONDARY SCHOOL GIRLS IN BORABU DIVISION OF NYAMIRA
DISTRICT, KENYA**

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of Egerton University**

EGERTON UNIVERSITY

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DECLARATION AND RECOMMENDATION

Declaration

This project report is my original work and has not been presented for degree or diploma in any other university

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Recommendation

This project report has been submitted with my approval as University Supervisor

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DEDICATION

I dedicate this work to my husband Steve, my children Brian, Belden and Phoebe and all my family members whose love, care and understanding have been my fountain of inspiration in writing this project. To God be the glory.

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I am greatly indebted to my colleague students in the department for providing the necessary stimulus for writing this work. I am grateful to all those persons whose writings and works have helped me in the preparation of this report. I am extremely grateful to Dr. Omulema who has severally reviewed this work and extremely made valuable suggestion and has contributed in enhancing the standard of this report. I thankfully acknowledge the input and contribution of Dr. Mary Kariuki that has brought into completion this work. I shall feel amply rewarded if the project report proves helpful to all stakeholders in the education sector.

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ABSTRACT

A good mathematics education is salient to scientific and technological development. The Kenya National Examinations Council evaluates the performance of students through the examinations it offers. Evaluation of the Kenya Certificate of Secondary Examinations has revealed that girls do not perform well in mathematics. Girl child education world-wide provides benefits to the family and the society at large. Thus dismal performance in mathematics by the girl child should be addressed for the sake of scientific and technological development of any country and Kenya in particular. The purpose of this study was to explore the factors contributing to dismal performance in mathematics among secondary school girls in Borabu Division, Nyamira District. The investigation employed Ex-post facto research design. The population was 714 (700 girls, 7 teachers and 7 head teachers). Out of this population, a sample of 154 respondents were selected which included 140 girls, 7 mathematics teachers and 7 head teachers. The samples were done purposively which included 1 mathematics teacher from each sampled school. The head teachers of the 7 sampled schools were involved in the study purposively. 5 girls were randomly selected from each form from forms 1-4. Data was collected from the head teachers, mathematics teachers and the secondary school girls by use of questionnaires and interview schedules. The researcher used statistical package for social sciences (S.P.S.S 11.5) in data analysis. Descriptive statistics involving frequencies and percentages were used to analyze the data. The findings of the study indicate that inadequacy of mathematics teachers, societal gender stereotypes, influence from peers, attitudes of girls towards mathematics, girl's low levels of aspiration and inadequate resources for teaching contributed to the dismal performance in mathematics by secondary school girls in Borabu division. Many respondents recommended that the attitudes held by majority of the girls in secondary schools about maths need to be changed. The same study be carried out in the same area or a similar region for the findings are of great significance to the girl child, human development and the nations' scientific and technological development.

TABLE OF CONTENTS

DECLARATION AND RECOMMENDATION.....	ii
COPYRIGHT.....	iii
DEDICATION	iv
ACKNOWLEDGEMENT	v
ABSTRACT.....	vi
TABLE OF CONTENTS.....	vii
LIST OF TABLES.....	x
LIST OF FIGURES.....	xi
LIST OF ABBREVIATIONS AND ACRONYMS.....	xii
CHAPTER ONE: INTRODUCTION.....	1
1.1 .Background Information	1
1.2 Statement of the Problem	3
1.3 Purpose of the Study.....	4
1.4 Objectives of the Study.....	5
1.5 Research Questions.....	5
1.6 Significance of the Study	6
1.7 Scope of the Study.....	6
1.9 Limitations of the Study.....	7
1.9.1 Delimitations.....	8
1.10 Definition of Terms.....	8
CHAPTER TWO: LITERATURE REVIEW.....	8
2.1 Introduction.....	8
2.2. Shortage of Mathematics Teachers	8

2.3 Gender Stereotypes.....	9
2.4. Peer Influence.....	13
2.5 Girls' level of Aspiration.....	13
2.6 Resources of Mathematics.....	15
2.7 Girls' Attitudes towards Mathematics.....	16
2.8 Theoretical Framework.....	17
2.8.1 Social learning theory.....	17
2.8.2 Adlerian theory.....	18
2.9 Conceptual Framework.....	19
CHAPTER THREE: RESEARCH METHODOLOGY.....	21
3.1 Introduction.....	21
3.2 Research Design.....	21
3.3 Location of the Study	21
3.4 Population of the Study.....	21
3.5 Sampling Procedures and Sample Size	22
3.6 Instrumentation.....	23
3.6.1 Validity of the Research Instruments.....	23
3.6.2 Reliability.....	23
3.7 Data Collection Procedures.....	23
3.8 Data analysis.....	24
CHAPTER FOUR: RESULTS DISCUSSION	25
4.1 Introduction.....	25
4.2 Demographic characteristics of the respondents of the Study	25
4.3 The respondents views on the shortage of mathematics teachers as role models.....	27

4.4 Respondents views on societal gender stereotypes.....	29
4.5 Respondents views on peer influence and how it contributed to dismal performance of girls in mathematics.....	30
4.6 Responses on the attitudes and interests of girl students towards mathematics.....	31
4.7 Respondents views on the level of aspiration of girls and how it contributed to their dismal performance in mathematics.	32
4.8 Respondents views on how learning resources of mathematics contributed to dismal performance in mathematics.	33
CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS.....	35
5.1 Introduction.....	35
5.2 Summary of the major findings.....	35
5.3 Conclusions.....	36
5.4 Recommendations.....	37
5.5 Suggestions for Further Research.....	38
REFERENCES.....	39
APPENDICES.....	42
APPENDIX A: QUESTIONNAIRE FOR MATHEMATICS TEACHERS	42
APPENDIX B: QUESTIONNAIRE FOR SECONDARY SCHOOL STUDENTS.....	46
APPENDIX C: QUESTIONNAIRE FOR HEAD TEACHERS	51

LIST OF TABLES

Table 1: Students with grade D and below in KCSE in Selected Schools.....	2
Table 2: Population of the Study.....	22
Table 3: Sampling Procedure.....	22
Table4: Distribution of head teachers and teachers by age.....	26
Table 5: Number of Years Served in their Capacities as Head teachers and Mathematic Teachers.....	26
Table :6 Distribution of secondary school girls as per their age and form.....	27
Table 7: Shortage of teachers as role models	28
Table 8: Mathematics teachers in selected schools and lessons they teach	28
Table 9: Societal gender stereotypes.....	29
Table 10: Views on peer influence.....	30
Table 12: Responses on girls level of aspiration.....	32
Table 13: Responses on learning resources.....	32

LIST OF FIGURES

Figure 1: A model showing the factors contributing to dismal academic performance in mathematics among secondary school girls.....	19
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LIST OF ABBREVIATIONS AND ACRONYMS

K.N.E.C -Kenya National Examinations Council.

K.C.S.E -Kenya Certificate of Secondary Education.

U.S.A -United States of America.

I.P.I - Integrated Programmed Instructions.

I.Q - Intelligence Quotient.

S.P.S.S - Statistical Package for Social Sciences

CHAPTER ONE: INTRODUCTION

1.1. Background Information

Mathematics is a compulsory subject in Kenya for all students in both primary and secondary schools. Ndimbirwe (1995) as quoted by Githua (2002) indicated that the subject is both academically and vocational important for both males and females. The reason for this perceived importance of mathematics is because it is basic for modern scientific development and technology (Cockcroft, 1982). Education stakeholders continue to invest heavily in the education of young Kenyans year by year with the hope that the input will be equivalent to the output if not better. The immediate expected results from education system are good performance in examinations. However, the performance continues to be poor in general. Of great concern is the learner's performance in mathematics, given that this subject is key to the attainment of the national goal of industrialization by the year 2020.

To compound this problem of dismal performance in mathematics, there is overwhelming evidence that the proportion of females passing mathematics in KCSE examination is lower than that of males and that the proportion of males taking mathematics related courses beyond secondary school education also outweighs that of females (Abagi, 1992 & 1994, Kyungu 1988, Makau, 1994, Masiga, 1994.)The researcher observed the results of some of the selected schools for the last four years - 2003 – 2007.

Table 1: Students with Grade D and below in Mathematics in K.C.S.E in Selected Schools in Borabu Division.

