2019

The Impact of instructional, student related and demographic factors on performance in Mathematics in Bungoma West Sub-County: case of Kenya Certificate of Secondary Education (KCSE)

Francis E. Kituyi
School of Humanities and Social Sciences (SHSS)
Strathmore University

THE IMPACT OF INSTRUCTIONAL, STUDENT – RELATED AND DEMOGRAPHIC FACTORS ON PERFORMANCE IN MATHEMATICS IN BUNGOMA WEST SUB-COUNTY: CASE OF KENYA CERTIFICATE OF SECONDARY EDUCATION (KCSE)

KITUYI FRANCIS EXAVIER

Submitted in partial fulfilment of the requirements for the degree of Master of Science in Education Management at Strathmore University .

SCHOOL OF HUMANITIES AND SOCIAL SCIENCES

STRATHMORE UNIVERSITY

NAIROBI, KENYA

JUNE, 2019

Declaration

I declare that this work has not been previously submitted and approved for the award of a degree by this or any other University. To the best of my knowledge and believe, the dissertation contains no material previously published or written by another person except where due reference is made in the thesis itself.

Name: Kituyi Francis Exavier

Signature: .....

Date: 10TH JUNE, 2019.

Approval

The dissertation of Kituyi Francis Exavier was reviewed and approved by the following:

Dr. Vincent Omwenga (PhD).

Academic Director (Curriculum)

Faculty of Information Technology

Strathmore University

Professor Christine Gichure

Dean, School of Humanities and Social Sciences

Strathmore University

Professor Rurh Kiraka

Dean, School of Graduate Studies

Strathmore University

Abstract

The study was conducted to investigate the factors causing poor performance in Mathematics in KCSE examination in Bungoma West sub-county of Bungoma county and suggest strategies for improvement. The descriptive survey research design was used. The respondents for this study were categorized into four: The Sub County Quality Assurance and Standards Officer (SCQASO), principals, H.O.Ds of Mathematics and form four students. The SQASO provided the analysed of the county for comparison purposes – to show how Bungoma West performs in relation to the other sub counties in the county. The study included 10 principals of schools, 18 H.O.Ds of Mathematics and 82 form four students. These three groups of respondents were availed with questionnaires to gather data on the influence of instructional factors, student-related factors and demographic factors on performance in Mathematics. The results of the study were analysed using descriptive statistics and regression analysis was applied using the SPSS software to investigate the effect of the aforementioned factors on students' performance in Mathematics examinations. The analysis of the data revealed that the instructional approaches that were used in content delivery had no significant influence on good performance. The student-related factors such as negative attitude towards Mathematics and low motivational levels had a significant influence on good performance in Mathematics. The demographic factors that result to student absenteeism from school due to poor fees payment and non-provision of essential mathematical resources also had a significant influence on performance in Mathematics.

Table of Contents

List of figures

List of tables

List of abbreviations

ASEI - Activity, Student – centred, Improvisation and Experiment

CEMASTEA – Centre for Mathematics and Science Teacher

GOK – Government of Kenya

HOD –Head of Department

KCSE –Kenya Certificate of Secondary Education

KNBS - Kenya National Bureau of Statistics

KNEC – Kenya National Examination Council

KICD – Kenya Institute of Curriculum Development

KUCCPS – Kenya Universities and Colleges Central Placement Service

MOE – Ministry of Education

PDSI – Plan, Do, See and Improve

SCQASO – Sub County Quality Assurance and Standards Officer

SMASSE – Strengthening Mathematics and Science in Secondary Education

SPSS - Statistical Package for the Social Sciences

TSC – Teachers Service Commission

Acknowledgement

I wish to acknowledge the following people who participated in the process of writing this dissertation.

First I acknowledge the Almighty Father for granting me the physical health and mental strength to achieve this dissertation.

Secondly my heartfelt gratitude go to Dr. Vincent Omwenga, Dr. Alfred Kitawi and Dr. Magdalene Dimba of Strathmore University for their tireless guidance on writing this dissertation

Lastly I appreciate the support of my family members and colleagues of St Monica, Bukokholo Girls' secondary school who individually and collectively reignited my belief.

May God bless you all.

CHAPTER ONE
INTRODUCTION

1.1 Introduction to the study

Performance measurement and management of public services has been on the rise across many countries in recent years. It is widely perceived to have started around the late 1980s or early 1990s, but in fact, discussions about various aspects of performance go back beyond that period (Talbot, 2013). There are theoretical, empirical and practical reasons why this subject will not go away, and while it may wax and wane, it is certain to always return to the centre stage in academics and policy circles from time to time for the same reasons. For instance, many aspects of education system in Kenya are performance – based, such as promotion of teachers to higher job groups and placement of students to various courses in universities and colleges by KUCCPS.

According to Elger, (2006), to perform is to take a complex series of actions that integrate skills and knowledge to produce valuable results. He views a performer as an individual or a collection of people who collaborate to achieve valuable results. Also, he likens performance to a journey, not a destination and equates the level of performance to a location in the journey. He finally points out that, the performance of a system depends on the components of the system and on the interactions between these components.

Performance in mathematics by students should therefore aim at achieving valuable results from tests and examinations. Tests are administered at regular intervals to evaluate short term attainment of concepts while examinations are administered at the end of the term or the year. KCSE is administered at the end of the four - year course to summatively evaluate the entire mathematics syllabus by the Kenya National Examination Council (KNEC). From these results, Bungoma West sub – county was ranked last in the county among the 9 sub – counties of Bungoma county in the years 2014, 2015, 2016 and 2017 with mean scores of 2.269, 2.432, 1.712 and 2.176 respectively (Bungoma County Academic Committe, 2016)

1.2 Background to the study

Education and development are intertwined since education gives people the skills they need to help themselves out of poverty and into prosperity. This view is supported by Kishore, (2015) who asserts that education is central to poverty eradication strategies and achievement of global commitments for sustainable development. Consequently, many countries in the world invest heavily in education.. Besides investing resources heavily in education, many

countries have also put in place legal framework to ensure access and quality of education to their citizens. (Kishore, 2015) cites various examples of legal aspects in education. One such example is the Supreme Court ruling of the United States of America which emphatically declared that separate educational facilities for white and black children was inherently unequal. Another example is the Supreme Court of India which emphasised the philosophy of universal excellence through equality of opportunity for education. The constitutional court of Colombia in 1994 ruled that by excluding pupils on an economic basis, schools violet their right to education (Kishore, 2015).

Many African countries also put a lot of emphasis on education particularly Mathematics and science subjects as they aspire to advance in technology and innovation. Kiwanuka and Damme, (2015) In Uganda, as in most countries, Mathematics is one of the compulsory core subjects in primary and lower secondary level of education. This is intended to improve mathematical literacy and steer the country towards economic growth and development. In Kenya, education is widely recognized as key to national development. Since the attainment of political independence in 1963, the Government of Kenya has placed emphasis on the role of education in socio-economic and political development (Ministry of Education, 2010). In the recent past however, the issue of performance in examination has taken a centre stage in educational matters. This has led to some scholars to refer to the education system of Kenya as being "under siege" of the examinations, while others refer to the situation as "The exam trap." This concepts have developed from the emphasis that the stakeholders in education put on performance in examinations. These stakeholders include the government agencies such as Teachers Service Commission, Boards of Management of schools, the Ministry of Education, religious organisations, civil societies, parents and teachers.

The ministry of education in partnership with development partners have come in handy in order to address the issue of poor performance in Mathematics. One of such initiatives was the partnership between the Kenyan government and the Government of Japan through JICA, who jointly established the SMASSE project in July, 1998. The project was piloted in nine districts in the country. Later on, six other districts were included in the project in 2001 after the mid- term evaluation. Upon the end of phase 1 in May 2003, phase 2 was launched in August, 2004 in the entire country. The project was aimed at establishing In – Service Education and Training (INSET) centres in order to offer in- service programmes to serving

teachers. The INSETS were aimed at helping teachers to improve their instructional skills as well as attitudinal change for both teachers and students.

Improvement in instructional skills and attitudinal change ought to be supplemented with a "rich" and conducive learning environment in order to realise good performance. An ideal learning environment entails situations where learners optimally exploit their potential and abilities in class. One of the aspects of realising ideal learning environment is the development of child – friendly schools. Some of the areas to consider in making a school to be child- friendly are optimum class sizes, adequate resources and standard teachers' workload. According to Ministry of Education, (2010), large class sizes are common in many countries, and can be a barrier to the inclusion of children with diverse backgrounds and abilities. The manual outlines that in developed countries, class sizes of 30 are considered too large while in countries with limited resources, class sizes of 60 – 100 are common. Besides the class sizes, teachers' workload and inadequate resources also affect the students' performance.

From the theoretical point of view, education is seen as one of the flagship projects for driving the vision 2030 in the country as Kenya aspires to become an industrialized country. Education is perceived as one of the social pillars earmarked for making Kenya a newly industrialising, middle - income country providing high quality life for all its citizens. The flagship project to realising this vision is to exploit knowledge in Science, Technology and Innovation (STI) in order to function more efficiently, improve social welfare and promote democratic governance (Government of Kenya, 2007). This flagship project is aligned to one of the objectives of secondary education in Kenya which borders on building a firm foundation for technological and industrial development.

To achieve this feat, mathematics education plays a central role. According to the Ministry of Education, Mathematics aims at producing a person who will be numerate, orderly, logical, and precise in thought. The person should also be competent in appraising and utilising mathematical skills in playing a positive role in development of a modern society. To this end, two principle objectives are worth mentioning: Appreciate the role, value and use of Mathematics in the society and to acquire knowledge and skills for further education and training (Government of Kenya, 2005).

In order to acquire knowledge and skills in Mathematics, teachers need to use methods that enable learners to comprehend, analyse, synthesis, evaluate and make generalisations so as to solve mathematical problems (Government of Kenya, 2005). The methods that teachers use in class together with the education environmental factors and socio – economic factors have a profound effect on performance. These factors may lead to the barriers of learning, as outlined in the Ministry of Education manual, namely: interaction barriers, physical barriers and emotional barriers respectively.

Interaction barriers may arise from intimidative methodologies used by teachers which undermine the sex, cultural background or abilities of learners making them feel inferior, thus lowering their self – esteem. The physical barriers may include overcrowded classes arising from high enrolment, inadequate teaching and learning resources, high teacher workload, large class sizes and inadequate resources. Such conditions tend to "hide" the weak students and they may not participate actively in lessons. The emotional barriers may be caused by physiological changes and situations at home or society. Negative attitude acquired through peer pressure, absenteeism from school due to lack of school fees or social backgrounds can cause emotional instability which may affect their concentration in school. These barriers to learning affect students' performance in examinations.

In contextual perspective, Mathematics is examined in two papers, paper one and paper two. Each paper is marked out of 100 marks and the average score is graded. The lowest grade is E whose numerical value is 1 point, while the highest grade is A with 12 points. The average grade is C with an aggregate of 6 points. The composition of the two papers differs. Paper one constitutes mainly of form one and form two work, while paper two constitutes mainly of form three and form four work. These papers are intended to supplement each other in covering the entire Mathematics syllabus. However, the subject's mean score in the Kenya Certificate of Secondary Education examination remains below the average grade in spite of its fundamental role that it plays in students' transition from secondary education to college and university education (Oundo, 2013). The K.C.S.E Mathematics report also indicates that though Mathematics is a very important subject, its performance has generally remained low nationally. (KNEC, 2004) points out some of the causes of poor performance in Mathematics as inadequate use of teaching resources, poor syllabus coverage, and negative attitude towards Mathematics arising from its abstract nature, poor teaching methods and classroom climate.

The performance of students in Mathematics in Bungoma West sub-county has also been below average for a long period of time in comparison to other sub – counties in Bungoma County. Tables 1.1, 1.2, 1.3 and 1.4 show the performance in Mathematics in Bungoma County from 2014 to 2017.

Table1.1: Performance in Mathematics for 2014

Name	No.	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	E	MS	DEV
Mt. Elgon	733	17	11	14	20	28	20	50	45	57	125	222	144	3.425	-1.160
Bungoma South	2893	149	69	80	104	103	139	147	165	182	475	633	610	3.246	-0.981
Bumula	1828	37	20	31	35	43	75	72	95	107	280	501	532	2.830	-0.565
Cheptais	823	12	7	12	13	19	27	21	39	42	113	257	261	2.667	-0.402
Bungoma East	3447	35	37	70	55	70	112	112	175	185	498	842	1256	2.629	-0.364
Bungoma North	2703	40	39	42	52	68	78	86	125	121	362	692	1000	2.621	-0.356
Kimilili	2008	70	44	52	52	60	77	69	113	127	313	479	553	2.598	-0.333
Bungoma Central	2414	51	21	37	53	61	107	74	124	131	320	529	763	2.495	-0.230
Bungoma West	1435	13	16	14	12	25	36	35	48	71	209	431	535	2.265	

Source: Bungoma West Sub County Academic Committee

The table shows the performance in Mathematics of all the sub counties in Bungoma county for 2014. It indicates that Bungoma West sub county had the lowest mean score of 2.265. Further analysis indicates that Bungoma West sub – county had the lowest mean score since the deviations from the mean scores of the other sub – counties was negative.

Table 1.2: Performance in Mathematics for 2015

Name	No.	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	E	M.S	DEV
Cheptais	**916**	5	1	3	14	12	54	49	62	82	102	82	431	2.91	-1.10
Bungoma South	3311	31	21	45	58	69	195	134	156	228	266	375	1733	2.08	-0.27
Bungoma Central	2913	6	6	7	16	25	95	64	118	153	211	288	1924	2.05	-0.24
Kimilili	2247	9	4	9	9	15	78	90	133	167	209	245	1279	1.90	-0.09
Mt. Elgon	873	0	1	2	3	6	23	19	41	49	90	114	525	1.89	-0.08
Bungoma West	1764	7	5	17	14	28	46	64	75	95	333	542	543	1.81	
Bumula	2176	3	4	5	12	4	71	62	80	117	162	201	1455	1.79	0.02
Bugoma East	3652	6	8	7	19	21	75	64	89	183	244	317	2619	1.73	0.08
Bungoma North	2869	0	7	5	11	6	53	41	80	101	195	282	2088	1.62	0.19

Source: Bungoma West Sub County Academic Committee

The table shows the performance in Mathematics in all the sub counties of Bungoma County. Bungoma West registered a mean score of 1.81. This means score show that the sub county was position six out of nine. The analysis of the results also show that Bungoma West sub – county registered negative deviations against the mean scores of five sub – counties.

Table 1.3: Performance in Mathematics in 2016

Name	No.	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	E	M.S	DEV
Bungoma South	357	74	60	60	80	105	77	90	100	97	529	757	1549	2.138	-0.426
Bungoma Central	2988	28	31	30	40	49	46	66	57	48	365	591	1637	1.945	-0.233
Kimilili	2617	66	35	51	72	66	64	76	71	64	374	511	1167	1.939	-0.227
Cheptais	901	11	5	7	12	17	23	13	24	13	113	185	478	1.933	-0.221
Bumula	2249	25	16	14	22	28	33	26	47	50	248	479	1261	1.924	-0.212
Bungoma East	3870	26	26	29	36	49	53	81	76	81	478	825	2110	1.918	-0.206
Mt elgon	880	5	2	5	10	11	11	16	18	13	114	184	491	1.864	-0.152
Bungoma North	3509	29	27	21	31	13	39	51	50	45	350	736	2699	1.796	-0.084
Bungoma West	1853	9	11	13	17	23	16	28	20	34	213	383	1086	1.712	

Source: Bungoma West Sub County Academic Committee

In 2016, the mean score of Bungoma West was 1.712, which was the lowest in the county. The analysis also indicates that Bungoma West sub – county registered negative deviations against the mean scores of the other sub – counties.

Table 1.4: Performance in Mathematics for 2017

Name	No.	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	E	M.S	DEV
Mt. Elgon	1202	20	15	18	24	22	27	34	35	27	214	314	449	2.424	- 0.249
Bungoma South	4005	88	71	80	88	111	102	120	127	89	690	1029	1389	2.364	- 0.189
Bungoma central	3198	40	36	47	65	63	81	89	90	67	510	799	1309	2.321	- 0.146
Bumula	2593	28	17	26	39	49	42	66	57	51	417	727	1064	2.318	- 0.143
Bungoma East	1759	16	18	22	28	56	35	41	56	40	257	444	744	2.266	- 0.091
Kimilili	2802	85	66	66	76	92	79	83	107	84	410	588	1058	2.249	- 0.074
Bungoma North	3903	49	35	31	67	82	52	72	85	86	546	1010	1768	2.216	- 0.041
Cheptais	1125	10	13	15	19	24	17	24	20	22	188	308	460	2.212	- 0.037
Webuye West	2414	17	22	19	22	45	34	39	49	46	295	537	942	2.208	- 0.033
Bungoma West	2072	16	27	26	36	53	50	47	75	57	351	599	1069	2.175	

Source: Bungoma West Sub County Academic Committee

The table shows that Bungoma West sub – county attained a mean score of 2.175 which was the lowest among the mean scores of all the sub counties.The analysis shows that the Bungoma West sub – county registered negative deviations against the mean scores of the other sub – counties. The results for the four years clearly indicate that Bungoma West sub – county registered the lowest mean scores in the years 2014, 2016 and 2017. It was therefore ranked the last one in the county for these years.

Table 1.5 shows the grade distribution for Mathematics in KCSE examination for the period 2014 to 2017 in Bungoma West sub – county.

Table 1.5: Grade distribution for Mathematics in the Sub – County

Year	No.	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	E	M.S	M.G
2014	1435	13	16	14	12	25	36	35	48	71	209	431	529	2.269	D-
%		0.91	1.11	0.98	0.84	1.74	2.51	2.44	3.34	4.95	14.6	30.0	36.7		
2015	1764	7	5	17	14	28	46	64	75	95	333	542	543	2.432	D-
%		0.40	0.28	0.96	0.79	1.56	2.61	0.34	4.25	5.39	18.9	30.7	30.8		
2016	1853	9	11	13	17	23	16	28	20	34	213	383	1086	1.712	D-
%		0.49	0.59	0.70	0.92	1.24	0.86	1.51	1.08	1.83	11.5	20.7	58.6		
2017	2072	16	27	26	36	53	50	47	75	57	351	599	1069	2.176	D-
%		0.77	1.30	1.25	1.74	2.56	2.41	2.23	3.62	2.75	16.9	28.9	51.6		

Source: Bungoma West Sub County Academic Committee

The table indicates that the highest percentage of students scored the low grades of D- and E for the period 2014 to 2017. Of particular concern were the years 2016 and 2017 where more than half of the candidates scored grade E. It can also be inferred that for the four – year period, the percentage of students who scored the quality grade of A was below 1% of the total candidates, with the years 2015 and 2016 scoring below 0.5%.

The table therefore shows that the performance of students in Mathematics is very poor. This calls for thorough research to be done in order to identify the weak points in the system and suggest remedial measures for rectifying the trend so that students can enrol for high – end courses in universities and colleges. According to the regulations laid down by KUCCPS for university entry, a candidate must attain a minimum grade of C+ in KCSE examinations after being graded in seven subjects. Out of the seven subjects, Mathematics is one of the compulsory subjects besides English and Kiswahili. A poor score in Mathematics therefore affects the student's overall mean grade.

1.3 Problem statement

Performance in Mathematics in KCSE examinations in Bungoma West sub-county has remained relatively low for a long period of time. The mean score for Mathematics in the sub – county has hardly attained the mean mark of 6.0 which is the average score as per the KNEC grading system. This is evidenced from tables 1 and 2. The poor performance in Mathematics is a cause for worries and concern to students in particular since they miss out on competitive courses that demand for good performance in Mathematics. Andile, M. and Makgato, M. (2006) observe that the country is in need of suitably qualified teachers, doctors,

and many other scientifically oriented professionals. If the country is to participate in the technologically advancing global village therefore, it is necessary that research should inform policy and drive transformation to a mathematically and scientifically literate society.

Poor performance in Mathematics is also a concern to parents since they have to shoulder an extra cost of taking their children for university bridging courses before they enroll in the courses of their choice. Some students may wish to take certain courses that require good performance in Mathematics. However, such students cannot be enrolled in the courses of their choice if their results do not meet the minimum cluster points. To achieve their goal therefore, they go for university bridging courses where emphasis is laid on Mathematics. These courses are expensive and pose a challenge of fees payment to most parents. It is also a concern to teachers of Mathematics since promotion to the higher job groups is majorly pegged on students' performance, besides other factors.

The ministry of Education has deliberately made efforts to improve the teaching and learning of Mathematics in order to improve the performance (SMASSE, 1998). These measures include organizing workshops and seminars for teachers of Mathematics, improved remuneration for teachers of Mathematics, the SMASSE in – service programmes for teachers of Mathematics and science subjects, periodic review of the syllabus and re – structuring of examination papers. Despite these interventions, the performance in Mathematics in Bungoma West sub – county has remained low for a long period of time. This study therefore, seeks to determine empirically the pertinent factors which relate to instruction, individual students and demographic in nature that affect performance in Mathematics in Bungoma West sub – county and suggest measures that can be put in place to address the situation.

1.4.1 General Objective

The purpose of the study is to determine the factors affecting the performance in Mathematics in KCSE examination in Bungoma West sub – county, and suggest ways of changing the trend.

1.4.2 Specific Objectives

In order to address the concerns adequately the study is guided by the following specific objectives:

i) To investigate how instructional factors affect performance in Mathematics in Bungoma west sub-county.

ii) To investigate the individual student – related factors on performance in Mathematics in Bungoma West sub-county.

iii) To analyze the influence of the demographic factors on performance in Mathematics in Bungoma west sub-county.

1.5 Research Questions

In order to achieve the set objectives, the research was guided by three fundamental questions:-

i. How do instructional factors influence performance in Mathematics in Bungoma West sub-county?
ii. What is the relationship between the individual student – related factors on performance in Mathematics in Bungoma West sub – county?
iii. How do demographic factors influence performance in Mathematics in Bungoma West sub - county?

1.6 Scope of the study

Geographically, the study was conducted in Bungoma West sub-county of Bungoma County in western region of Kenya. The study area has 26 public secondary schools, classified as either extra –county or sub-county schools. The study involved 10 principals, 18 HODs of Mathematics and 82 form - four students. The study focused on performance in Mathematics in Bungoma West sub – county. The areas for study comprised of instructional factors, demographic factors and the individual student – related factors in relation to performance in Mathematics. The study confined itself to the instructional related factors such as methodology, teaching and learning resources, teachers' workload and departmental organization, the individual student – related factors, namely attitude, motivation and

absenteeism, and the demographic related factors bordering on socio – economic background and student: teacher ratio were explored.

1.7 Significance of the study

Performance in Mathematics ought to be good because of its importance in the school curriculum. It is an important pre-requisite for vocational training and critical filter for career choices. At personal level, mathematical skills help individuals to lead responsible lives. It is therefore crucial for students to enjoy and succeed in learning Mathematics in schools. Yet despite this realization many students continue to perform poorly. The recurring poor performance in Mathematics in the sub-county therefore calls for concerted efforts on measures that will help to improve its performance. One important element in an endeavour to find solutions to the problem of poor performance by the learners is to undertake investigations that will help to inform stakeholders, teachers, parents, sponsors and the Ministry of Education. Research on why most students perform poorly is important because it helps to identify the problem that needs to be resolved.

It is therefore anticipated that the findings and recommendations of the study would go a long way in generating the much needed information that would be used by various stakeholders, teachers and students in particular to improve the performance in Mathematics in the sub-county. Other than that, the findings will also add to the existing body of knowledge and act as a gate-way for later researchers in similar studies within and outside Bungoma West sub-county. Therefore, the significance of this study can best be summarised by (Talbot, C., 2013) who observes that there is a simple practical reason why interest in effectiveness or performance would not go away – all organizations, public and private are there for a purpose and those with an interest in these purposes are always going to ask of how well they are doing.

1.8 Limitations

The study was limited to one sub – county in Bungoma county. Within the sub – county, the study was limited to four categories of respondents, namely, SCQASO, principals, HODS of Mathematics and form four students for ease of data collection and analysis. The study was limited to form four students for two reasons. The first reason was that these students had

interacted with the curriculum longer than the students in the lower classes and therefore could give more reliable information to the study. The second reason was that these students were candidates for the KCSE examination which forms the basis for the study.

1.9 Assumptions

The assumptions of the study were that all respondents could cooperate and give their responses in the questionnaires and interviews. However, 18 students did not hand in their questionnaires and no reason was given for that. The second assumption was that the KICD syllabus was used in curriculum implementation.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter examines the theoretical and conceptual frameworks of the study. The theoretical framework delves into the theory of Educational Productivity, and thereafter the review of the related literature. The conceptual framework then operationalizes the variables under study.

2.2 Theoretical Framework

The study is anchored on the Theory of Educational Productivity. This theory was advanced by Walberg in 1981. The theory postulates that classroom learning is a multiplicative, diminishing – returns function of four essential factors – student ability and motivation, and quality and quantity of instruction – and possibly four supplementary or supportive factors – the social psychological environment of the classroom, education – stimulating conditions in the home and peer group, and exposure to mass media (McGrew, 2007). This theory points to the fact that performance is a product of an interplay of factors that impact on the learning process. Elger, (2006) supports this view by postulating that to perform is to produce valued results, while a performer can be an individual or a group of people engaging in a collaborative effort. This view is in tandem with the education system of Kenya where emphasis is laid on good performance in examinations by the various stakeholders. Good results are usually measured against the student's individual effort or collaborative effort between the teachers, parents and the school community.

Various studies have been conducted by different scholars in support of Walberg's theory. One such study was conducted by Wang, et al. (1977) cited in (McGrew, 2007) who identified 28 categories of learning influence. They noted that of the 11 most influential domains of variables, 8 involved social – emotional influences: classroom management, parental support, student-teacher interaction, social – behavioral attributes, motivational – effective attributes, peer pressure, school culture and classroom management. Another study that supports this theory was conducted by Zins, et al. (2004) cited in McGrew, (2007) who demonstrated the importance of the domain of motivational orientations, self – regulated learning strategies, and social or interpersonal abilities in facilitating academic performance.

They advocated for a social – emotional learning program which outlines the learner characteristics that are at the center stage in academic performance. These findings were echoed by the research review of Wang who targeted student learning characteristics.

A study by Hartel, et al, (1993) as cited in McGrew, (2007) organized the relevant school learning knowledge base into major construct domains and attempted to establish the relative importance in 228 variables in predicting academic domains. Using a variety of methods, the researchers concluded that psychological, instructional and home environmental characteristics have a more significant impact on achievement than other variables. Nonetheless, McGrew, (2007) asserts that Walberg's theory of educational productivity is one of the few empirically tested theories of school learning and is based on the review and integration of over 3000 studies.

Besides this theory, schools as organizations are also directly influenced by the theories of performance that apply to all organizations. Elger, (2006) views performance as a journey, and he uses three axioms to suggest performance improvement. These are the performer's mindset, immersion in an enriching environment and engaging in a reflective practice. His views are in line with the three factors under this study. The performer's mindset relates to the individual student – related factors that affect his or her performance in Mathematics. The learning environment encompasses the classroom environment and the instructional approaches that teachers use to disseminate the content. Smith (1996) supports this view by pointing out that the dominant modes of describing and managing education are today coached in the productive form. He observes that education is most often seen as a technical exercise where objectives are set, a plan drawn up then applied and the outcome (product) measured. His ideas correlate to the education system of Kenya where The Kenya Institute of Curriculum Development (KICD) outlines the content and the intended objectives to be achieved. The content is then disseminated by teachers to the learners. To achieve the set objectives, teachers plan on how to deliver the content by drawing schemes of work and lesson plans. Periodically, the learners are examined to measure the desired outcomes. KNEC also subjects learners to examinations at end of the four – year course to evaluate the content covered by the learners to determine the desired outcomes.

Redman and Wilkinson, (2006) view performance as a function of ability, motivation and opportunity. They argue that people perform well when they possess the necessary knowledge and skills, have the motivation to do so and their work environment provides the

necessary support and avenues for expression. These three functions are in line with the factors under study in the sense that teachers are ought to use instructional approaches that will enable learners to acquire mathematical knowledge and skills that will enable them to perform well in national examinations. Good performance is also highly influenced by motivation. Motivation refers to forces that energize, direct and sustain a person's effort (Thomas and Scott, 2011). Motivation plays a key role in the influence of the individual student related factors on performance. The demographic related factors are linked to the work environment that provides the necessary support and avenues for good performance.

Good performance is fundamental to organizations. Organizations measure performance in some way through the core principles for which they are established. Schools as organizations also measure their performance through the examination that students sit for at the end of a given period, either summative or formative assessments. One of the key indicators of good performance in schools is through the summative assessment of students at the end of their course in secondary school through KCSE examination. This examination is used as the criteria by the KUCCPS to place students in universities and colleges to undertake various courses. The integral part in the placement of students is the performance in Mathematics in KCSE examination.