School	KCSE Year	Total Entry	Males	Females.	Grade D to E	
					Male	Female
Nyandoche	2007	22	13	9	6	8
	2006	16	8	8	6	8
	2005	16	10	8	6	7
	2004	19	9	10	6	10
Eronge S.DA	2007	22	10	12	8	10
	2006	74	38	36	29	33
	2005	89	42	47	26	38
	2004	80	45	35	25	20
	2003	26	12	14	10	14
Menyenya	2007	134	70	64	9	44
	2006	133	63	74	18	38
	2005	152	63	89	28	41
Manga girls	2007	24		24		20
	2006	44		44		40
	2005	34		34		32
	2004	41		41		36
Total		796	383	549	177	399

Source :AEO's Office Statistics Borabu Division(2007)

Such a dismal performance of females in mathematics and under – representation in mathematics related studies after secondary school education is a source of inequality which closes many educational and career opportunities to women and deprives society of the benefits of their talents. According to Burton (1996), Cockcroft (1982) and Earnest (1993), the reasons currently advanced from research findings in Britain, USA and Australia for the under –achievement and under representation between boys and girls include:- mathematics being culturally viewed as a male domain, lack of female mathematics role models in mathematics classrooms, unconscious

sexism among teachers and the modes of teaching being individualistic as opposed to being cooperative, different cognitive styles (Cline & Ashcroft, (1993) and student's mathematics self concept (Marsh, 1989 & 1991). Gender insensitive instructional methods and learning materials (Kyungu, 1998 & Masiga, 1994) have also been identified as areas that need more research in order to explain the disparity.

Eshiwani (1975 & 1984) in his research studies in Kenya indicated that girls get better scores than boys when they are taught mathematics by the use of Integrated Programmed Instruction (IPI). He concluded that the method of instruction has an important influence on achievement and retention. His research findings also showed that girls' under-achievement and under-representation in mathematics are attributable to attitudes rather than their ability. Mondoh (1995) investigated the extent of the effects of teaching effectiveness on mathematics achievement. Yearly reports of K.C.S.E examination results posted on school notice boards show a very high proportion of girls as utter failures in mathematics compared to other subjects (FEMSA – 1991). This study sought the views of the teachers, head teachers and learners (girls) in order to establish the reasons behind girls under – achievement in mathematics.

1.2 Statement of the problem

Despite the crucial role of mathematics in the technological development of any county, dismal performance by secondary school girls in mathematics is still a persistent problem in many schools in the country. This has serious implications since the speed or pace of industrialization and adoption of appropriate technologies is a positive indicator, to society's level of mathematical attainment. Despite the importance attached to student's mathematics achievement by the Kenyan society, performance of secondary school girls in the subject continues to deteriorate. In Nyamira District, Borabu Division has many secondary school girls performing dismally in mathematics. Thus, a study to investigate the factors that have contributed to dismal

performance in mathematics by secondary school girls is vital. This is crucial because no such a study has been carried in the area yet mathematics achievement contributes to Kenya's technological development and industrialization.

1.3 Purpose of the Study

The purpose of this study was to explore the reasons contributing to dismal performance in mathematics among secondary school girls in Borabu division, Nyamira district.

1.4 Objectives of the Study

The study sought to accomplish the following objectives:-

- i. To find out how shortage of mathematics teachers contributes to dismal performance in mathematics among secondary school girls in Borabu Division.
- ii. To explore how gender stereotypes in society contribute to dismal performance in mathematics among secondary school girls in Borabu Division.
- iii. To find out how negative attitudes of secondary school girls contributes to their dismal performance in mathematics in Borabu Division.
- iv. To explore whether peer influence contributes to dismal performance in mathematics among secondary school girls in Borabu Division.
- v. To find out whether inadequacy of resources and facilities contributes to dismal performance of secondary school girls in Borabu Division.
- vi. To find out whether low aspiration levels contribute to dismal performance in mathematics amongst secondary school girls in Borabu Division.

1.5 Research Questions

- i. Does shortage of mathematics teachers contribute to secondary school girl's dismal performance in mathematics in Borabu Division?
- ii. Do societal gender stereotypes contribute to secondary school girl's dismal performance in mathematics in Borabu Division?
- iii. Do facilities and resources used in mathematics classrooms contribute to secondary school girl's dismal performance in mathematics in Borabu Division?
- iv. Do secondary school girl's attitudes contribute to their dismal performances in mathematics in Borabu Division?
- v. Does peer influence contribute to dismal performance in mathematics among secondary school girls in Borabu Division?
- vi. Does low level of aspiration contribute to dismal performance in mathematics among secondary school girls in Borabu Division?

1.6 Significance of the Study

As a country, the study is of great importance particularly at this time when countries in the world are intending to achieve equality in education by 2015. The knowledge of various factors contributing to dismal performance in mathematics may help teachers, parent, education officers and all stake holders to come up with more practical interventions to improve secondary school girl's performance in mathematics. The study findings are expected to not only increase girls' awareness of factors contributing to dismal performance in mathematics but also serve as a useful source of reference for further research.

1.7 Scope of the Study

The study was based in Borabu Division, Nyamira district. It drew its sample from head teachers, secondary school mathematics teachers and secondary school girls. The study focused on how societal gender stereotypes, shortage of math's teachers, influence of peers, attitudes of girls and level of aspiration as some of the factors that may have contributed to dismal academic performance in mathematics by secondary school girls in the division.

1.8 Assumptions of the Study

The study was based on the following assumptions:-

- i. The respondents would co-operate in giving the required information honestly.
- ii. There was dismal academic performance among secondary school girls in Borabu Division.
- iii. Achievement in mathematics by secondary school girls was not emphasized by stakeholders in Borabu Division.
- iv. That the findings of the factors contributing to dismal performance in mathematics by secondary school girls be generalized to other schools not included in the study.

1.9 Limitations of the Study

The study was limited to only Form One to Four girls, head teachers and mathematics teachers of the schools under study, in Borabu Division. The results can be generalized to schools with similar characteristics in Nyamira District.

1.9.1 Delimitations

Most of the respondents were co-operative. The researcher was familiar with the area and therefore found it easy to visit all the schools.

1.10 Definition of Terms

The following terms were defined as follows-:

- Aspiration** -Girls deemed to have a low level of aspiration because of their low achievement motivation leading to their dismal performance in mathematics.
- Attitudes** - A set of disposition acquired by girls that is negative about mathematics. That it is difficult, which contributes to their low achievement in the subject.
- Facilities** - Materials or resources used in teaching and learning during math's sessions.
- Gender** - Culturally shaped attributes given to the male or female. Attributes aligned to the female like the gender roles at home contributed to the dismal performance in mathematics by the females. Hence they are roles, activities responsibilities and privileges accorded to men and women.
- Performance** - Achievement of students which in this context is achievement in mathematics which is dismal.
- Stereotypes** - Images/ ideas that have become fixed. Girls have a fixed feeling/idea that mathematics is a difficult subject; difficult issues are for tough people like men – this has contributed to dismal achievement in mathematics.
- Inadequacy** - Something that is not sufficient like mathematics teachers are few - hence they are not enough compared to the students they teach.
- Dismal** - Low achievement that is attained by girls involved in this research, performance was low.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter presents the review of literature relevant to factors that contribute to dismal performance in mathematics by secondary school girls in Borabu Division, Nyamira District. The factors include shortage of mathematics teachers, gender stereotypes in society, peer influence, girl's level of aspiration, resources of mathematics and the girl's attitudes and interests. The chapter concludes by explaining the theoretical and conceptual frame work guiding the research.

2.2. Shortage of Mathematics Teachers

In learning mathematics, teachers play an important role. The teacher is the main channel of information to the students. The teacher should understand the students' environment and how to present the subject at different levels of the student's development.

According to Daily Nation (February 5th, 2001), there is an acute shortage of teachers in the country. This problem has been occasioned by retirements and lack of recruitment by the government. Daily Nation 2005 has indicated that economic crisis has dictated efforts by the government to recruit teachers. The retention of qualified mathematics teachers has been by virtue of a higher salary and certain incentives. Today, not many are recruited or trained while the number of schools and consequently the number of students has increased tremendously.

Equally other employers look for trained personnel in mathematics and sciences which attract many who could be teachers. As many teachers retire from service, some are taken away by the HIV/AIDS pandemic and many more subject to mismanagement and consequently the schools remain bereft of mathematics teachers.

The African Virtual University Teacher Education Programme has also noted that shortage of mathematics teachers has been occasioned by the increasing numbers of student enrolment and the negative impact of the HIV/AIDS pandemic. Secondly, there is the fact that even where there are enough teachers, many of them are untrained or undertrained. Daily Nation (February 5th, 2001), has indicated an imbalance in staffing caused by Teachers Service Commission as a result of transfers of teachers.

The gender policy in education (July, 2007), attributes the shortage of teachers to historical imbalance in the intake of student teachers in the training institutions as well as lower performance of girls in secondary schools. The gender policy's other major concern is the imbalance in the few women teachers who are over-represented in many urban areas and under-represented in remote areas where their presence can encourage girls education.

According to the ministry of education (2003), gender disparities in enrolment in teacher education are highest in secondary school education programmes. This is supported by (Ng'ethe et al ,2005) who identifies enrolment in teacher education degree programmes in mathematics as revealing a wide gender disparity in favor of males. According to Ng'ethe (2005) in 2002/2003 and 2004/2005 academic years, of those who enrolled in teacher education degree programmes in public universities, only 39.8 percent were female.

2.3 Gender Stereotypes

The manual for Gender Poverty and Development (2004) describes gender as a social concept of male or female roles and relationships. The roles and relationships are defined with socio-cultural attributes; characteristics and values being assigned to men and women, girls and boys. Equally, the ministry of education has clarified gender stereotypes in its circular of Gender Policy in Education (2007) as assigning of roles, tasks and responsibilities to men and women, boys and girls on the basis of pre-conceived prejudices. The journal on Gifted Child Today cites

reasons that may be attributed to girls not succeeding in mathematics. It notes that they are not expected to excel in this area by some of their parents, teachers or peers. Stereotypes influence perceptions and performance in school and in life and are often cited as contributing to girls' problems in mathematics and related fields such as technology. Mathematics is often thought of as a male field and the society holds traditional male images of scientists, engineers, computer scientists and mathematicians.

Evidence also exists that girls are regarded as less capable in mathematics by some of their teachers and parents and these perceptions may influence girls' opinions of their own abilities.

The FAWEK (FORUM FOR WOMEN EDUCATIONISTS in KENYA) journal has advanced reasons for girls' poor participation and performance in mathematics. These reasons are varied. Girls generally believe that mathematics and science subjects are basically masculine and difficult and that they require struggle. Other girls believe that there are few opportunities for them after school in careers based on mathematics or science. They also harbor the belief that though they succeed in making a career in these disciplines, they will not be allowed to attain their full potential in the male dominated professions. Culture has also brainwashed girls that they are not capable of doing much that requires hard mental thought. This is brought about by the societal belief that girls cannot do hard subjects like mathematics and science that require aggressiveness; a welcome trait in boys but traditionally frowned upon by girls.

Teachers also contribute in instilling the stereotypes to girls since they know that mathematics calls for struggle and determination. They believe that girls do not have the ability to study mathematics nor the capability of coping with difficult subjects. They therefore actively discourage girls from mathematics. The FAWEK journal still singles out rural parents as part of an important web of low expectations of their girls' achievement in mathematics. They want their daughters to study those subjects that will make them good prospects for marriage.

Kenya Times of (9th April, 2001) cites traditional stereotypes as restricting women career options to teaching and nursing having not been completely rooted out of the educational systems and this has resulted into most girls continuing to be confined to home based subjects. Teachers are also to blame for their failure to take into account the differences in biological make ups of girls as pertains their learning abilities. Cases abound of teachers shutting away girls from pursuing certain subjects when it appears that they could never merge with the boys' aptitudes. Thus teachers are to blame for failure to instill a sense of courage and encouragement on the girls to pursue subjects traditionally viewed as a preserve of male students.

Research conducted by the ministry of education and outlined in its journal of Gender Policy in Education (July 2007) has shown that in Kenya there is poor participation and performance in science and mathematics subjects and courses by both males and females. However females' participation and performance is worse than that of males' at all educational levels.

2.4. Peer Influence

According to Paul et al (1987), in adolescence allegiance is switched to peers. To some extent most adolescents adopt the morals of their peers. If the parents have brought them upright, however, the adolescents will tend to choose peers who believe in the same things. Choosing one's associates is very crucial because in seeking popularity and social acceptance, one conforms to peer group ideologies, loyalties and standards.

Peer pressure occurs when an individual experiences impaired or expressed persuasion to adopt familiar values, beliefs and goals or to participate in some activities as those in the peer group. Peer influence peaks in the adolescence but it never entirely disappears. The level of peer influence often declines as children gain independence from the family of care givers and before they fully form an adult identity. Pre-teens and teenagers face many issues related to conformity

and peer pressure. They are pulled between the desire to be seen as individuals of unique value and the desire to belong to a group where they feel secure and accepted. The result is that often teens reject family or general society values while feeling pressure to conform rigidly to the values of their peer group.

Both low and high academic achievement is closely linked to peer influence. Peers influence the degree to which children conform to expected gender roles. For instance, until grade six, girls perform as well in science and mathematics as boys, but during adolescence, girls' test scores and level of expressed interest declines. The tendency is to abandon competition with boys in favour of placing more emphasis on relationships and physical appearance. As girls get older, beliefs of their classmates are held in greater esteem than those of parents (Simpkins, Davis Kean & Eccles, 2006). Girls not only have to deal with their own fears of mathematics but also fears of rejection by peers if they do pursue mathematics. This fear of social retaliation is related to beliefs in the stereotype of poor performance of girls in mathematics and science. Kessel (2005) found that students who like mathematics are more masculine where as students who liked music were perceived as more feminine. In a time when girls are dealing with the trials of significant puberty and social changes of moving to high school, such social repercussions could be significant in girls' decision to pursue mathematics classes.

Although parents and classmates can both influence girl's beliefs in stereotypes, once stereotypes have been established, they are difficult to erase. A recent study showed that girls who were more likely to endorse the stereotypes of girls being bad at mathematics and science also evaluated themselves more negatively than boys who did not endorse the stereotype (Selimbegovic & Chatard, 2007).

Boys and girls have different relationships with peers and respond differently to these relations, which suggest that peer contexts could be a source of gender variability in the seemingly equivalent-or-equifinal-mathematics careers of girls and boys (Giordano, 1995, Riegle Crumb, Farakas & Muller, 2006, Ryan 2001). Gender socialization has hyped mathematics as a male activity leading to future careers that will not be conducive with adult female family roles. Consequently, girls perceive mathematics classrooms as inhospitable to them. Thus socialization processes create gender differences in motivations, expectations and values (the end-result is that dropping out of mathematics has traditionally been more justifiable for girls than boys). First peers loom large in adolescence when the task of establishing autonomy from parents significantly increases the socializing power of peers (Berndt & Murphy, 2002, Crosnoe, 2000). Indeed, even controlling for selection, the norms and characteristics of peers profoundly influence adolescents academic behavior through direct and indirect mechanisms - social approval of behaviour, self – enhancement through perceived social competence , modeling and social learning, overt peer pressure, group regulation, adult treatment related to group reputation, expectation of accomplishment and instrumental assistance for meeting goals (Berndt & Keefe, 1995 Ryan, 2000). Gender differences in peer relations are well established. Girls tend to have fewer, closer relationships and are more embedded in these friendships. Peer relations therefore provides insight into a key socialization agent of adolescence that shapes the motivations expectations and values that are so important to understanding gender differences in mathematics pathways.

2.5 Girls' level of Aspiration

The proportion of females passing maths in KCSE examination is lower than that of males (Abagi 1992 & 1994, Akayungu 1988, Makau 1994 Masiga 1994). This determines the proportion of females taking mathematics related courses beyond secondary school education

and is a precursor to females under representation in mathematics related studies. This under-representation in mathematics closes many educational and career opportunities to women and deprives society of the benefits of their talents.

Girls' achievement motivation is affected by the stories in their readers which advertently reinforces very narrow professional career aspirations (Good 1986). Girls self esteem, confidence in their abilities, expectations of life interest in challenging courses and rewarding careers in pursuits in mathematics and science decline as they get older (American Association Of Varsity Women, 1992) according to Stipek, Deborah, Granliliski, Herde (1991). Girls have a lower expectation for themselves in mathematics than boys and that girls believe that they do not have mathematical ability. It clearly shows that girls' beliefs began early in their education and persists into junior high school. Female participation and interest in mathematics diminishes as they move up in the educational ladder towards university level due to a variety of factors that are primarily rooted in their religious and cultural beliefs surrounding the role of women in society (combs 2003).

In trying to justify the factors responsible for low participation of female secondary school girls in mathematics, (George 2002) identifies the following factors as: attitudes and expectations of parents and teachers, instructional strategies such as hands on experiences, group projects, field trips and interactions with role models as opposed to traditional text book methods, self image and expectations that often change from high interest and low anxiety about mathematics in the early grades in the intermediate classes are some of the factors identified.