For schools to realize good performance in Mathematics it is imperative to understand why performance measurement is important. Performance measurement plays an important role in identifying and tracking progress against organizational goals, identifying opportunities for improvement and comparing performance against both internal and external standards. This objective squarely falls in the functions of schools as social organizations that promote education in the society. For schools to realize this feat, they constantly have to evaluate their goals against their performance especially in national examinations.

Reviewing the performance of an organization is also an important step when formulating the direction of the strategic activities. It is important to know where the strengths and weaknesses of the organization lie and as part of the "Plan – Do – Check - Act" cycle, measurement plays a key role in quality and productivity improvement activities. For schools to realize good performance in mathematics, therefore a thorough analysis of their strengths and weaknesses needs to be undertaken in order to determine the areas for priority attention. The study therefore undertakes to determine the instructional factors, individual student –

related factors and demographic factors that affect performance. On the basis of this theory therefore, the study is set to determine the factors that contribute to poor performance in Mathematics in KCSE examination arising from dissemination of the curriculum.

2.3 Related literature

Several studies have been conducted on the performance in Mathematics worldwide. These are necessitated by the concern in the performance in Mathematics by students in relation to the role that the subject plays in society. Aja and Eze, (2013) assert that the importance of quality secondary education cannot be over – emphasized considering the fact that secondary schools supply the bulk of workers in both public and private service in any society as well as feed all the institutions of higher learning. This section therefore examines the literature relating to instructional related factors, individual student related factors and the demographic related factors.

2.3.1 Instructional Related Factors

Teachers are important agents that can influence change in students' performance in Mathematics since they are in contact with students most of the time. The methods that teachers use in content delivery can influence the performance of students in examinations. (Mutie and Ndambuki, (1999) observe that teaching from the known to unknown guides the student to develop interest in learning because daily experiences are incorporated into learning. Learning also becomes enjoyable and thematic when interesting teaching methods are used. Therefore, a highly motivated student would develop the ability to plan for his or her time most gainfully resulting in good working habits and performance in Mathematics.

Various methods can be used to teach Mathematics. These include the lecture method, teacher demonstrations, student experiments, project work, field work, discussions, simulations and skits. The method used is determined by various factors that include the content to be taught, the objectives to be achieved, availability of resources, individual learners and evaluation and follow-up activities (Tapia, 2011b). However, Tapia, (2011b) points out that success or failure in Mathematics performance is greatly determined by personal believes. Regardless of the teaching method used, students are likely to exert effort, according to the effects they anticipate, which is regulated by believes about their abilities,

the importance they attach to Mathematics, enjoyment of the subject matter and the motivation to succeed.

Good performance in Mathematics needs a good and firm foundation. Learners need to master basic skills in order to understand the high order thinking skills. Loveless, (2003) outlines the importance of basic skills in Mathematics. He espouses that basic skills are necessary to advance. According to him, they are a floor, not a ceiling. Besides the basic skills, it is worth noting that Mathematical concepts are spiral in nature. This is to say that some concepts covered in form one and two syllabi lay a foundation for high order thinking concepts in forms three and four. Therefore if students fail to master those concepts as a result of poor instructional methods, then they will face challenges in mastering concepts in higher classes. This leads to poor performance, as alluded to by the (KNEC, 2004).

The teaching – learning resources play an important role in enhancing the acquisition of abstract and complex concepts which affect performance. In their study on factors contributing to poor performance in Mathematics in KCSE: a case of Baringo county, Mbugua, et al. (2012) identified inadequate teaching and learning resources as one of the factors that cause poor performance in Mathematics. They found out that the major teaching – learning resources for Mathematics in secondary schools were text books, geometrical sets, coloured chalk, Mathematics models and charts. Among these resources, text books were the major input for performance in examination. This view is supported by the findings of another study conducted by Mwendwa, (2013) on factors contributing to students' poor performance in Mathematics in public secondary schools in Tharaka South district. Their findings indicate that inadequate revision materials is one of the factors that cause poor performance in Mathematics.

Teachers can use various resources to assist students comprehend the abstract concepts that would otherwise appear a mirage to them. The resources can be commercially acquired (purchased) or improvised from locally available materials. The ASEI/PDSI approach of the SMASSE project encourages teachers to improvise the teaching – learning resources that cannot be easily purchased. However, availability of resources may not cause great impact if they are not utilized optimally. Departmental organization also plays an important role in the achievement of the goals of an organization. Amitai, (2007) defines an organization as social units or human groupings deliberately constructed and reconstructed to seek specific goals. In

the broad sense of the term, it can be deduced that schools are organizations which have explicit goals to achieve in society. One of the methods which schools employ to achieve the goals is setting up of departments.

The role of proper departmental organization in the achievement of the set objectives cannot be overemphasized. This onus lies on the leadership qualities and management models employed by the head of the department. In his research paper on the role of the head of department in secondary schools of Kakamega East district, Atebe, (2009) shows the importance of school departmental organization and its contribution to the classroom instruction which affects performance.

These responsibilities, among many others if effectively executed will contribute to good performance in Mathematics. However, the leadership and management models that the head of department employs may have a profound effect on performance. Bush, (2011) outlines that leadership and management are practical activities that determine the vision, articulate the aims, allocate the resources and evaluate the effectiveness of the organisation or department. Hammond, (1998) observes that the role of the head of department is not limited to management of resources only but rather to people as well. He explains that heads of department play a key role in monitoring, supporting and motivating other teachers of the department as well as setting targets for professional development and improvement. This is achieved through proper layout of policies and programmes for the department.

2.3.2 Individual Student Related Factors

The factors that affect performance in Mathematics may vary from one group of students to the other. One of the most common factors is attitude. The role that attitude plays towards performance in a particular subject cannot be underestimated. (Zan and Martino, (2009) define attitude as the positive or negative degree of affect associated with a certain subject. They outline three components of attitude as emotional responses, believes regarding the subject and behavior related to the subject. Umar, (2014) in their study on the causes of poor performance among public senior secondary school students in Azare Metropolis of Bauchi state, Nigeria point out that negative attitude is one of the causes of poor performance in Mathematics. In their study on modeling factors influencing Mathematics learning and performance in Tanzania secondary schools, Kisakali and Kuznetsov, (2015) put the concept

of attitude in a broader perspective. They point out that lack of interest while studying Mathematics, triviality and lack of practice by students, lack of self - drive and enthusiasm for teachers and students, perception and attitude towards the subject terming it to be difficult and lack of qualified teachers lead to poor performance. Positive attitude enhances the learning process while negative attitude embeds learning which has a profound effect on performance.

It is worth mentioning that student motivation is an essential element that is necessary for quality education. Basically very little, if any learning can occur unless students are motivated on a consistent basis. Condron, (2011) points out that students who are not motivated will not learn effectively. They won't retain information, they won't participate and some of them may even become disruptive. While motivating students can be a difficult task, the rewards are more than worth it. Motivated students are more excited to learn and participate in lessons. Teaching a class full of motivated students is enjoyable for teacher and student alike. In support of this view, Irvin, et al. (2007) point out, "motivation and engagement are critical for adolescent readers. If readers are not motivated to read, research shows that they will simply not benefit from reading instruction." In other words, students will take on the task of learning how to read and write better only if they have sufficiently compelling reasons for doing so.

2.3.3 Demographic Related Factors

Various studies have been carried out on the impact of socio – economic status on performance of students in examinations. Farooq, et al. (2011) in their study on factors influencing the academic performance of students in a metropolitan city in Pakistan argue that the socio – economic status is one of the most researched and debated factor among educational professionals that contribute towards the academic performance of students. He points out that low socio – economic status has a negative effect on the academic performance of students since their basic needs remain unfulfilled and hence they do not perform better academically. In addition, the low socio – economic status causes environmental deficiencies which result in low self – esteem of students.

Kiwanuka and Damme, (2015) found out that students from higher socio – economic status families in Central Uganda tend to achieve significantly better in Mathematics than those from lower socio – economic families. This can be realized through payment for extra tuition,

buying textbooks, encouragement to work hard, involvement in activities such as in PTA meetings, helping with homework and counselling. They conclude that illiteracy and poverty need to be overcome so as to have parents involved in children's' education. However, Heyneman and Loxley, (1983) argue that in low income countries, socio – economic status makes little difference in academic performance.

Students from well – off families are less interfered with in terms of being send away due to poor fees payment. Such students have the advantage of attending lessons with very minimum or no interruptions arising from poor fees payment. On the contrary, students from families with poor economic backgrounds face the challenge of absenteeism from class due to poor fees payment. The major drawback to such students is inconsistency in syllabus coverage that leads to gaps in content and concept acquisition. These gaps have a profound effect on academic performance in examinations.

The student – teacher ratio affects the learning process which impacts on performance. The optimum student – teacher ratio ought to be realised in order to improve performance in Mathematics. Ijaiya, (1998) cited in Aja and Eze, (2013) assert that improving the quality of the teaching force in schools is seen as the key to raising the students' achievement. This fact points to the view that low student – teacher ratio in any educative process cannot be under – estimated. In support of this view, Wanyonyi, (2013) found that schools with low student – teacher ratio had better performance than those with high student – teacher ratio. A low student – teacher ratio enables teachers to understand each student's individual differences thereby enabling them to address the student's weaknesses. This helps them to improve in their performance in examinations.

In his study on pupil – teacher ratio and its impact on academic performance in primary schools in Central Division, Machakos County, (Kaloki, (2012) observes that high pupil: teacher ratio affects performance. His study revealed that high pupil – teacher ratio limits the classroom interaction activities between students and teachers, since teachers resort to the traditional lecture method and pay little attention to the learners' individual differences.

Sinyolo, (2007) observes that Kenya has had one of the lowest student – teacher ratios in Africa. However, this scenario changed drastically due to paradigm shift in the employment of teachers by TSC and the introduction of Free Primary Education (FPE) and Free Day Secondary Education (FDSE) by the government. As a result of the ballooning public wage bill, the government was pressurised by IMF and the World Bank to stop employing more

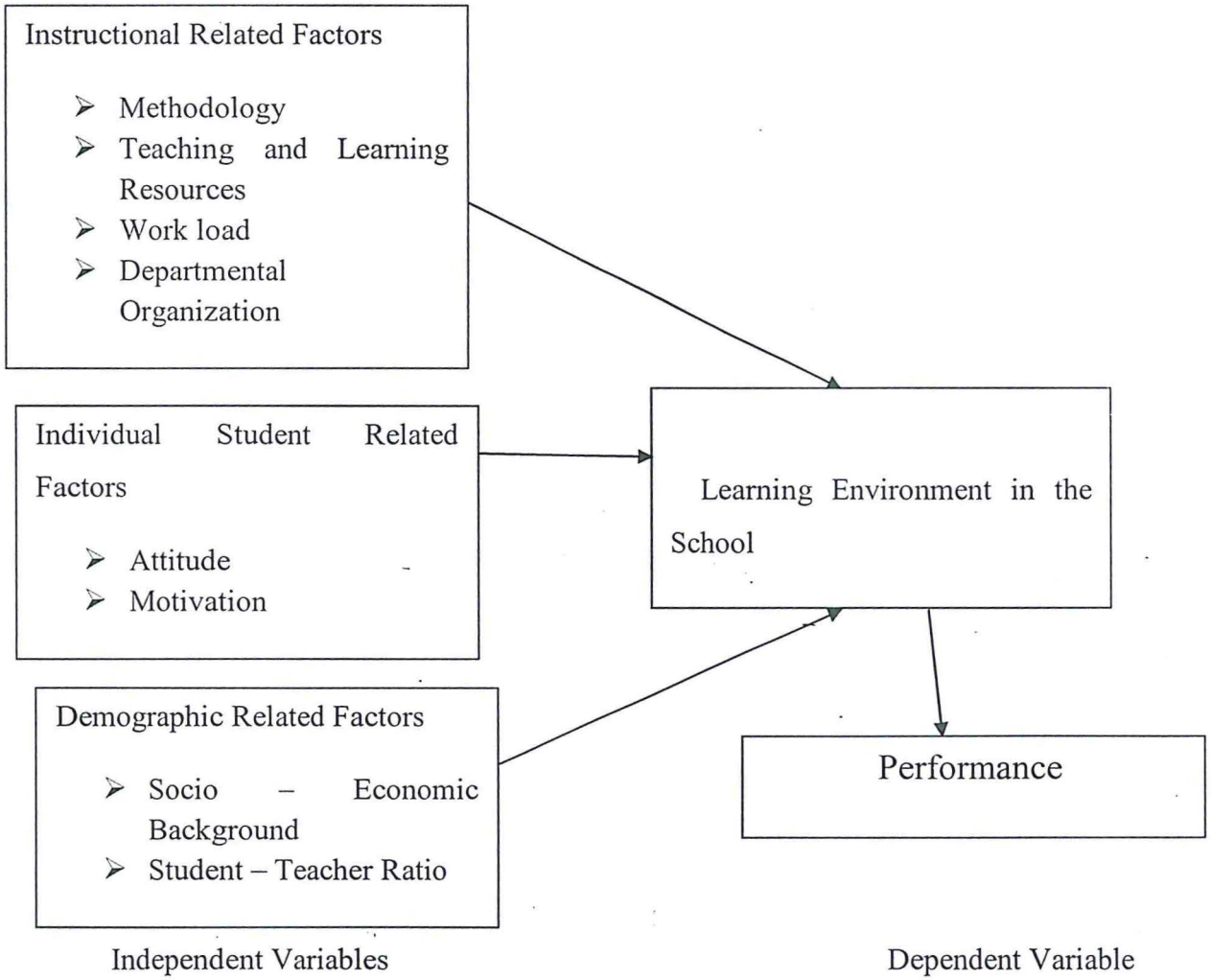
teachers. This forced the government, through the TSC to resort to replacing the teachers who left the service through natural attrition only. Compounded with the introduction of FPE and FDSE, the student: teacher ratio increased tremendously.

The school environment ought to be learner friendly in order to enhance learning. The environment includes both physical and suitable technological environment and workable school policies and programs. These promote human dignity and as a result social environment. The physical environment that promotes learning of mathematics includes clean and habitable classrooms, availability of teaching – learning resources, such as text books, revision materials, enhance self – confidence in the students.

These studies give an overview of the factors affecting performance in Mathematics. The key factors identified can broadly be classified as individual student – related, instructional related and demographic related factors. It is critical therefore to have in depth study and analysis of these factors in Bungoma West sub – county in order to come up with home grown solutions to alleviate the problem of poor performance in Mathematics.

2.4 Conceptual Framework

Figure 2.1: Provides a conceptual framework relating the variables in the study



The study was concerned with investigating the factors affecting the performance in Mathematics in Bungoma West Sub - county. From the literature review, the instructional related factors, individual student related factors and the demographic related factors education were identified as the independent variables and performance as independent variable. (CEMASTEA, 2004) identified the following methods for teaching Mathematics: lecture method, teacher demonstrations, student experiments, project work, field work, group discussions, simulations and skits. Questionnaires for Mathematics HODs was used to determine the preferred teaching methods. The Linkert scale was then used to determine the most preferred method of teaching. The questionnaires for HODs of Mathematics and students were used to collect data on the availability and adequacy of the teaching and

learning resources. The ordinal scale was used, then the regression analysis was done to determine their impact on the teaching and learning process which affects performance in examinations.

The questionnaires for HODs of Mathematics were also used to collect data on teachers' work load. The ordinal scale was used then regression analysis applied to determine the impact of the teachers' work load on performance in examinations. These questionnaires were also used to collect data on departmental organization in various schools. The Linkert scale was used, then regression analysis was applied to investigate the impact of policies and programs in schools on performance in examinations. The students' questionnaire was majorly used to collect data on students' attitude and motivational level in Mathematics. The Linkert scale was used to show their levels, then regression analysis was done to determine their influence on performance in examinations. Interviews for principals were used to collect data on socio – economic background of students and the student: teacher ratio. The Linkert scale was used, then regression analysis was carried out to determine their impact on performance in Mathematics. Table 2.1 gives a summary of the way in which the study variables were measured.

Table 2.1: Operationalization of the variables.

Type of Variable	Variable	Operational Definitions	Measurement Indicator	Measurement Scale	Source
Dependent variable	Performance	To perform is to produce valued results	High marks in exams High mean scores High mean grades	Five point Linkert scale - SD - D - NS - A - SA	Elger,(2006) KNEC (2001)
Independent variable	Instructional related factors	The teaching methods and approaches used by teachers to disseminate mathematical knowledge and skills to learners	• Methodology • Teaching and learning resources • Work load • Departmental organization	Five point Linkert scale - SD - D - NS - A - SA	(Mutie and Ndambuki, (1999) Loveless, (2003) Tapia, (2011) Amitai, (2007)
Independent variable	Individual student - related factors	The attributes exhibited by individual learners in the learning process that affect their performance.	• Attitude • Motivation • Absenteeism	Five point Linkert scale - SD - D - NS - A - SA	Zan, and Martino,, (2009) Kisakali, and Kuznetsov, (2015)
Independent variable	Demographic related factors	The human environmental factors that have an impact on students' learning process and performance in examinations.	• Socio- economic background • Student: Teacher ratio	Five point Linkert scale - SD - D - NS - A - SA	Farooq, et al., (2011) Kiwanuka, and Damme, (2015) Aja and Eze, (2013)

Key: SD – Strongly Disagree, D – Disagree, NS – Not Sure, A – Agree , SA - Strongly Agree

The table shows the dependent variable (performance) and the three independent variables, namely the instructional related factors, the individual student related factors and the demographic related factors. A brief operational definition of each variable is given.

Performance – To perform is to produce valued results in KCSE examination. The measurement indicators for good performance are high marks in examinations, high school mean scores and mean grades. These are evidenced from descriptive statistics in schools.

Instructional related factors – These are the teaching methods and approaches used by teachers to disseminate mathematical knowledge and skills to learners. The measurement indicators are the teaching and learning methods, resources, teachers' work load and departmental organization. This indicators were subjected to Linkert scale during data collection.

Individual student related factors – These are the attributes exhibited by the individual learners in the learning process that affect their performance in examinations. The measurement indicators are attitude towards Mathematics and motivational levels in the subject. During data collection, the Linkert scale was used.

The demographic related factors – Are the human environmental factors that have an impact on the students' learning process and performance in examinations. Two measurement indicators were considered: the socio – economic background of students and the student: teacher ratio. The Linkert scale was used in data collection.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter outlines the research methodology that was used to get the relevant data on factors determining students' performance in Mathematics in KCSE examination. It is worth mentioning that a good research depends on the appropriate methodology applied in data collection. This chapter therefore outlines the research design, population and sampling, data collection methods, data analysis, validity of the instruments and reliability of the instruments.

3.2 The Research Design.

There are two main fundamental questions in research, what is going on and why is it going on. These questions fall under descriptive and explanatory research respectively. This study applied the descriptive survey research design. According to (Kothari, 2013), descriptive research studies are those studies which are concerned with describing the characteristics of an individual or a group of people. This design is helpful in describing the factors and characteristics concerning individuals, group or situation. Since the study was concerned with finding the factors contributing to poor performance in Mathematics in Bungoma West sub county, this design was deemed to be the most suitable.

To effectively carry out the research, the mixed research design was also used. This design combines both qualitative and quantitative approaches to best understand and explain a research problem. The qualitative design is mainly used to describe experiences. In this study, it was mainly applied in data collection since the study was concerned with determining factors contributing to poor performance in Mathematics. It was therefore mainly used in data collection. The quantitative design was mainly used to examine the relationship between the dependent and independent variables. It was therefore handy in data analysis and presentation.

3.3: Population

The Sub- County has a total of twenty six secondary school, classified as extra--county and Sub-County schools. There are four extra – county schools of which three are boys' schools and a girls' school. Among the remaining twenty two schools four of them are single - sex schools, three are girls' schools and a boys' school, while the rest are mixed schools. Besides gender, the sub – county schools can be classified as day or boarding schools. To this end there are ten boarding schools and twelve day schools. The study was therefore set to involve 10 head teachers and Mathematics HODs, but sampling was done for the students.

3.4 Sampling

With regards to status, gender and type of school, probability sampling was used. Under this, stratified and cluster sampling techniques were employed. Two schools were selected among the four extra – county schools, 1 boys' school and 1 girls' school. 2 schools were selected among the single - sex sub –county boarding schools – 1 boys' school and 1 girls' school. Then 6 schools among the mixed day schools were selected. After identifying the schools for the study, cluster sampling was done by selecting 10 form four students from each school to take part in the study.

3.4: Data Collection methods

There are six widely used data collection instruments in quantitative and qualitative research. These are questionnaires, interviews, observation, focus group discussion, content analysis and tests. Out of these instruments, the research mainly applied questionnaires, interviews and content analysis methods for data collection. Both primary and secondary data were collected. Questionnaires and interviews were used to collect primary data while content analysis was used to collect secondary data.

Questionnaires are widely used in both qualitative and quantitative research designs because they are easy to process and analyse data. For this study, the questionnaires were structured, though the tail – end section was unstructured to allow respondents give their own views on the key socio - economic factors affecting performance in Mathematics. The checklist and Likert type of questions were used for ease of response and analysis. The questionnaires were administered to Mathematics HODs and students.

Interviews were used to collect data from head teachers because they had limited time due to office duties and responsibilities. Content analysis was used to collect data from SCQASO relating to analysis of results in the sub county. The analysed results were obtained from SCQASO's office mainly for comparison of results in the whole county.

3.6: Data Analysis

The qualitative data collected from the field using the structured closed - ended items for Mathematics H.O.Ds and students, as well as interview schedule for principals were tabulated. They were organized and presented in frequency distribution tables and percentages calculated which helped to show the distribution of respondents on the dependent variable. Besides the distribution tables, bar graphs and pie – charts were also used to present data. Qualitative analysis was then done to relate the identified factors to performance.

To determine the relationship between the dependent variable and the independent variables, multiple regression analysis was done using the SPSS software. According to (Amin, 2004), multiple regression analysis is an extension of simple linear regression and is concerned with the use of the values of several independent variables to predict the value of a single dependent variable. This method was deemed to be the most appropriate form of analysis since the study was concerned with multiple factors affecting performance in Mathematics in the sub – county.

3.6 Validity

The validity of the measuring instrument refers to the extent to which the instrument measures what it purports to measure (Amin, E. M., 2004). Therefore, construct validity was used to assess the validity of research instruments. Construct validity is a measure of the degree to which data obtained from an instrument meaningfully and accurately reflects or represents a theoretical framework (Mugenda, M.O. and Mugenda, G.A., 2003). The questionnaire and interview questions were subjected to scrutiny by the supervisor and his recommendations were used to finally formulate instruments that had the ability to obtain the expected relevant data for the study from the targeted respondents, namely school principals, Mathematics H.O.Ds and students.

3.7 Reliability

The reliability of a measuring instrument refers to the extent to which the instrument will produce consistent scores when the same group of individuals are repeatedly measured under the same conditions, (Amin, 2004). Therefore, the questionnaire was pre-tested in two schools to ensure their consistency and dependability to tap data that would achieve the objectives of the study. In this case, the questionnaire was administered and the scores recorded. A fortnight later, the questionnaire was administered to the same group to determine the consistence of the scores. The results showed that responses in the pre – test and the post – test were similar. The instruments were therefore deemed suitable for data collection.

3.8 Ethical Considerations

The purpose of the study was to determine factors that affect performance in Mathematics in Bungoma west sub – county: case of Kenya Certificate of Secondary Education. The information given by respondents therefore was treated with utmost confidentiality and used only for the purpose of the study. The researcher therefore given an introductory letter from the university which enabled him to apply for ethical clearance and permit to carry out research by The National Council for Science, Technology and Innovation. Other permits were also issued by the Ministry of Interior and National Coordination and The Ministry of Education at the sub county level.

CHAPTER FOUR

PRESENTATION OF RESEARCH FINDINGS AND ANALYSIS

4.1 Introduction

This chapter contains the respondents' feedback as presented in the questionnaires for Mathematics HODs and students, as well as the interview schedule for principals. An insight analysis and interpretation of the data is also presented.

4.2 Feedback on questionnaire for Mathematics H.O.DS.

The questionnaire was broadly divided into two sections: education environmental factors and pedagogical factors affecting performance in Mathematics. The first section of the questionnaire looked at the education environmental factors of teachers' qualification, teaching experience and work load, the class size, textbook: student ratio, and teaching and learning resources. The pedagogical factors considered included the consideration of learners' individual differences, use of different methods for solving questions, use of discovery method for learning, conducting remedial lessons, use of practical examples in teaching, offering assistance to students, implementation of policies and programmes, use of team – teaching and lesson observation.

4.2.1 Teachers' Qualification

Table 4.1 shows the level of teachers' qualification.

Table 4.1: Teachers' Qualification

		Level of Qualifications				
		Masters	Degree	Diploma	Untrained	Total
Gender	Male	1	9	3	0	13
	Female	0	4	0	1	5
Total		1	13	3	1	18

Table 4.1 illustrates that out of the 18 respondents, one respondent had a Masters degree, 13 respondents had degrees, 3 respondents had diplomas and one was untrained. This table

shows that 94.44% of the teachers were trained and a paltry 5.56% of the respondents were untrained.

4.2.2 Teaching experience

Table 4.2 shows the duration of teachers in the teaching profession.

Table 4. 2: Teaching experience

Duration	N	Frequency	Percentage
1 – 5	18	10	55.56
6 – 10	18	1	5.56
11 – 15	18	2	11.11
16 – 20	18	2	11.11
Above 20	18	3	16.67

Table 4.2 illustrates that the highest percentage of respondents had a short stint in the teaching profession. 55.56% of the respondents indicated that they had taught the subject for a period ranging from 1 to 5 years. 16.67% replied that they had taught for a long period of more than 20 years. The durations of 11 – 15 and 16- 20 years had 11.11% each, while the duration of 6 -10 years had 5.56%.

4.2.3: Teaching Load

Table 4.3 shows the total teaching load for teachers of Mathematics.

Table 4.3 : Total teaching load

Number of lessons	N	Frequency	Percentage
11 – 15	18	2	11.11
16 – 20	18	6	33.33
21 – 25	18	2	11.11
26 – 30	18	8	44.44

Table 4.3 shows that the highest percentage of respondents had lessons ranging between 26 and 30 per week with a percentage of 44.44%. Those with lessons ranging from 16 to 20 lessons per week had 33.33%, while those with 11 to 15, as well as those with 21 to 25 had 11.11% each. Apart from the teaching loads all respondents indicated that they had other responsibilities apart from teaching.

4.2.4. Class Size

Figure 4.1 shows the distribution of the class sizes.

Figure 4.1: Class Sizes

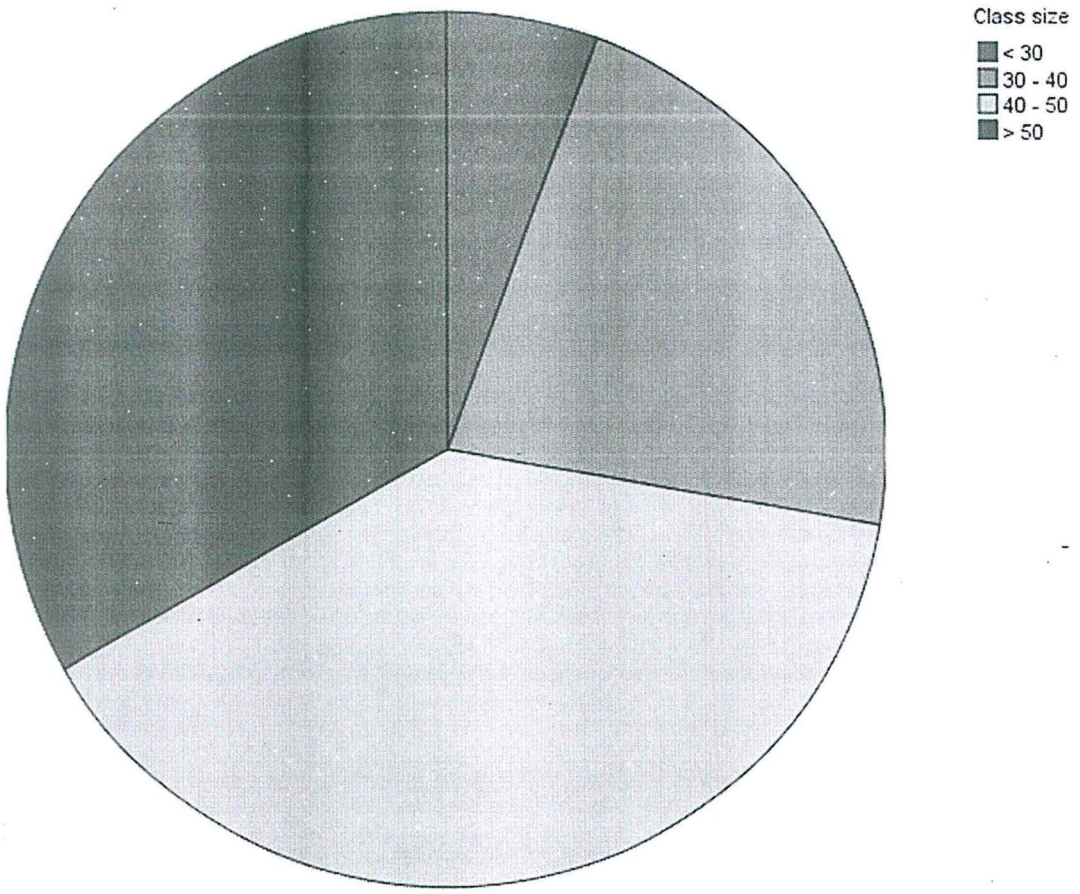


Figure 4.1 shows that the highest percentage of respondents had class sizes of 40 – 50. This was represented by 37.5%, while the class sizes with over 50 students per class had 33.3%. The standard class sizes of 30 – 40 had 22.2% while classes of below 30 students had 7%. This figure shows that majority of the classes were above the standard size of 45 students per class.