Due to the low level of aspiration among girls, Maccoby, 1996 indicates that boys are more likely to rise to an intellectual challenge, girls to retreat form one. This is because boys display

greater independence while girls display greater conformity and passive dependency. The independent person takes the initiative of carrying out intellectual tasks while the passive person is more at a disadvantage on some tasks than others. Thus the existence of these differences may have a bearing upon the cognitive development of the two sexes.

2.6 Resources of Mathematics

The key role of printed media in education is self-evident. Nevertheless serious book shortages are typical of the developing world. The World Bank regards text books as the most cost-effective investment in improving quality education in the developing world (Lockheed and Vespoor, 1990). Schramm's early analysis of research pertaining to printed materials suggested the following generalized findings as having some relationship to preparation and use of these materials in schools. If one medium is used to reinforce another like print with lecture or lecture with slides or pamphlets, there is a possibility of achieving considerably more learning than from one medium alone.

The mathematics textbook is a major factor in determining what mathematics topics are taught and how they are taught. It is thus a powerful means of determining the teaching strategy especially when instruction is inadequate. Mathematics textbook is thus a powerful influence in the classroom; in that it may be an invaluable servant or an intolerable master depending upon the intelligence with which it is handled (SMASSE , 2004).

A good textbook must include the following characteristics:-

- (i) Provide most of the content
- (ii) Posses the topics in a manner that builds understanding
- (iii) Provide a means of independent study

- (iv) Make provision for individual differences.
- (v) Act as a compact reference book.
- (vi) Provide basis of giving achievement test.

Jensen (1976) suggests that visual arts were particularly suitable for illustrating certain mathematical concepts. Mathematics is concerned with the objective of helping children develop visual perceptual skills so that they can recognize and identify shapes, sizes and colours. This emphasizes on the use of visual aids and other manipulative materials, which help to make students actively involved in various activities and hence stimulating and motivating them to learn mathematics. The availability of the resources encourages the teacher to experiment and try certain approaches that he or she will not perhaps have considered. However, there is a serious shortage of textbooks in most schools. In many schools, students have to provide their own textbooks. Besides, gender insensitive learning materials have also been identified (Masiga, 1994, Kyungu, 1998). In some books, the writers use gender biased language with examples, illustrations and questions depicting or referring to boys carrying out the scientific tasks. Girls may also be scared by the scientific examples which are not in harmony with their nature and upbringing for example in linear motion the writers give examples like head – on- collisions, a gun is fired among others. This may scare the girls while boys may be excited with such examples.

2.7 Girls' Attitudes towards Mathematics

Attitudes are ways of thinking or feeling about something or somebody, usually reflected in a person's behavior. They are descriptions of a person's readiness to respond in a certain way to some stimulus. Attitudes are acquired through experiences in our environment and learned in the same way as skills and habits. Where there is negative attitude, the person responds by showing

dislike and defense. According to Odindo C. and Oduor S. 2004, performance in mathematics in KCSE has remained generally poor compared to other subjects. Historically, the subject has been considered to be difficult and for this reason many students especially girls have shied away from it. Kenya Times (April 2001) indicated that girls have exhibited negative attitudes to mathematics because they have continued to doubt their capabilities to pursue these subjects because of the fear that mathematics carries a lot of challenges which only boys can withstand with ease.

The poor performance in mathematics in the national examinations has also triggered a negative attitude amongst the girl students. They consider it a waste of time to contrite on a subject they will not pass. Studies done by Birch and Veroff (2004) indicate that anticipation of a positive outcome enhances the tendency to achieve while anticipation of negative outcomes blocks or inhibits the action. Teachers also contribute in instilling the negative attitude in students. They expect some students to pass and others to fail. This is especially so in mixed schools where teachers expect boys to perform better than girls in mathematics. Thus when students have a negative attitude towards mathematics, teachers will no doubt be discouraged. Some mathematics teachers show no great interest in the way their subject is used in other areas of the curriculum and consequently they teach mathematics in a contextual vacuum.

2.8 Theoretical Framework

This study was guided by the following theories: the social learning theory and the Adrelian theory.

2.8.1 Social learning theory

According to Bandura (1986) in social situations people often learn more rapidly by observing the behavior of others. Social learning theory is shaped by the learners society, culture, structure

and history, (Merriam and Caffare, (1999). The theory places emphasis on society as a basic support for construction, acquisition and utilization of knowledge. Therefore what the society does or does not do is crucial to success in teaching and learning relationships. The theory is applicable to the performance of secondary school girls in mathematics. This is because the theory emphasizes that school girls' learning could be affected either positively or negatively by the institutions of their environments.

Teachers, parents and the behavior of the entire society are crucial to the girls' education because they are significant to the child's life. The underperformance of secondary school girls in mathematics is a result of stereotyped behavior from parents and members of the community. By the stereotypes already spelled in some communities especially where this study was carried out, girls believe that mathematics is a subject of the male domain.

Bandura (1967) has shown that children's ability to listen, remember abstract general rules from complex sets of observed behaviour affects their behaviour, imitations and learning. Good T.L (1986) shows how social learning theory can be applied in a classroom situation. He portrayed how modeling is responsible for a great deal of classroom learning. First, simply through their presence and behaviour teachers are role models of their students. In this capacity they are continuously supplying students with information about what and how to think not only about their academic curriculum but also about social, political and life style issues. Since the female teachers for mathematics in secondary schools were few, the girl students did not have sufficient role models to emulate.

2.8.2 Adlerian theory

Alfred Adler (1911) postulated that human beings have inherent factors that affect their destiny. He considered such factors to be social, cultural and biological. He portrayed that

individuals are merely discouraged because of their self defeating inferiority feelings. Adler being a holist thought that a person could be understood only as an indivisible unity. This theory is applicable to this study since the social cultural and biological factors underlie the dismal performance of girls in mathematics. This is because girls harbor self defeating feelings of inferiority. These feelings are nurtured in our societies whereby women and girls are viewed as a weaker sex. Thus difficult tasks are considered masculine or of male domain. Such feelings need to be changed since Adler thought that lifestyle was not synonymous with behaviour, because behaviour can change throughout a person’s life. Although girls grow up in a social environment, they need to search for significance by attempting to master their environment. Girls need to be thought by the significant others that human beings can be creative, self -determined decision makers who can choose the goals they wish to pursue. They need to put aside the self defeating feelings of inferiority and embrace creativity, self determination and decision making. This will finally make them achievers in areas considered by society as male sanctuaries.

2.9 Conceptual Framework

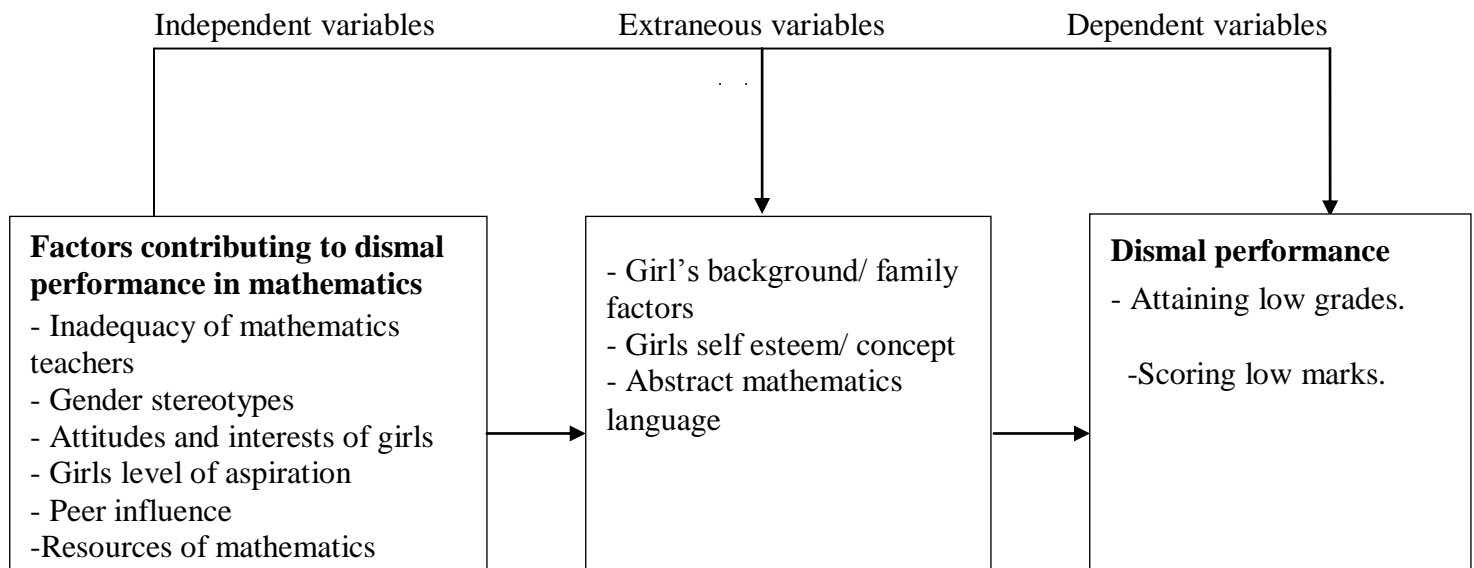


Figure 1: A model showing the factors contributing to dismal academic performance in mathematics among secondary school girls.

The relevance of theoretical framework to the study basically drew its ideas from theories that address factors that can lead to under achievement. The social learning theory indicated that observational learning or modeling can influence learning. Since female mathematics teachers are few, girls lack role models to emulate so that they can excel in mathematics and pursue it to higher levels. The Adlerian approach also portrays that social cultural and biological factors can influence one not to attain what he or she expects. This also hinders the performance of girls in the subject. The cultural factors hold that women are a weaker sex and that mathematics is a masculine subject. This makes girls to shy away since they believe that it is difficult.

The dismal performance in mathematics among secondary school girls in Borabu Division can be attributed to the shortage of mathematics teachers, the gender stereotypes in the society and the negative attitudes developed by the girls. The influence of peers, low aspiration level and inadequate facilities and resources also contribute to the low achievement of secondary school girls in mathematics. In the figure above, the factors are referred to as independent variables. Extraneous variables include girl's background or family factors, girls' self-esteem and abstract mathematics language. These factors equally contribute to dismal achievement in that if the girls' family background is not motivating or supportive in providing an enabling environment, it will contribute to girls' low self esteem or concept and the girl will feel that she may not make it. When girls have a low self esteem they are prone to a situation of taking the mathematics language to be too abstract for them. The dependent variable for the study is dismal performance in mathematics. The following sets of variables in relation to the girl students' performance in mathematics together with their interrelationships therefore form the conceptual framework of the study.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter mainly focuses on research design, location, population of the study, sampling procedures and sample, instruments, data collection procedures and data analysis.

3.2 Research Design

The study employed ex-post facto research design. The design involved a systematic empirical investigation in which the research does not directly control the independent variables because they study events that have occurred (Kerlinger, 1993). In the study, girls' dismal performance in mathematics in Borabu Division is an issue which was already prevalent. There was no manipulation of variables.

3.3 Location of the Study

The research was carried out in Borabu Division of Nyamira District, Nyanza province. The area was appropriate for the study because of its convenience to the researcher hence saving time and cost. The schools were chosen according to the educational zones already established in the Division for purposes of homogeneity.

3.4 Population of the Study

The target population was from form 1-4 girls, their mathematics teachers and the head teachers of seven secondary schools in Borabu Division of Nyamira District. The population studied was 714 (700 girls, 7 mathematics teachers and 7 head teachers). There are 21 secondary schools in Borabu Division.

Table 2: Population of the Study

Zone	Sampled schools	Girls	Teachers	H/Teacher
Nyansiongo	2	200	2	2
Esise	3	300	3	3
Mekenene	2	200	2	2
Total	7	700	7	7

Source: AEO's Office Statistics (2007)

3.5 Sampling Procedures and Sample Size

According to Borg and Cell (2003) a sample of 100 respondents is adequate for survey. Therefore the researcher used a sample of 154 respondents in the study which is appropriate for good results. The 21 schools in Borabu Division have been stratified in to three zones namely Nyansiongo, Esise and Mekenene Zones. From the zones, the researcher purposively selected a sample of 2 schools from each of the three zones, making 6 schools. The researcher also purposevely chose one public girls school making it a sample of 7 schools. The samples were done purposively. Five girls were randomly chosen from each form one to four. The samples for teachers and head teachers were purposeful in that, 7 mathematics teachers and 7 head teachers of the selected schools were included in the sample of the study.

Table 3: Sampling Procedure

School	Girls	Mathematics Teachers	Head teachers	Total
Menyenya	20	1	1	22
Nyandoche	20	1	1	22
Eronge S.D.A	20	1	1	22
GonzagaGonza	20	1	1	22
Nyaronde	20	1	1	22
Mathias	20	1	1	22
Manga girls	20	1	1	22
Total	140	7	7	154

3.6 Instrumentation

To get the required data the researcher used questionnaire instruments. A questionnaire was designed to determine the factors that contribute to dismal performance of girls in mathematics. The primary data was collected through administration of structured questionnaires with the selected respondents.

3.6.1 Validity of the Research Instruments

To ensure the validity of the research instruments the researcher through a critical analysis of the objectives of the study developed suitable items. Later, these instruments were subjected to validation by the research supervisor so as to improve on the content validity as suggested by Borg (1987). Redundant items were phased out and the logical ones retained. According to Mugenda and Mugenda(1999),reliability is the degree to which research instruments yield consisted results after repeated trials.

3.6.2 Reliability

To ensure the reliability of the research instruments, pre-testing was done in Manga Division which borders Borabu Division. The schools used in pre-testing the instruments were: Ekerubo, Nyaikuro, Sengera, Manga and Tombe girls. These institutions were chosen because they had homogenous population to those in Borabu Division that were studied .The number of schools used for pre-test was taken because it is the smallest that yielded meaningful results for data analysis in a survey (Kathuri&Pals, 1998).The purpose of the pre-test was to allow for modification of various questions in order to rephrase, clarify and clear up any ambiguities in the research instruments. The reliability coefficient of the research instruments was 0.80. Thus the research instruments were reliable.

3.7 Data Collection Procedures

The researcher sought permission from the District Education officer Nyamira District to carry out the study at Borabu Division. The researcher also sought permission from the Divisional Education officer Borabu Division. When permission was granted, the researcher had to make introductory visits to the sampled schools in each zone where he delivered the questionnaires after discussion with the head teachers on how the questionnaires were to be administered. Respondents were given their questionnaires which were later collected by the class teachers on behalf of the researcher. The researcher assisted the respondents (girls) who had problems in responding to the items appropriately especially where the language used was not clear.

3.8 Data analysis.

The data obtained from the study was organized, coded and analyzed. The researcher used statistical package for social sciences (SPSS) in data analysis. Descriptive statistics involving frequencies and percentages were used to analyze the data.

CHAPTER FOUR: RESULTS DISCUSSION

4.1 Introduction

This chapter presents discussions of the research results. The discussion addresses the research objectives of the study which included:–

- i. To find out whether shortage of maths teachers contributes to dismal performance in mathematics among secondary school girls in Borabu Division.
- ii. To establish whether gender stereotypes in society contributes to dismal performance in maths among secondary school girls in Borabu Division.
- iii. To find out whether attitudes of secondary school girls contributes to their dismal performance in mathematics in Borabu division.
- iv. To explore whether inadequate resources and facilities contribute to dismal performance of secondary school girls in Borabu division.
- v. To investigate how peer influences contributes to dismal performance in maths among secondary school girls in Borabu Division.
- vi. To find out how the level of aspiration contributes to dismal performance among secondary school girls in Borabu Division.

4.2 Demographic characteristics of the respondents of the Study

The sample of the investigations consisted of three groups namely; head teachers, teachers and secondary school girls. This section presents head teachers, teachers and schoolgirls information by age and experience as indicated in table 6. The sample consists of 154 respondents who include 7 head teachers, 7 mathematics teachers and 140 secondary schoolgirls respectively.

Table4: Distribution of head teachers and teachers by age.

Category	Age	Frequencies	Percentage
Head teachers	25-29	0-1	14.3%
	30-35	2	28.6%
	36-40	3	42.9%
	Over 41 yrs	1	14.3%
Teachers	20-29	1	14.3%
	30-35	3	42.9%
	36-40	2	28.6%
	Over 41 yrs	1	14.3%

Table 4 shows clearly that most of the respondents in the study were ranging at the age of between 30-40 years. A very small percentage was seen in the age of 25-29 yrs in the study. The information on table 4 indicates that over 71.5 % of the head teachers have between 30-40 yrs while the same percentage of mathematics teachers have between 30-40yrs.

Table 5: Number of Years Served in their Capacities as Head teachers and Mathematic Teachers.

Category	years of service	frequencies	percentage
Head teachers	1-5	2	28.6%
	6-10	5	71.4%
	Over 11 yrs	-	-
Mathematics teachers	1-5	1	14.3%
	6-10	3	42.9%
	Over 11 yrs	3	42.9%

Table 5 shows the experience of respondents in years. Most head teachers have served for more than 6yrs which is equivalent to 71.4%. None of them had served in their capacities for more

than 11 years. Mathematics teachers were different since 42.9% had an experience of 6-10 yrs and another 42.9% had served for more than 11 years.