4.2.5. Student: Textbook Ratio.

Table 4.4 shows the distribution of the student: textbook ratio.

Table 4.4: Student: Textbook Ratio

Ratio	Frequency	Percentage
3: 1	2	11.11
4: 1	4	22.22
5: 1	7	38.88
Above 5: 1	5	27.77

Table 4.4 illustrates that 11.11% of the respondents had a ratio of 3: 1, 22.22% had a ratio of 4: 1, 38.88% had a ratio of 5: 1 while 27.77% had a ratio of more than 5: 1. Higher percentages of respondents had high textbook: student ratio since majority had a ratio of either 5: 1 or above textbooks per student.

The respondents indicated that the main course book used in the school was Secondary Mathematics by Kenya Literature Bureau. However the other reference books commonly used were Advancing in Mathematics, Discovering Secondary Mathematics and Certificate Mathematics.

Concerning the teaching – Learning resources apart from text books, respondents indicated that they used mathematical tables and geometrical sets to help students master concepts and skills in various topics. They indicated that the resources played an important role in mastering of the requisite skills and concepts for students.

4.2.6 Instructional Approaches

The second section of the questionnaire sought for information on the instructional approaches used by teachers, and how such approaches impact on students' performance. The ordinal scale was used where respondents were expected to select one response among strongly disagree, disagree, not sure, agree and strongly agree for each suggested method outlined.

4.2.6.1 Consideration of student's individual differences.

The results indicate that 5.55% of respondents were not sure if they considered the student's individual differences during their lesson. 55.55% of the respondents agreed that they consider students individual differences while 38.88% strongly agreed that they consider the students individual differences when teaching mathematics. This indicates that a large

percentage of teachers consider student's individual differences in the course of teaching mathematics.

4.2.6.2 Use of different methods for solving questions.

The results indicate that 38.88% of the respondents agreed that they use different methods for solving mathematical questions while 61.11% strongly agreed that they use different approaches in solving problems. When teachers use different methods or approaches in solving question, they help students to master skills and give them a variety of approaches to solving questions.

4.2.6.3 Encouragement of students to discover methods for solving questions.

Results indicated that 5.55% of the respondents disagreed that they encouraged students' to discover methods of solving problems on their own, while 5.55% were not sure. 38.88% of the respondents agreed while 38.88% strongly agreed that they encouraged students to discover various methods of solving mathematical question.

4.2.6.4 Remedial Lessons

The results showed that 16.67% of respondents were not sure of organizing remedial lessons for students. 38.89% agreed that they organize for remedial lessons for slow learners while 44.44% strongly agreed that they organize for remedial lessons to assist the learners.

4.2.6.5 Use of practical examples from real life in teaching and setting of examination.

Results indicate that 50% of the respondents agreed of using practical examples from real life in teaching and setting of examinations while 50% strongly agreed. The use of practical examples in teaching concepts and setting of examinations help to demystify the notion that Mathematics is abstract. They also help students to apply the concepts learned in class outside the classroom hence helping them to internalise and apply in the examination.

4.2.6.6 Assistance to students who were absent during lessons.

The results indicated that 5.56% of respondents disagreed that they offered assistance to students were absent during the lessons. 16.67% of the respondents were not sure if they assisted the students while 61.11% agreed that they assisted students. 41.11% strongly agreed

that they assisted students who were absent during the Mathematics lessons. Mathematics concepts are spiral in nature and when a student misses out on some of the concepts, it becomes challenging for them to understand the concepts in the subsequent relevant topics. Missed concepts impact negatively on performance.

4.2.6.7 Policies and programmes.

The results indicated that 55.5% of respondents disagreed that they followed policies and programmes set out in the department. 16.67% indicated that they were not sure of policies and programmes in the department while 50.0% agreed that they followed policies and programmes of the department. 27.78% of the respondents strongly agreed that they followed policies and programmes put in place in order to enhance performance.

4.2.6.8 Team teaching

The results indicated that 11.11% disagreed that they did not allow their colleagues to teach topics that posed challenges to them. 16.67% indicated that they were not sure whether they used team teaching while 27.78% strongly agreed that they used team teaching. 44.44% strongly agreed that they used team teaching, both vertically and horizontally to help students master the concepts which play an important role in performance.

4.2.6.9 Lesson observation

The results showed that 11.11% of respondents were not sure of conducting lesson observation with their colleagues. 50.0% of respondents agreed that they conducted lesson observation while 38.89% strongly agreed that they conducted lesson observation. Lesson observation helps teachers to identify each other's weakness and strengths in the course of content delivery. This helps them to improve in their areas of weakness.

4.2.6.10 workshops and seminars

The results indicated that 5.88% were not sure whether workshops and seminars had helped them to improve on teaching methodology and performance in Mathematics. 47.05% agreed while 47.05% strongly agreed that workshops and seminars had helped them to improve on teaching methodology.

4.2.6.11 Methods of Teaching

The results indicated that 5.56% of the respondents agreed that they use the lecture method during lessons. 94.44% of the respondents strongly agreed that they use the lecture method for content delivery. Concerning demonstrations during lessons, 11.11% of the respondents were not sure, 38.89% indicated they agreed while 50.0% strongly agreed that that they use demonstrations while teaching. The use of experiments during lessons received respondents in all categories of the scale. 5.56% indicated that they strongly disagreed, 16.67% indicated that they disagreed, 22.22% indicated that they were not sure whether they use experiments, 33.33% agreed while 22.22% strongly agreed that they use experiments during their lessons.

The use of project work also received respondents in the five categories of the ordinal scale. 16.67% strongly disagreed that they use project work in their lessons, 22.22% disagreed, 11.11% were not sure whether they use project work in their lessons, 27.78% agreed while 22.22% of the respondents strongly agreed that they use project work in their lessons. Concerning the use of fieldwork, 22.22% of the respondents strongly disagreed. 11.11% of the respondents disagreed, 27.78% were not sure whether they use the fieldwork method in teaching, while 22.22% agreed and 16.67% strongly agreed that they use field work in teaching and learning of Mathematics.

The use of group discussions was a popular method since 50.0% of the respondents agreed while 50.0% strongly agreed. Conversely, the use of simulations and skits as a method of teaching Mathematics was very unpopular as more than half of the respondents indicated that they strongly disagreed to the use of the method. This category represented 55.56% of the respondents, while 22.22% disagreed that they use the method. 11.11% were not sure whether they use simulations and skits in teaching of Mathematics while 11.11% agreed that the method is used in content delivery.

4.2.7 Open-ended question on factors affecting performance in mathematics.

The teachers' perception on the factors affecting performance in mathematics was sought with the open-ended question. The key factors outlined by the respondents were students' attitude, lack of adequate textbooks, high teacher's workload, lack of adequate mathematics resources and low entry behaviour.

4.2.7.1 Students' Attitude

Table 4.5 shows the percentage of respondents on students' attitude towards Mathematics.

Table 4. 5 students' attitude

	Frequency	Percent	Valid Percent	Cumulative Percent
negative	18	100.0	100.0	100.0

The table illustrates that all the respondents view attitude as a key component that affects performance in Mathematics. Positive attitudes enhance performance, while negative attitude inhibits good performance.

4.2.7.2. Inadequate textbooks.

Table 4.6 shows the percentage of respondents on impact adequacy of books on performance in the subject.

Table 4. 6: Adequacy of textbooks

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Adequate	5	27.8	27.8	27.8
	Inadequate	13	72.2	72.2	100.0
	Total	18	100.0	100.0	

The table illustrates that 27.8% of respondents had adequate mathematics textbooks while 72.2% indicated that they had inadequate books. Availability of textbooks help students to have adequate practice which impacts positively on performance in examinations.

4.2.7.3 Teachers' workload.

Table 4.7 shows the percentage of respondents on the effect of the teachers' workload on performance.

Table 4.7: Teachers' Workload

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Affect	7	38.9	38.9	38.9
	No affect	11	61.1	61.1	100.0
	Total	18	100.0	100.0	

Table 4.7 shows that 38.9% of respondents observed that high teachers' workload impacts negatively on performance, while 61,1% opined that the teachers' workload was not a factor that affected performance in Mathematics. Good delivery of Mathematics content and concepts require ample time for preparation.

4.2.7.4 Inadequate Resources

Table 4.8 shows the percentage of respondents on the impact of inadequate resources on performance.

Table 4. 8: Inadequate Resources

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	adequate	6	33.3	33.3	33.3
	inadequate	12	66.7	66.7	100.0
	Total	18	100.0	100.0	

Table 4.8 illustrates that 33.3% of respondents viewed inadequate resources as inconsequential to performance in mathematics. However, 66.7% of the respondents held the view that inadequate mathematics resources impacts negatively on performance in mathematics.

4.2.7.5 Entry Behaviour

Table 4.9 shows the percentage of respondents on the level of the learner's entry behaviour on performance.

Table 4. 9: Entry Behaviour

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not affect	6	33.3	33.3	33.3
	Affects	12	66.7	66.7	100.0
	Total	18	100.0	100.0	

Table 4.9 illustrates that 33.3% of respondents held the view that the learner's entry behaviour had no impact on the performance in mathematics. However 66.7% held the view that the learner's entry behaviour affects their performance, especially the low achievers. On further probing the respondents observed that most students who joined secondary schools with low marks hardly performed well in examinations.

The regression analysis was then used to determine the influence of the teaching methods and approaches (independent variables) on performance in Mathematics (dependent variable).The analysis illustrates that the approaches and methods of teaching had no significant influence on good performance in Mathematics. The analysis indicates that the t – value is .69 which is greater than the significance level of 0.05. Therefore, it can be inferred that the teaching methods that teachers of Mathematics use in class are not assisting learners to perform well in examinations

Apart from the teaching methods applied by teachers in content delivery, the other instructional related factors such as availability of teaching and learning resources, the teachers' work load, the class size and departmental organization in terms of the implementation of policies and programmes were also subjected to the t – test to examine their influence on performance in Mathematics. Table 4.10 shows the analysis of instructional related factors.

Table 4.10: Analysis of Instructional related factors

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	T	Sig.
	Class size	.065	.157	.125	.416	.690
	Teaching and Learning Resources	.139	.104	.481	1.339	.222
	Policies and programmes	.398	.332	.388	-1.199	.070
	High teacher work load	.553	.321	.586	1.723	.001
	Teaching Methods	.406	.265	.288	1.6	.69

The analysis of the variables indicate that the availability of the teaching and learning resources, the class sizes and the implementation of the policies and programmes had no significance on performance. They had significance values of .222, .690 and .70 respectively, which are greater than .005. However, the analysis shows that, the teachers' work load significantly influences performance since it had a significance value of .001, which is less than the significance level of .005. This could be attributed to the fact that high teacher's work load affects his or her efficiency in content delivery since it affects lesson preparation. Good lesson preparation accords teachers time to be logical and systematic in content delivery. This goes down to help learners comprehend the content which is applied in the examinations.

The other instructional related factors subjected to analysis were the teachers' qualifications and their teaching experience. Table 4.11 shows the results.

Table 4. 11 : Teacher' qualification and years in profession

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
	Teacher's Qualification and Years in profession	-.036	.016		-.699 -2.306	.055

a. Dependent Variable: Performance in Mathematics

The analysis shows that the teacher's qualification and teaching experience had no significance on performance. Their significance value was .055 which is greater than the significance value of .005. This indicates that the qualification of the teacher as well as the number of years in the teaching profession do not lead to students' poor performance.

4.3 Feedback on student's Questionnaire

The questionnaire was broadly divided into two sections to sought for information on the effect of pedagogical and education environmental factors on performance in mathematics. Ten schools were visited where 10 questionnaires were administered. However, only 82 students gave their responses.

4.3.1 Respondents by gender

Figure 4.2 shows the distribution of respondents by gender.

Figure 4.2: Respondents by Gender

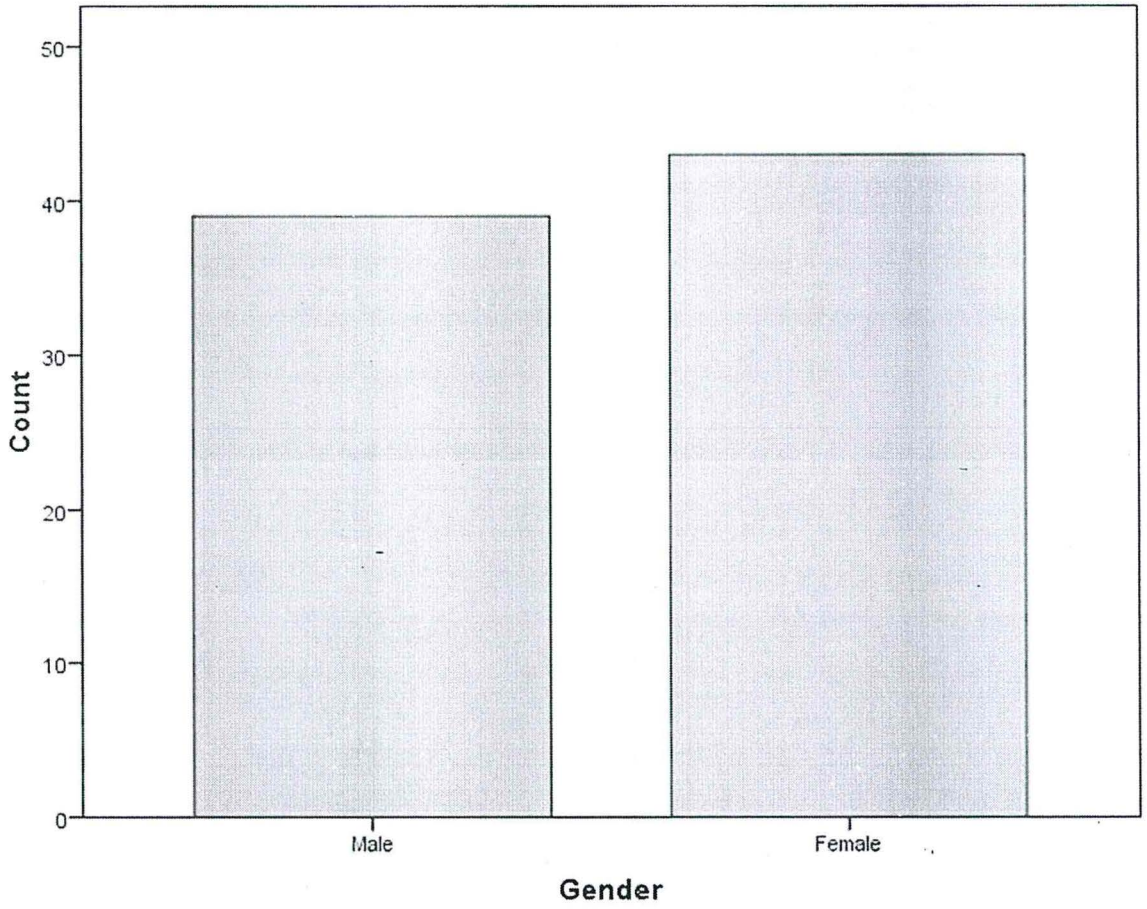


Figure 4.2 shows that out of a total of 82 respondents, the female students had a higher representation of 41 against the male with a representation of 39 students. This could be alluded to the fact that may be the female respondents were more co-operative than their male counter parts.

4.3.2 Respondents by category

Figure 4.3 shows the respondents by category

Figure 4.3: Respondents by category

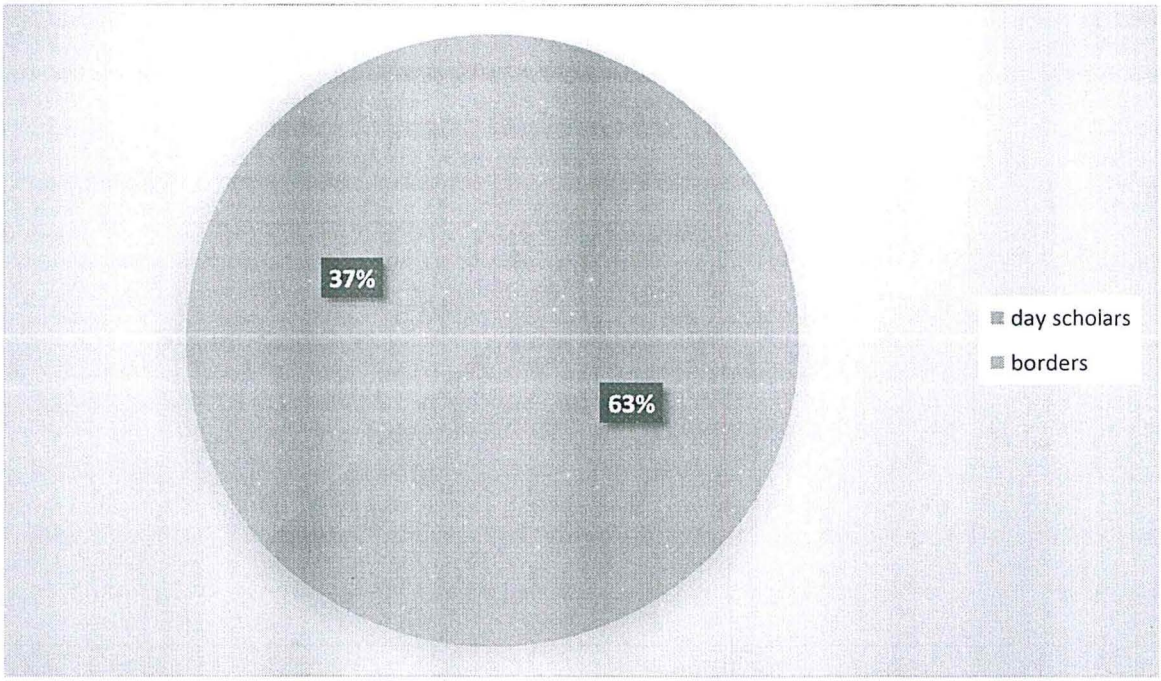


Fig. 4.3 shows that out of a total of 82 respondents, 52 were day scholars and 30 were boarders. This arises from the fact that most of the schools in the sub – county have more day scholars than boarders. However, it is worth noting that some of the schools under study had a mixture of day scholars and boarders. Therefore, the category of the respondents in the study were not pre – determined in any way.

4.3.3 Challenges in Fees Payment

The analysis revealed that, 66 out of the 82 respondents had challenges in fees payment. 16 out of the 82 respondents indicated that they had no problems with fees payment. In relation to this, the respondents who observed that they had challenges in fees payment agreed that they often miss classes. The responses also showed that the other common reason for missing classes was sickness. Out of the 66 respondents that often missed classes, 74.24% of them indicated that they updated their work in Mathematics once they resumed classes. Those who did not update their work did not give any reasons as to why they never updated their work. This could indicate that some teachers were not keen in following up the students' work which gave them a leeway to leave out some concepts. On the subject of showing interest in Mathematics, 60% of the respondents indicated that they did not find Mathematics to be an interesting subject. The most common reasons given for this were negative attitude towards Mathematics and others indicated that Mathematics is a hard subject.

4.3.4 Remedial Work

Table 4.11 shows the attendance to remedial work.

Table 4. 12: Remedial work

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	51	62.2	62.2	62.2
	No	31	37.8	37.8	100.0
	Total	82	100.0	100.0	

Table 4.12 Illustrates that 62.2% of the respondents attended to remedial work while 37.8% of the respondents did not.

4.3.5 Group Discussions

Table 4.13 shows the use group discussions as one of the methods of learning by the students.

Table 4.13: Group Discussions

		Time of discussion			
		0	During class lessons	Outside normal class lessons	Total
Use of Discussion Groups	Yes	0	5	60	65
	No	13	0	4	17
Total		13	5	64	82

Table 4.13 illustrates that 13 out of the 82 respondents did not use the group discussion at all, both during lessons and outside the classroom. A small number of respondents, five out of 82 , used group discussions during lessons. A large percentage of the respondents, 60 out of 82

used group discussion outside the normal lessons. A small percentage, 4 out of 82 respondents did not have formal groups but held discussions outside the normal class lessons. Generally, 65 out of 82 respondents used group discussions while 17 respondents did not use group discussions at all.

4.3.6 Consultation

Table 4.14 shows the results of respondents who went out of their way to consult teachers in areas of difficulty.

Table 4.14: Consultation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	64	78.0	78.0	78.0
	No	18	22.0	22.0	100.0
	Total	82	100.0	100.0	

Table 4.14 illustrates that a high percentage of students, 78% consulted other Mathematics teachers in areas they had difficulty or were challenging to them. However 22% of the respondents did not consult other Mathematics teachers and the reasons given varied from lack of interest in the subject to fear of the unknown.

4.3.7 Teaching and Learning Resources.

Figure 4.4 below shows the percentage of respondents who used teaching and learning resources during mathematics lessons.

Figure 4.4: Use of teaching and learning resources

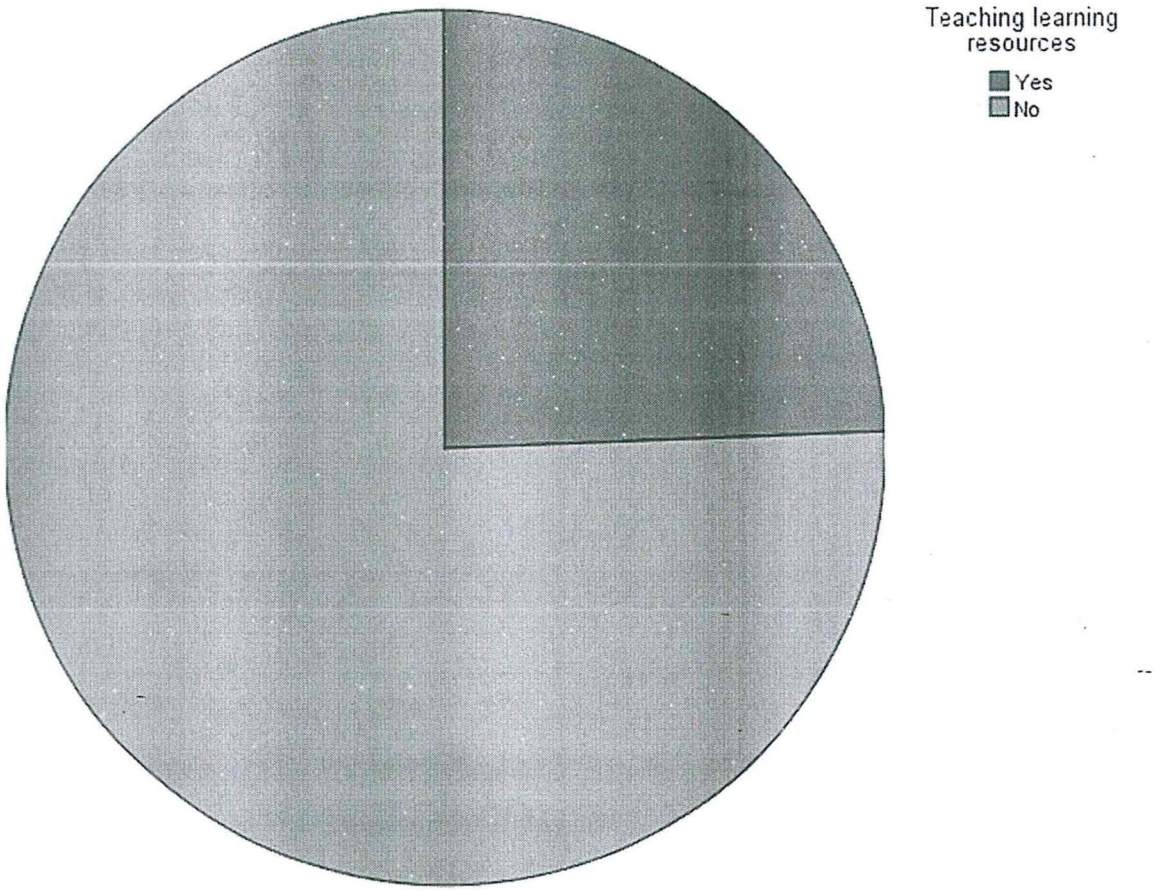


Figure 4.4 illustrates that 25% of the respondents used teaching and learning resources during the mathematics lessons. The most common resources mentioned by respondents were text books, geometrical sets, models and mathematical tables.

However; a large percentage of the respondents, 75% replied that they did not use teaching and learning resources during mathematical lessons.

4.3.8 Mathematics policies

Table 4.15 shows the percentage of respondents with mathematics policies put in place to enhance the performance in Mathematics.

Table 4.15: Mathematics Policies

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	36	43.9	43.9	43.9
	No	46	56.1	56.1	100.0
	Total	82	100.0	100.0	

Table 4.15 illustrates that 56.1% of the respondents did not have any policies put in place to enhance the performance in mathematics. However, 43.9% indicated that some policies were put in place to improve the performance in mathematics. Some of the policies mentioned included setting time aside for mathematics and lunch – hour brief tests in Mathematics.

4.3.9 Open – ended question on factors affecting performance in mathematics.

Table 4.16 shows the students' views on factors affecting performance in Mathematics.

Table 4.16: Factors affecting Performance in Mathematics

Factor	N	FREQUENCY	PERCENTAGE
Peer pressure	82	53	64.6
Negligence	82	32	39.0
Poor teaching methods	82	21	25.6
Low time of contact	82	53	64.6
Lack of revision	82	32	39.0
Poor teacher-student relationship	82	21	25.6
Absenteeism	82	32	39.0
Negative Attitude	82	82	64.6
Lack of practice	82	53	64.6
Lack of concentration	82	32	39.0
Laziness	82	62	75.6
Poor foundation	82	21	25.6

An open – ended question was included in the questionnaire to search for information on the students' perception of factors affecting performance in their school. Table 4.16 illustrates

that 75.6% of respondents perceive laziness among students as the key factor leading to poor performance. These factors; peer pressure, low contact time, negative attitude and lack of practice each registered 64.6% as the factors leading to poor performance in Mathematics. Negligence of work, lack of revision and lack of concentration in class had 39.0% of respondents feeling that they are the factors causing poor performance in mathematics.

The other factors that received low percentages of respondents were poor teaching methods, poor teacher - student relationship and poor foundation as the factors mentioned by students as the factors leading to poor performance. Some of the factors mentioned by students are also replicated in the principals' and teachers' responses, such as the learners low self - drive in the subject, negative attitude and absenteeism.

4.3.10 Students' Responses on Attitude towards Mathematics

The second section of the questionnaire sought for information on students' attitude towards Mathematics and how it impacts on their performance. The ordinal scale was used where respondents were expected to select one response among strongly disagree, disagree, agree, strongly agree and not sure.

4.3.10.1 Students' Perception of Mathematics

The results showed that 24.39% of respondents strongly disagreed that they like Mathematics. 51.23% disagreed that they like Mathematics while 24.39% either agreed or strongly agreed that they like Mathematics because its importance in the curriculum. This shows that more than 70% of the respondents did not like Mathematics.

4.3.10.2 Solving Mathematics Questions

The analysis shows that 42.68% of respondents strongly disagreed that they enjoyed solving mathematics questions. 31.71% disagreed while only 23.17% agreed or strongly agreed that they enjoyed solving Mathematics questions. This results show that a high percentage of respondents did not enjoy solving Mathematics questions.

4.3.10.3 Work Covered

The results revealed that 24.39% of respondents strongly disagreed that they liked all topics of Mathematics that they had already covered, while 40.24% of respondents indicated that

they disagreed. 21.95% agreed while 12.19% strongly agreed. These show that over 60% of respondents did not like all topics that had been covered.