Table :6 Distribution of secondary school girls as per their age and form.

Response	frequencies	percentage
Age		
13 – 14 yrs	30	21.4%
15 – 16 yrs	40	28.6%
18 – 19 yrs	50	35.7%
Over 21 yrs	17	12.1%
Form		
1	35%	25%
2	45%	32.1%
3	35%	25%
4	25%	17.9%
Total	140%	100%

Table 6 indicates that majority of the girls involved in the investigation are between 13-19 years of age. There were 12.1% who attained the age of over 21yrs. On participation, form 2 had the highest number of girls who responded (32.1 %). Form 3 and form 1 were second with 25% participation in responding to the items given out by the researcher. Form 4 had a low percentage of 17.9%

4.3 The respondents views on the shortage of mathematics teachers as role models.

The first research question sought to find out whether the inadequacy of mathematics teachers as role models contributed to the dismal performance of girls in mathematics. In order to answer this question, the researcher presented two statements to the respondents relating to the

statements. They were asked to respond by indicating their level of agreement (strongly agree (SA) Agree (A) Undecided (U) Disagree (D) and strongly Disagree (SD)).

Table 7: Shortage of teachers as role models

Statements	Response (percent)									
	SA		A		U		D		SD	
	F	%	F	%	F	%	F	%	F	%
Liking the female teachers way of teaching	43	28.1	24	15.6	26	17.2	36	23.4	24	15.6
Preference of females to teach mathematics	41	26.6	39	25.0	10	6.3	26	17.2	39	25.0

N=153

From the analyzed data in table 7, 43.7 of the respondents either agreed or strongly agreed with the view that they liked the way of teaching mathematics by the female teachers. Only 39.0 disagreed that they didn't like the ways in which the female mathematics teachers taught. 17.2 of the respondents were undecided. The above observation is conclusive that majority of the student respondents liked to be taught by female mathematics teachers. On giving preferences between male and female teachers for mathematics, 51.6% of the respondents agreed that they preferred to be taught by female teachers than male teachers.

The teachers' responses indicated that they were few and they had many lessons to teach in the other subjects besides mathematics as shown in the table below. This reduced the frequency at which they gave assignments and evaluated the students work.

Table 8: Mathematics teachers in selected schools and lessons they teach

Name of school	No of teachers	No of lessons per week	percentage
Eronge SDA	1	26	11.1
Gonzaga gonza	1	26	11.1
Menyenya high	3	13	33.3
Manga girls	1	26	11.1
St. Paul Nyandoche Ibere	2	12	11.1
Nyaronde	1	26	22.2
Total	9		100%

From table 8, it is indicative that the teachers were few and they also taught other subject combinations like physics, chemistry, biology and geography.

4.4 Respondents views on societal gender stereotypes.

The second research question sought to find out whether the gender stereotypes in society contributed to girls dismal performance in mathematics. To address this, five statements were given to all respondents. They were supposed to respond to each item by indicating if they strongly agreed, agreed, undecided, disagree or strongly disagree. The table below shows their responses.

Table 9: Societal gender stereotypes

Statements	Response (percent)									
	SA		A		U		D		SD	
	F	%	F	%	F	%	F	%	F	%
Parents encouragement to girls to study maths	7	4.7	12	7.8	-	-	101	65.6	34	21.9
Parents advice to drop mathematics	89	57.8	29	18.8	7	4.7	10	6.3	19	12.5
Parents material support in maths	2	1.6	12	7.8	5	3.1	103	80.0	31	20.3
Support to society in maths achievement	7	4.7	7	4.7	5	3.1	70	45.3	65	42.2
Girls lack time to solve maths problem	10	15.6	60	39.1	5	3.1	36	23.4	29	18.8

N = 154

Table 9 records that the gender stereotypes in the society contributed to the dismal performance of girls in mathematics. 87.5% disagreed that parents encouraged their girls to study mathematics. 76.6% of the responses indicated that parents actually advised girls to drop the subject since they believed that it is boys who can tackle it. Almost 87.5% of the respondents disagreed that parents give girls financial and material support in their achievement of mathematics .It was also indicative from the responses given that majority of the society / community members around the school did not support girl student’s study of mathematics. This

was portrayed by the 87.5% disagreement. On considering whether lack of enough time to solve mathematics problems led to dismal performance of girls in mathematics, 55% of the respondents agreed while 40% disagreed. From the five statements, it was indicative that the gender stereotypes in society contributed to dismal performance of girls in mathematics.

4.5 Respondents views on peer influence and how it contributed to dismal performance of girls in mathematics.

The third research question was seeking to establish whether the influence of peers contributed to dismal performance in the subject. To get appropriate information about the extent of peer influence, respondents were served with four items related to the question to respond to.

Table 10: Views on peer influence

Statements	Response (Percent)									
	SA		A		U		D		SD	
	F	%	F	%	F	%	F	%	F	%
We discuss mathematics problems in study groups	2	1.6	7	4.7	5	3.1	94	60.9	46	29.7
My peers and I find mathematics assignments to be easy and useful	2	1.6	12	7.8	5	3.1	103	67.2	31	20.3
My peers and I ask questions in mathematics lessons	17	10.9	29	18.8	2	1.6	84	54.7	22	14.1
Friends discourage me from pursuing mathematics	24	5.6	60	39.1	5	3.1	36	23.4	29	18.8

N=154

According to the respondents' views, peer influence contributed to dismal performance of secondary school girls towards mathematics. 90% of the respondents strongly disagreed that they discussed mathematics problems in their study groups. 70% of the responses portrayed that peers did not ask many questions in mathematics while 55% of the responses given indicated that friends discouraged each other from pursuing mathematics.

The responses given early portrayed that there was much influence amongst the peers that contributed to dismal performance amongst the secondary school girls. This concurs with Paul

et al (1987) who states that in adolescence , allegiance is switched to peers.(Many secondary school girls are undergoing adolescence stage while in high school and thus adopt the morals of their peers). Coleman (1961) raised an equal concern for the apparently negative influence of the adolescent sub – culture on the performance of female high school students. Coleman (1961) found out that clever and status conscious girls learn quickly that they should not compete with males in the latter’s traditional intellectual sanctuaries of mathematics and science.

4.6 Responses on the attitudes and interests of girl students towards mathematics.

The fourth research question was seeking to establish whether the attitudes and interests of girl students contributed to dismal performance in mathematics. To address the research question, five statements were given to the respondents. They were supposed to indicate whether they strongly agreed (SA) agreed (A), undecided (U), strongly disagreed (SD) or disagreed (D) as shown in the table.

Table 11: Responses on the attitudes and interests of girl students

Statements	Response(Percent)									
	SA		A		U		D		SD	
	F	%	F	%	F	%	F	%	F	%
Mathematics is my favorite subject	2	1.6	14	9.4	10	6.3	82	53.1	46	29.7
Mathematics is interesting when learning.	5	3.1	10	6.3	10	6.3	70	45.3	60	39.1
If mathematics is made optional I will drop it.	58	37.5	31	20.3	24	15.6	31	20.3	10	6.3
I hate mathematics.	70	45.3	65	42.2	5	3.1	7	4.7	7	4.7
Girls practice solving mathematics problems on their own	2	1.6	7	4.7	–	–	103	67.2	41	26.6

N=154

According to the respondent’s views, the attitudes of the girls towards mathematics contributed to their dismal performance in the subject. 83% of the respondents disagreed that mathematics was their favorite subject. 84% of the responses given portrayed that mathematics was not an

interesting subject when learning .58% of the responses given indicated that if mathematics was made optional, the girls will drop it. 87% of the respondents indicated from the responses that they hated mathematics as a subject. On seeking views whether girls practiced solving mathematics problems on their own or during the holidays when they could get extra time, 94% of the responses given disagreed with the statement.

It was indicative from above statements that the girls had formed negative attitudes towards the subject and they therefore did not have any interest for it. Johnson and Rising (1972) indicated that all attitudes are fundamental to the dynamics of behaviour. Thus the attitudes formed greatly influence learning of a subject.

4.7 Respondents views on the level of aspiration of girls and how it contributed to their dismal performance in mathematics.

The fifth research question sought to find out whether girls aspired to study mathematics beyond high school .To address this, three statements were given to each respondent. The respondents were supposed to respond to each item by indicating if they strongly agreed, agreed, undecided, disagreed or strongly disagreed. Table 10 below shows their responses.