4.3.10.4 Performance in Mathematics

The results showed that 6.10% and 8.54% of respondents strongly disagreed and disagreed respectively that their performance in Mathematics was satisfactory. On the other hand, 28.05% and 36.59% agreed and strongly agreed respectively that their performance was satisfactory. However, 20.73% of respondents were not sure whether their performance was satisfactory.

4.3.10.5 Participation during lessons

The results show that 34.15% neither asked nor answered questions during lessons. 29.27% disagreed that they asked or answered questions during lessons, while 36.59% and 2.44% agreed and strongly agreed respectively that they asked and answered questions during Mathematics lessons.

4.3.10.6 Remedial work

The results revealed that 18.29% of respondents strongly disagreed that they worked out their own remedial work. 36.59% disagreed that they worked out their own remedial work while 36.59% agreed that they worked out remedial work. A very small percentage of respondents, 7.32% agreed that they worked out their own remedial work. This result shows that over 54% of respondents did not work out their own remedial work, which points at their attitude towards Mathematics.

4.3.10.7 Consultation of teachers

The results revealed that 17.07% of respondents strongly disagreed, 23.17% disagreed, 39.02% agreed, 6.10% strongly agreed while 14.63% were not sure of consulting the teachers. An overview of the results shows that 40.24% of respondents did not consult their teachers of mathematics.

4.3.10.8 Consultation of fellow students

The results indicate that 28.05% of respondents strongly disagreed that they consulted their fellow students when certain questions or topics challenged them. 32.93% disagreed that they consulted their fellow students while 24.39% and 10.98% agreed and strongly agreed respectively that they consulted their fellow students when certain questions or topics challenged them. This results show clearly that a high percentage of the respondents did not consult their colleagues in challenging areas. It is worth noting that lack of consultation is an indicator of negative attitude towards Mathematics.

4.3.10.9 Interesting lessons

The results on the subject of whether Mathematics lessons were interesting to students indicate that 36.59% strongly disagreed, 30.49% disagreed, 17.07% agreed, 8.54% strongly agreed and 7.32% were not sure. The analysis shows that a high percentage of respondents felt that Mathematics lessons were not interesting to them.

4.3.10.10 Absenteeism of Teachers

The responses show that 6.10% strongly disagreed, 12.20% disagreed, 42.68% agreed while 36.59%strongly agreed that they felt happy when teachers of Mathematics failed to attend to their lessons. A high percentage of respondents either agreed or strongly agreed that they felt happy when teachers failed to attend to their lessons.

4.3.10.11 Completion of assignments

The results show that 34.15% of respondents strongly disagreed that they completed their assignments on time without anyone's assistance. 37.80%disagreed that they completed their assignments on time while 20.73% and 6.10% agreed and strongly agreed respectively that they completed their assignments on time. The analysis shows that a high percentage of respondents were unable to complete the assignments on time.

4.3.10.12 Peer Pressure

The results show that 12.20% of respondents strongly disagreed their friends had influenced them to dislike Mathematics. 32.93% disagreed that their friends had influenced them to dislike Mathematics. However, 50% and 4.88% of respondents agreed and strongly agreed

respectively that their peers had influenced them to dislike Mathematics. These results clearly show that most of the respondents dislike the subject because of peer pressure.

4.3.10.13 Abstractness of Mathematics

The results show that 6.10% of respondents strongly disagreed that they dislike Mathematics because some of its concepts are abstract. 20.73% disagreed, 21.95% agreed while 48.78% strongly agreed that they dislike Mathematics because some of the concepts are abstract and give them challenges to comprehend.

Table 4.17 shows the significance of students' attitude on performance.

Table 4.17: Significance of Attitude

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
	Negative attitude	.116	.063	-- 1.483	1.836	.000

a. Dependent Variable: Performance in Mathematics

Table 4.17 reveals that negative attitude significantly influences performance. The results indicate a significance level of .000 which is less than the significance level of .005. This implies that negative attitude among most of the students in the sub – county could be a key pointer to dismal performance in Mathematics. This can also be inferred from their responses in the questionnaire.

4.3.11 Responses on factors influencing the level of Motivation

The third section of the questionnaire sought for information on the factors influencing students' level of motivation and how it impacts on their performance. The ordinal scale was used where respondents were expected to select one response among strongly disagree, disagree, agree, strongly agree and not sure.

4.3.11.1 Teachers' influence on students' Motivation

The results indicate that 29.27% of respondents strongly disagreed that they derive motivation of excelling in Mathematics from their subject teachers. 34.15% disagreed with this view, 36.59% agreed while 1.22% strongly agreed that they derive their motivation of excelling in Mathematics from their subject teachers. The results show that a high percentage of respondents did not draw motivation of performing well in Mathematics from their teachers.

4.3.11.2 Importance of Mathematics in career choice

The results reveal that 18.29% of respondents strongly disagreed that the importance of Mathematics in career choice was an impetus to good performance. 36.59% disagreed with this fact while 37.80% agreed and 6.10% strongly agreed that they were motivated to perform well in Mathematics because of its importance in career choice.

4.3.11.3 Teachers' Comments

The analysis of the responses indicate that 12.20% of respondents strongly disagreed that they were motivated by teachers' positive comments on their performance in Mathematics. 21.95% disagreed with the view while 51.23% and 12.20% agreed and strongly agreed respectively that they were motivated by teachers' positive remarks on their performance. This indicates that a high percentage of respondents were motivated by the teachers' positive remarks.

4.3.11.4 Role of family members in motivation of students

The analysis show that 19.51% of respondents strongly disagreed that their family members motivated them to perform well in Mathematics. On this view, 28.05% disagreed while 36.59% agreed and 13.49% strongly agreed that the family members encouraged them to perform well in Mathematics. However, a small percentage of 1.22% were not sure whether their siblings encouraged them to perform well in Mathematics.

4.3.11.5 Role of feedback on motivation

The role of feedback in any process cannot be under estimated. In the education system, examinations are administered in order to give feedback on the learning process. The results on the role of feedback from examinations on motivation indicate that 12.20% of respondents

strongly disagreed that they drew any challenges and lessons from their previous examinations to improve in the subsequent examinations. However, 32.93% of respondents disagreed with the statement in the questionnaire. 39.02% and 13.41% agreed and strongly agreed respectively with the view that they drew challenges from the previous exams and were therefore motivated to perform better in the subsequent exams.

4.3.11.6 Self – Drive in solving questions

The results indicate that 36.58% of respondents strongly disagreed that they solved some questions of Mathematics daily on their own. 25.61% of respondents disagreed with the view, while 24.39% and 12.20% agreed and strongly agreed that they solved their own questions of Mathematics daily. A paltry 1.22% of respondents were not sure whether they solved their own questions daily. A self – motivated student will not wait and rely on the teacher alone. He or she will go out of her way to expound her knowledge.

On the view of individual remedial work, the results show that 18.29% strongly disagreed that they presented their own remedial work to teachers for marking. 36.59% disagreed with the view, while 36.59% agreed that they presented their own remedial work to teachers for marking. 7.32% of respondents strongly agreed that they presented their remedial work for marking. 1.22% of respondents were not sure if they presented their work for marking. Doing individual remedial work builds confidence and motivation in a given subject. However, the results indicate that a high percentage of respondents disagreed that they presented their remedial work to teachers for marking.

4.3.11.7 Research Work

The results revealed that 29.27% of respondents strongly disagreed that they carried out research work in the library to expound on the knowledge learnt in class. 40.24% disagreed that they did research work in the library while 23.17% of respondents agreed that they carried out research. 7.24% of respondents strongly agreed that they carried out research in the library to expound their knowledge in Mathematics. None of the respondents indicated that he or she was not sure.

4.3.11.8 Acquaintance to KCSE Exams

The study showed that 36.59% of respondents strongly disagreed that they requested their teachers for past KCSE exam papers in order to familiarize themselves to KNEC questions in

Mathematics. 26.83% disagreed, 20.73% agreed, 12.20% strongly agreed while 3.66% of respondents were not sure whether they requested for past KCSE papers to acquaint themselves. The underlying factor behind acquaintance to KCSE exams is motivation. From the analysis, it is clearly shown that most of the respondents did not request for past papers.

4.3.11.9 Methods of Teaching

The results of the study revealed that 25.61% of respondents strongly disagreed that the methods used for teaching motivated them to perform well in Mathematics. 35.37% disagreed that the methods used for teaching motivated them. I9.51% and 12.20% agreed and strongly agreed respectively that the methods used for teaching Mathematics motivated them to perform well in examinations. The analysis indicates that a high percentage of respondents were not motivated by the methods of teaching used.

Table 4.18 shows the significance of students' level of motivation on performance.

Table 4.18: Significance of the level of Motivation

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
	Low level of Motivation	-.533	.228	-.546	-2.337	.002

a. Dependent Variable: Performance in Mathematics

Table 4.18 shows that low levels of motivation significantly influence performance. The analysis indicates a significance level of .002 which is less than the conventional significance level of .005.

4.4 Feedback on interview schedule for principals

General information from principals comprised of their views on the performance in Mathematics in their respective schools, student – teacher ratio, demographic factors affecting performance in Mathematics and suggestion on measures that can be put in place to improve performance in Mathematics in the sub – county.

4.4.1 Staffing in Mathematics Department

Staffing in Mathematics department implies the number of teachers in the department. The number of teachers was then compared to the total number on students in order to calculate the student: teacher ratio.

Table 4.19 shows the student: teacher ratio in the visited schools.

Table 4.19: Student: Teacher Ratio

Ratio	N	Frequency	Percentage
40: 1	10	2	20
50: 1	10	4	40
60: 1	10	4	40
		10	100

Table 4.19 shows that most schools had high student – teacher ratios of 50: 1 and 60: 1 at 40% each, while 20% of the schools had a ratio of 40: 1, the standard student: teacher ratio. Those with high ratios responded that the number of teachers for Mathematics was inadequate, though the schools had employed more teachers on Board to curb the shortfall. Only 20% of the respondents with the ratio of 40: 1 indicated that the number of teachers for Mathematics was adequate.

4.4.2 Demographic factors affecting performance in Mathematics

Table 4.20 shows the respondents' views on the demographic factors affecting performance in Mathematics in the visited schools.

Table 4.20: Demographic factors affecting performance in Mathematics

Factor	Number	Frequency	Percentage
Poor fees payment	**10**	**9**	**90**
Absenteeism of students	**10**	**8**	**80**
Parental involvement	**10**	**8**	**80**
Provision of teaching/learning resources	**10**	**7**	**70**

Table 4.20 indicates that a high percentage of students in the visited schools had challenges of fees payment. This resulted from their parents' poor socio – economic background which

results to failure of fees payment on time. Most of the respondents indicated that the highest number of fees defaulters were KCSE candidates. Consequently, most students were often send away from school in order to clear the fees arrears, particularly during the KCSE registration period. One of the respondents observed that at one moment, the school management board had to recall some students who overstayed at home due to lack of fees. Another respondent observed that the school had established the mercy kit to assist the needy but bright students. This was meant to assist the students whose parents could not afford to provide the necessary personal needs. It goes without saying that lack of essential personal needs affect the students' emotional stability resulting to poor concentration in class. This affects students' performance in examinations.

Most respondents observed that parental involvement in students' academic work was low. They decried that most parents from low socio – economic backgrounds rarely visited schools to discuss the academic performance of their children. Probed to expound on this fact, the respondents said that some parents kept aloof because of the unfulfilled promises which they had committed on fees payment. This instilled phobia which drove most parents to avoid planned academic programmes in the schools.

Concerning the provision of the necessary teaching – learning resources, the respondents observed that most parents were unable to provide the necessary mathematical requirements for their children. The most commonly mentioned requirements were geometrical sets, mathematical tables and calculators. Lack of essential mathematical tools impacts negatively on performance in examinations.

Table 4. 21: Principals' responses on factors causing poor performance in Mathematics.

Factor	N	Frequency	percentage
Entry Behaviour	10	9	90
Learner's poor self-drive	10	10	100
Teachers' workload	10	5	50
Inadequate resources	10	4	40
Large class size	10	7	70

Table 4.21 indicates that all respondents mentioned the learner's poor self-drive as one of the key factors affecting performance in Mathematics. Nine of ten of the respondents were of the view that the student's entry behaviour impacts negatively on their performance in the

subject. Seven of ten them were of the view that large class sizes affect performance in Mathematics.

Half of the sample of respondents observed that the teachers' workload, in and outside the classroom impacts on the students' performance. Four of ten of the respondents were of the view that inadequate resources hamper performance in Mathematics. Nonetheless, all respondents observed that there could be other factors affecting performance in Mathematics, but in their opinion, these were the most outstanding.

Table 4.22 shows the analysis of the socio – economic factors on performance in Mathematics

Table 4. 22: Significance of socio – economic factors.

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
	Low Parental Involvement	-.173	.080	-2.002	-2.155	.008
	Absenteeism	-.493	.344	-.399	-1.432	.000
	Lack of teaching/learning Resources	.666	.295	.682	2.257	.059

a. Dependent Variable: Performance in Mathematics

Table 4.22 absenteeism significantly influences performance in Mathematics. The analysis shows that its significance level was .000 which is less than the significance level of .005. The results of the respondents indicated that a high percentage of respondents missed classes due to challenges of fees payment. Among this group, there were some who never updated their work once they resumed classes. The missed concepts impacted negatively on their performance. However, parental involvement and provision of teaching and learning resources had no significant influence on performance. They had significance levels of .008 and .059 respectively which are greater than the significance level of .005.

4.5.5 Model Summary

Table 4.23shows the model summary of the independent factors influencing performance in Mathematics (dependent variable).

Table 4.23: Model Summary

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2.811	10	.281	1.975	.009[a]
	Residual	.996	7	.142		
	Total	3.807	17			

a. independent variables: Instructional factors, Student related factors and Demographic factors

b. Dependent Variable: Performance in Maths

The analysis revealed that there is a significant influence of the independent variables on the dependent variable (performance in mathematics

CHAPTER FIVE

DISCUSSION

5.1 Introduction

This chapter presents the discussion of the findings in relation to the literature review. The instructional factors, individual student related factors as well as the demographic factors are discussed.

5.2 Instructional Related Factors

Teachers are important agents that can influence change in students' performance in Mathematics through the methods that they employ during content delivery. (CEMASTEA, 2004) outlined the various methods that can be used in teaching Mathematics. These included the lecture method, use of teacher demonstrations, student experiments, project work, group discussions, simulations and skits. According to the H.O.D's questionnaire, these methods were outlined and the ordinal scale was applied for data collection. From data analysis, it was revealed that 94.44% of the respondents strongly agreed to the use of the lecture method for content delivery. The use of group discussions also received substantial number of respondents since 50% agreed and 50% strongly agreed that they used the method. The other methods however, received low percentages of respondents who either agreed or strongly agreed to the use of the method outlined.