Table 12: Responses on girls level of aspiration.

Statements	Response (Percent)									
	SA		A		U		D		SD	
	F	%	F	%	F	%	F	%	F	%
Aspiration to study mathematics after KCSE	22	14.1	19	12.5	22	14.1	55	35.9	36	23.4
Girls don't understand that mathematics gives opportunities for personal advancement.	36	23.4	55	35.9	22	14.1	19	12.5	22	14.1
Girls would hardly like a career that requires mathematics	36	23.4	55	35.9	22	14.1	19	12.5	22	14.1

N=154

Table 12 portrays that girls did not aspire to study mathematics after high school. This could be because they did not understand that mathematics could give them many opportunities for personal advancement. On responding to whether girls aspired to study mathematics after K.C.S.E, 59% disagreed. It was indicative that majority never aspired to study the subject after high school where it was compulsory. On responding to the statement that girls didn't understand that mathematics gave them opportunities for personal advancement, 59% agreed but 27% disagreed. On responding to whether girls could hardly take a career that requires mathematics, only 27% agreed but 59% disagreed and 14% were undecided. It also became clear from the three statements that the level of aspiration was low and this may have contributed to their dismal performance in the subject.

4.8 Respondents views on how learning resources of mathematics contributed to dismal performance in mathematics.

The sixth research question was seeking to know whether the few learning resources contributed to dismal performance in mathematics. To address this, three statements were given to each respondent. Respondents were to respond to each item by indicating whether they strongly agreed, agreed, undecided, disagreed or strongly disagreed in two of the statements. In the third statement they were supposed to indicate how often they used the given learning resources.

Table 13 shows those responses.

Table 13: Responses on learning resources

Statements	Response (percent)									
	SA		A		U		D		SD	
	F	%	F	%	F	%	F	%	F	%
Lack of mathematics text books discourages the study of mathematics .	41	20.3	89	57.8	7	4.7	24	15.6	2	1.6
Mathematics reference books are readily available in school .	12	7.8	7	4.7	-	-	101	65.6	34	21.9
Teachers use charts, films, overhead projectors and mathematical models in mathematics lessons.	7	4.7	12	7.8	-	-	34	21.9	101	65.6

88.1% of the responses reflected that there was insufficient text – books for use. 87.5% of the views given also portrayed that mathematics reference books were not available. 12.5 % of the responses were also indicative that charts, films, mathematical models and overhead projectors were used. The responses therefore portrayed that learning materials for mathematics were insufficient and this contributed to dismal performance in mathematics.

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter presents a summary of the findings based on the research objectives, conclusions from the findings and recommendations derived from the conclusion. It also gives suggestions for further research.

5.2 Summary of the major findings.

The main purpose of this study was to establish the factors contributing to dismal performance in mathematics among secondary school girls in Borabu Division, Nyamira District. From the objectives, the following findings were established.:-

- i) The mathematics teachers were few compared with the students they taught. Among the teachers, the female mathematics teachers who could act as role models for the students to emulate were even fewer.
- ii) Many girl students were influenced by their peers to dislike the subject that it was difficult.
- iii) There were gender stereotypes in the communities where the girl students belonged. Such stereotypes discouraged the girls as some brainwashed them that mathematics is a difficult subject which should be tackled by their male counterparts.
- iv) Many girl students had a negative attitude towards mathematics. They did not find it interesting.
- v) Majority of the girls did not aspire to do mathematics after high school. They had a low level of aspiration out of ignorance for not knowing that mathematics could give them many opportunities for personal advancement.

- vi) The study indicated that the resources for mathematics were limited .Only a few text books were available. A few students had personal text books.

5.3 Conclusions

From the findings, the study makes the following conclusions:–

- (i) Although the mathematics teachers were trained and experienced, they were few in comparison with their workload. These teachers also taught other subjects like Chemistry, Physics or Geography. Thus, they did not have sufficient time with the learners for remedial teaching and continues assessments often. Among the few mathematic teachers, the female teachers who could be role models for the girls were relatively fewer. Hence the students lacked role modules to emulate.
- (ii) The respondents’ views also indicated that they had developed negative attitude toward mathematics because some topics were too abstract for them to understand. Thus, they had problems in interpretation of mathematical language.
- (iii) The cultural gender stereotypes in society contributed to dismal performance in mathematics .From the responses given, it was indicative that many parents and guardians of the respondents gave partial support and only discouraged the girls that the subject was tough.
- (iv) The resources available for learning mathematics were inadequate. Most of the respondents indicated that lack of teaching materials like charts, models, films, textbooks and enough time for preparation were some of the problems they faced.
- (v) Majority of the girls were influenced by their peers against mathematics that it was a male domain subject.
- (vi) Many girls did not aspire to pursue mathematics to tertiary levels after high school.

5.4 Recommendations

In view of the research findings, this study makes the following recommendations.

- i) There is need for sensitization of girls about the importance and necessity of mathematics in their day- today lives. They should therefore be enlightened to disregard the influence of their peers against the subject.
- ii) Mathematics involves building of concepts. Therefore it is important for the girl student to have a good background in mathematics in primary schools and this will motivate them to aspire to pursue the subject at tertiary institutions.
- iii) The attitudes held by majority of the girls that mathematics is difficult needs to be changed. Teachers are the most important agents that can influence change in students' attitudes toward mathematics. Since they are with students often, they can easily guide and motivate the students often.
- iv) In order to improve girl's performance in mathematics, the learning facilities should be available and adequate. There's need for emphasis on the use of visual aids and other manipulative materials in order to make students actively involved in learning mathematics. These may include models, fractions, charts, dices and e.t.c. Teachers should also use the recommended textbooks in order to cover the syllabus appropriately.
- (v) Mathematics teachers need to be motivated and this will enable them to impact it to their students. A motivated mathematics teacher will encourage his/her students to develop self-confidence in themselves and the subject. The government needs to recruit more mathematics teachers so that there can be much interaction between the girls and their teachers for better performance.

- (vi) There's need to inspire many women who are joining tertiary institutions especially universities to pursue mathematics so that there can be many female teachers teaching mathematics. These will serve as good role models for the girl student.
- (vii) The parents, guardians and significant others to the girl child need to discard the stereotypes they have towards discouraging girls against mathematics. They need to leave the irrational believes because rational thoughts will lead to right actions.

5.5 Suggestions for Further Research

The study suggests the following areas for further research.

- a) Other studies to be undertaken on the same problem to include a larger population in order to ascertain whether the investigation shows similar results.

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APPENDICES

APPENDIX A: QUESTIONNAIRE FOR MATHEMATICS TEACHERS

Instructions :

This questionnaire is to secure information from mathematics teachers concerning the factors contributing to dismal performance in mathematics among secondary school girls in Borabu division Nyamira district. Please read the instructions for each question carefully before you give the required answers. Trust is placed on your honest supply of answers to the questions. All information given will be treated confidentially and will be used to improve performance in mathematics among secondary school girls.

SECTION A-General information of the mathematics teacher.

(a) Age

20-29yrs

30-35yrs

36-40yrs

Over 41yrs

(b) Experience as a teacher

1-5yrs

6-10yrs

Over 11 yrs

Q 1. Name of the school where you teach_____

Q 2 Category of the school (Tick (✓) one)

(a) Private_____

(b) Public_____

(c) Religious Run_____

Q3 Type of the school's social set up (Tick (✓) one)

(a) Boys only

(b) Girls only

(c) Mixed school

Q4. Which one of the following grades indicated your highest academic and professional qualifications? (Tick (✓) one)

(a) B.E.D./ ARTS

(b) BSC/BA

(c) Technical Teacher

(d) D.P. Ed/S1

(e) K.A.C.E/ A – LEVEL /UT

Q5. How many mathematics lessons do you teach per week? Number_____

Q6. How many lessons in total do you teach per week? Number_____

Q7. Please indicate the frequency you mark student's mathematical work and give them feedback. Tick (✓) one.

(a) Two times per week_____

(b) Once a week_____

(c) Once in two weeks_____

(d) Once a month_____

(e) Others (specify)_____

Q 8. Please indicate the number of pupils in single class in each grade level of the school where you teach mathematics. Check on the appropriate columns.

Number of pupils per class <25 26 – 35 36 – 45 46 – 55 Over 55

Form I

Form II

Form III

Form IV

SECTION B

Instructions: select only one response for each statement and circle the letter beside the selected response.

- Strongly Disagree SA
- Disagree D
- Undecided U
- Agree A
- Strongly Agree SA

	Questions	SA	A	U	D	SD
9)	Learning mathematics is frustrating to the girls I teach.					
10)	Girl students like teachers' prompt marking of mathematics test and giving results in good time.					
11)	The girls students that I teach mathematics do not seem to understand that mathematics gives them opportunities to personal advancement.					
12)	The girl students that I teach hardly practice solving mathematical problems on their own unless they are asked to do so.					
13)	Praise of girls by mathematics teachers for good performance increases their desire to perform better.					
14)	The girl students that I teach mathematics seem to enjoy its lessons					
15)	Girls students think that the comments they get from their teachers on their mathematics performance is useful.					
16)	The girl students that I teach mathematics would hardly like a career that requires mathematics.					
17)	Poor performance in mathematics examination may be due to lack of teaching/ learning materials					
18)	The girls that I teach discourage one another from studying mathematics?					

Q19. How do girls students perform in mathematics?

- (1) Very well (2) well (3) undecided (4) poor (5) very poor

Q 20. In your assessment as a mathematics teacher, is the society around the school encouraging the girls that you teach to study mathematics?

- (1) Very encouraging (2) encouraging (3) slightly encouraging (4) not encouraging

Q22. To what extent do you think are the parents of the girls that you teach supportive to them in learning mathematics?

- (1) Very supportive (2) Supportive (3) Slightly supportive (4) not supportive at all.

Q23. How often do you give mathematics continuous assessment tests?

- (1) Weekly (2) monthly (3) after every topic (4) other (specify)

Q24. How many mathematics textbooks are available for each class?

Form I _____ Form II _____ Form III _____ Form IV _____

Q25. Are there other reference books in mathematics?

Yes [] No. []

Q26. What problem do you get when teaching mathematics?

Q27. How do you solve them?

Q28. In your opinion, why do you think girls do poor in mathematics?

Q29. What are your suggestions for improvement?

Q30. Your gender (check one)

Male [] Female []

End of Questionnaire

APPENDIX B

QUESTIONNAIRE FOR SECONDARY SCHOOL STUDENTS.

Instructions:

This questionnaire has questions on learning and teaching mathematics in secondary schools.

Please read the instructions for each question carefully before you give the required answers.

Trust is placed on your honest supply of answers to the questions. All information you will supply will be treated confidentially.

SECTION A: General information of the students.

a) FORM

Form 1

Form 2

Form 3

Form 4

b) AGE RANGE

13-14 yrs

15-16yrs

17-18yrs

19-20yrs

1) Name of your secondary school _____

2) Category of the secondary school. (tick one)

(a) public _____

(b) private _____

(c) Religious run _____

3) Type of school's social set – up (tick one)

(a) Girls only_____

(b) Co- educational_____

4) Your sex (check✓/one)

(a) Male_____

(b) Female_____

5) Please indicate the number of students in single class in each grade level of the school where you learn mathematics (check on the appropriate column)

Number of students per class <25 26 – 35 36 – 45 46 – 55 Over 55

Form I

Form II

Form III

Form IV

6) Teachers of mathematics often use the following materials and equipment in the teaching of mathematics. Indicate the extent to which they use them. Tick one in each appropriate column.

Key N/A not applicable because it is not available in my school for teaching mathematics.

5- Material/ equipment used in every mathematics lesson.

4- Material/ equipment used once in every week.

3- Material/ equipment used once every two weeks

2- Material/ equipment used once a month.

1- Material/ equipment used once in a school term

Level of use of materials / equipment NA 5 4 3 2 1

a) Chalk board

b) Charts

c) Mathematical models

d) Films

e) Mathematical text books

7) What is the extent of your assessment of your parents' encouragement to perform well in mathematics at school? Please tick (✓) one against the points you would award your parents.

(a) Not encouraging

(b) Slightly encouraging

(c) Fairly encouraging

(d) Encouraging

(e) Very encouraging

8) How often do you do continuous Assessment Tests in mathematics?

1) Often 2) Rarely 3) Never

9) Could you cite the following as some of the problems you face when learning mathematics?

1) Lack of guidance from teachers.

2) Interpretation of mathematical terminologies being difficult.

3) Inadequate learning resources and materials.

4) Criticism from teachers when answering wrongly or when asking questions that appear simple to them.

10) Would the following suggestions be a basis for improvement of mathematics in your school?

1) C.A.T's to be given after every topic covered.

2) More textbooks and other reference materials to be made available.

3) Use of discussion groups.

4) Mathematics be allocated more time in the timetable.

Instructions.

This questionnaire consists of statements aimed at showing the extent to which you agree with them. Indicate the letter that best describes your level of agreement.

KEY

SD - Strongly Disagree D - Disagree U- Undecided

A - Agree SA - Strongly Agree

	Questions	SA	A	U	D	SD
11)	Mathematics is my favorite subject.					
12)	Mathematics is the most interesting subject when learning. It is an exciting experience for me					
13)	Too much work at home does not enable me to solve mathematics problems.					
14)	I aspire to study mathematics after KCPE.					
15)	If mathematics is made optional I will drop it.					
16)	Learning mathematics is frustrating.					
17)	Learning mathematics gives me opportunities for personal advancement.					
18)	I practice solving mathematical problems on my own during holidays.					
19)	The hours I spend doing mathematics are the ones I enjoy most.					
20)	Mathematics course should be allocated more time.					
21)	My friends discourage me from pursuing mathematics.					
22)	My peers and I ask questions in mathematics lessons					
23)	My parents advice me to drop mathematics because they believe its boys who can tackle it.					
24)	Lack of mathematics textbooks discourages me from studying mathematics.					
25)	My peers and I find mathematics assignments to be easy and useful.					
26)	My parents and siblings encourage me to study mathematics.					
27)	I will prefer female teachers for mathematics.					
28)	I hate mathematics.					

29)	I like the way the female teacher teaches mathematics.					
30)	Mathematics reference books are readily available in my school library					
31)	I get confidence from teachers' comments and advice on my performance in mathematics.					
32)	We discuss mathematics problems in our study groups					

End of questionnaire

Thank you for your co-operation

APPENDIX C

QUESTIONNAIRE FOR HEAD TEACHERS

Instructions:

This questionnaire is to secure information from mathematics teachers concerning the factors contributing to dismal performance in mathematics among secondary school girls in Borabu division Nyamira district. Please read the instructions for each question carefully before you give the required answers. Trust is placed on your honest supply of answers to the questions. All information given will be treated confidentially and will be used to improve performance in mathematics among secondary school girls.

SECTION A: General information of head teachers

a) Age.

25-29yrs

30-35yrs

36-40yrs

Over 40 yrs

b) Experience as head teacher.

1-5yrs

6-10yrs

Over 11 yrs

1. How many students does your school have? _____

2. How many mathematics teachers do you have in your school? _____

3. How many female mathematics teachers do you have? _____

4 What are the levels of qualifications of these teachers? _____

5 Indicate the number of mathematics teachers with the following experiences

i) More than five years _____

ii) 2-5 years _____

iii) Below 5 years _____

Instructions.

This questionnaire consists of statements aimed at showing the extent to which you agree with them. Indicate the letter that best describes your level of agreement.

KEY

SD - Strongly Disagree D - Disagree U- Undecided

A - Agree SA - Strongly Agree

	Questions	SA	A	U	D	SD
6)	The girl student in my school discourages one another from studying mathematics					
7)	The society around the school where I teach supports girl's study of mathematics					
8)	The girl students in my school look forward to pursuing mathematical related courses.					
9)	Girl students in my school do not have sufficient time to solve mathematical problems because of the domestic chores at home.					
10)	The environment and society around the school where I teach discourages girl students from studying mathematics.					
11)	The girl students in my school spend time in solving mathematics problems					
12)	The presence of the female mathematics teacher in my school has encouraged the girl students in studying mathematics.					

13. Does the school have a mathematics exhibition or demonstration room? _____

14. If yes, how well equipped is it?

i) Well equipped ii) Adequately equipped iii) Poorly equipped

15. Do you have problems regarding the supply of duplicating papers required to produce examination questions for Continuous Assessment Tests (CATs)?

16. How do you go about these problems?

17. Do you find the B.O.G / P.T.A supportive when it comes to financing such purchases?

18. How often do your teachers give CATs?

Weekly Monthly After every topic other specify

19. Would you suggest that students buy textbooks individually or pay annual fees?

20. In your opinion, why do you think girl students perform poorly in mathematics?

21. What are the suggestions for improvement?

22. Are the parents or guardians to the girl student supportive to them especially in the achievement in mathematics?

End of questionnaire.

Thank you so much for your co-operation.