These methods were therefore, subjected to the t – test to determine their impact on performance. The results indicate that the methods used in class had no significant influence on good performance in Mathematics, since the t – value was .69 which is greater than the significance level of 0.05. This finding does not rhyme with the study of Mutie and Ndambuki (1999) who observed that teaching from the known to unknown guides the student to develop interest in learning. Therefore, it can be concluded that the approaches that teachers of Mathematics used in class were not assisting learners to perform well in KCSE examinations.

(Loveless, 2003) outlined the importance of mastering basic concepts that lay a firm foundation for high order thinking concepts. He outlined that when students fail to master the basic concepts, then they face challenges in mastering concepts at higher levels. This

therefore calls for teachers to pay attention to student's individual differences, use of different methods for solving questions, sparing time for remedial work, use of practical examples to enhance transfer of knowledge, assisting students who were absent during lessons and having consultations. The results from the study indicated that a large percentage of teachers put into consideration the learner's individual differences in the course of teaching. However, an insignificant number of respondents indicated that they were not sure whether they considered the learners' individual differences.

The use of different methods to solve questions help learners to master different approaches to solving questions. This gives them a wide latitude for solving different questions rather than relying on one method alone. The results from the respondents indicated that a large percentage of teachers use different methods to solve questions so as to help students approach question in different ways. All the responds indicated that they use different methods for solving questions. Besides that they also indicated that a large percentage of them encourage students to discover various methods of solving questions through the discovery method. The discovery method enhances the learners' mastery of concepts which affects performance positively.

Remedial lessons for slow learners cannot be ignored in improving performance. To this end, a large percentage of teachers indicated that they organised remedial lessons to assist the slow learners. However, a small percentage were not sure whether they organized for remedial lessons. Responses from students indicated that most of them carried out remedial work; with a significant number alluding to the fact that they never had remedial work. The importance of the use of practical examples in teaching and setting of exams cannot be under estimated. The practical examples help learners to transfer knowledge learned in class to practical life, as well as putting abstract concepts into context. To this end, all teachers indicated that they used practical examples in teaching and setting of mathematical questions.

The concepts of mathematics are spiral in nature. The concepts covered at the lower levels form a firm foundation for complex concepts covered at higher levels. Due to some reasons, some students may miss classes and therefore miss out on key concepts. This affects their performance if they are not assisted to cover them. For this, the study showed that a large percentage of teachers created time to assist the students who missed such classes. The responses from students indicated that a large percentage of them consulted teachers in areas where they had challenges. However, a small percentage of them did not consult their

teachers due to lack of interest in the subject. Lack of consultation impacts negatively on performance.

Mathematics topics and concepts pose different challenges to different teachers and students. A topic in which a teacher faces challenges of comprehending the concepts will pose difficulties to such a teacher to teach the students. One of the best ways of overcoming such a challenge is to use team teaching. A large percentage of teachers illustrated that they use team teaching, both vertically and laterally to ensure that students master the concepts which can be applied in examination to register good performance. However, a small percentage of teacher disagreed that they use team teaching technique in their schools. Similar to team teaching is lesson observation technique. Lesson observation assists teachers to identify each other's weaknesses and strengths in the course of content delivery. The study indicated that a large percentage of respondents agreed that they conducted lesson observation while a small percentage indicated that they were not sure if lesson observation was conducted in their schools.

One of the effective ways of helping students to comprehend concepts is the use of group discussions. They help the students understand each other as they pass information from one student to the other. The study indicated that a large percentage of respondents used group discussions in their schools. The respondents indicated that the groups had been formed basing on students' performance. From table 1.1 however, it can be inferred that the performance in Mathematics in the sub – county for the period 2014 to 2017 was low. This performance came at the backdrop of the measures outlined. These measures therefore, had insignificant influence on good performance in Mathematics.

The responses from teachers indicated that most teachers had high work load. 44.44% of the respondents indicated they had 26 - 30 lessons per week. Other respondents had workloads below the minimum work load set out by the T.S.C. of 27 lessons per week. The significance of teachers' workload as well as the teacher's workload in Mathematics have a significant influence on performance in Mathematics as shown in table 4.23. This stems from the fact that teachers of Mathematics require ample time to prepare for lessons as well as marking the exercises given regularly. High workload therefore, works against their productivity and effectiveness in class.

The availability of resources and text books for improved performance in Mathematics cannot be over emphasised. Resources and text books help learners to understand the

concepts disseminated by the teachers. This helps them to register a good performance in examinations. The results from the study indicated that most of the schools in the sub – county had a student: textbook ratio of 4: 1. This is far above the recommended ratio by the Ministry of Education of 1:1. According to the Basic Education Act number 14 of 2013, the Academic Standards, Quality and Environmental committee should ensure that each learner has enough textbooks and other learning materials. Inadequate number of textbooks hinder learners from studying on their own to master the skills and concepts disseminated by teachers. This problem is compounded by the fact that most of the students in the sub – county were day scholars. In such a case, when one student goes home with the textbook, then the other(s) would not be in a position to use the book at that particular time. The analysis however, revealed that inadequate teaching and learning resources had no significant influence on performance.

The three categories of respondents indicated that there were some measure of programmes and policies put in place to enhance performance in Mathematics. The responses from principals indicated that they had put in places policies on setting a side time for Mathematics, conducting remedial lessons for slow learners, no operation below D-, daily practice in Mathematics, team teaching and conveyor belt system of marking as well as setting aside time for revision whenever exams were administered. The teachers' responses indicated that a large percentage of them follow the policies and programmes put in place in order to enhance performance in Mathematics. A small percentage of teachers indicated that they were not sure of policies and programmes put in place to improve performance in Mathematics. However; 56% of the students indicated that they were not aware of the policies and programmes in the department, while 43.9% indicated that there were some policies put in place in the department. The variance in the responses from the three categories of respondents indicate that there could be policies formulated for Mathematics department in some schools but they were never implemented. However, the analysis revealed that the implementation of policies and programmes in Mathematics department had no significant influence on performance.

5.2 Individual Student - Related Factors

The role of attitude in performance in Mathematics cannot be under estimated. (Kisakali, and Kuznetsov, (2015) put this point in perspective by outlining the attributes in students that indicate negative attitude. Some of the attributes outlined were lack of interest while studying

Mathematics, triviality and lack of practice, lack of self – drive and enthusiasm for teachers and perception towards Mathematics as a difficult subject. These attributes were affirmed in the study. From data presentation, table 4.3 indicates that all the principals viewed the learners' poor self – drive as one of the key factors causing poor performance in Mathematics in the schools. This response was replicated in the Mathematics HODS responses as indicated in table 4.12. Teachers viewed negative attitude as one of the key factors causing poor performance. A very high percentage of students also alluded to the fact that negative attitude played a key role in poor performance in Mathematics. This fact was manifested in attributes of laziness among the students, lack of practice, peer pressure and low contact hours with teachers. When the data was analysed, it revealed that negative attitude significantly influenced performance in Mathematics, as shown in table 4.26. Umar, et al. (2014) in their study pointed out that negative attitude is one of the causes of poor performance in Mathematics.

Motivation of students plays a key role in learning. Condron, 2011) points out that students who are not motivated will not learn effectively. Various attributes were therefore used to gauge students' level of motivation in Mathematics and asses its impact on performance. The results showed that a high percentage of students exhibited low levels of self – esteem in Mathematics. From the data analysis as shown in table 4.27, low levels of motivation significantly influence performance in Mathematics. In his study, Irvin, et al. (2007) pointed out that motivation and engagement are critical for adolescent readers. Therefore if students are not motivated in a particular subject, then they will not make an effort to study hard, which leads to poor performance.

5.3 Demographic Factors

Under the demographic related factors, the study focused on the impact of the socio – economic background and student : teacher ratio on performance in Mathematics. (Farooq, et al. 2011) observed that low socio – economic status caused environmental deficiencies which result in low self – esteem of students. (Kiwanuka and Damme 2015) observed that students from higher socio – economic status families achieved significantly better in Mathematics than those from lower socio – economic families. The results from this study resonate with the findings of the afore mentioned studies. The analysis shown in table 4.28 indicate that low socio – economic status significantly influences performance through financial obligations of fees payment by the parents. A high percentage of students often miss classes

as a result of non – payment of fees on time. This leads to high rates of absenteeism which significantly influences performance.

The results from the study indicated that most of the respondents among the principals had a student: teacher ratio of 50:1 and above. According to the Basic Education Act number 14 of 2013, the optimum student: teacher ratio is 45: 1. A high student: teacher ratio can affect performance as teachers may not pay special attention to most of the learners who need it. However most of the respondents indicated that the schools had employed trained teachers on board to alleviate the shortfall. A small percentage of respondents indicated that they had the standard ratio of 45: 1. The analysis however, shows that high student: teacher ratio had no significant influence on performance. This finding therefore does not agree with Kaloki, 2012) who observed that high student: teacher ratio affected students' performance in examinations in Central Division, Machakos County.

An open –ended questions was posted to all the three categories of respondents to gauge their own personal feelings on the factors affecting the performance in Mathematics. The results clearly indicate the similarity in the responses. The principals mentioned the learner's poor self – drive, large class sizes, inadequate resources, absenteeism of students from school as the key factors causing poor performance. The teachers of mathematics viewed the students' negative attitude towards Mathematics and inadequate resources as the main factors causing poor performance. The students observed that laziness and lack of interest in subject were the main factors causing poor performance in Mathematics. From the analysis however, inadequate resources had no significance in poor performance but leaners' poor self – drive and absenteeism had pronounced significance on poor performance.

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.1 Introduction

This chapter consists of the conclusion and recommendations. The first part of the chapter advances conclusions while the second part outlines the recommendations.

6.2 Conclusions

Based on data analysis and discussions in the previous chapter, it can be inferred that:

Most teachers had put in place measures that could assist students perform well in Mathematics. They indicated that they used a variety of teaching methods in order to assist students comprehend the content and concepts of Mathematics. However, such efforts and measures were not reflected in students' good performance in national examinations since most of the students scored low quality grades of D- and E. These grades limit students in career choices and admission to higher institutions of learning. The analysis also shows that the methods employed by teachers had no significant influence on good performance in Mathematics. Therefore, there is urgent need in paradigm shift in methods and approaches of disseminating Mathematics content and concepts to students. The teachers should therefore implore methods and approaches of effective and efficient syllabus coverage to enable students perform well in examinations.

The analysis revealed that negative attitude towards Mathematics by students, low levels of motivation and self - drive among the students, high rate of absenteeism stemming from low socio – economic background that leads to poor fees payment and the teachers' high workload occasioned by FPE and FSDE. However, the analysis also showed that inadequate teaching and learning resources, departmental organization in terms of the implementation of policies and programmes as well as high student: teacher ratio had no significant influence on performance in Mathematics in the sub – county. Besides these factors, the responses from the open – ended question for principals and Mathematics HODS outlined low entry behaviour as another key factor influencing performance.

6.3 Recommendations

Concerted efforts should be collated and geared towards improving performance in Mathematics in Bungoma West sub – county. Such efforts should be channelled to improving the teaching methods and approaches as well as curbing the menace of student absenteeism, changing the students' negative attitude towards Mathematics and improving the students' levels of motivation in Mathematics. The principals put forth two pronged solutions: those that can be implemented at the school level and those that can be implemented at the sub – county level.

At the school level, nine of ten of the respondents had established group discussions. They further said that the groups were formed on the basis of ability. Eight of ten the respondents indicated that they had established chalkboards on walls outside the classrooms to enable students do more practice, as well as promoting peer teaching among the students. Six of ten of the respondents observed that they had established programmes for rewarding good performers in Mathematics in order to motivate them, as well as encouraging other learners to emulate them. Half of the respondents said that they had formulated remedial programmes tailored for low achievers. On the Maths "Kesha" programme, three respondents said they had put the programme in place in order to create more time for Mathematics.

At the sub county level, nine out of ten respondents observed that bench marking for teachers within and outside the sub - county should be encouraged. Eight of ten of the respondents were of the view that workshops for mathematics teachers should be organised to help teachers acquire new skills for content delivery as well as share their experiences in the teaching of Mathematics. Seven of ten of the respondents were of view that strengthening of guidance and counselling departments to disseminate information on the importance of the subject in career choice would help to motivate the students to work hard in Mathematics.

The study therefore, puts forth the following recommendations:

1. The students' negative attitude and low levels of motivation should be addressed since the results of the study indicated that teaching methods used by teachers were ideal for improved performance in Mathematics. Therefore, more research should be done to address the students' low self-esteem and negative attitude through strengthening of the guiding and counseling departments in schools, particularly establishing career

guidance sessions to change the students' attitude towards Mathematics. The stakeholders should also device ways and means of motivating students in order to address the negative attitude. Bench marking should also be embraced in order to help students improve on their self - esteem to address the challenge of low self – drive.

2. Teachers should embrace the use of ICT to improve their teaching methods and approaches as well as encourage learners to search for information. Besides the use of ICT, workshops and seminars should be organized in order to offer in – service training to teachers. The seminars and workshops also offer teachers an opportunity for exchanging ideas and bench marking from one another. Besides normal teaching in class, teachers should also be encouraged to go out of their way and intensify on revision and re – teaching of challenging topics and concepts.

3. The Ministry of Education should be allocated more funds to employ more teachers in order to lower the student: teacher ratio and teachers' workload. High workload weighs down the teacher's efficiency and effectiveness of content delivery in class. This influences the students' performance in examinations.

4. The Ministry of Education should device better methods of bursary allocation to needy students to alleviate absenteeism of students from school. This will enable students from low socio – economic backgrounds to learn consistently without interruptions of being send away for fees.

Recommendations for further studies.

1. The impact of continuous assessment and evaluation on performance in national examinations of Mathematics in Bungoma West sub – county.

2. The impact of teachers of career guidance on performance of Mathematics in Bungoma West sub – county.

References

Aja and Eze. (2013). *Demand and Supply of teachers: Implications for quality assurance in Ebonyi state republic secondary schools. volume 2*(number 3), pg 92-97.

Amin, E. M. (2004). Foundations of statistical inference for Social Science Research. *University of Yauonde, Yauonde.*

Amin, E. M. (2004). *Foundations of statistical inference for Social Science Research.* Yauonde.: . University of Yauonde.

Amitai, E. (2007). *Morden Organizations*. Prentice-Hall.

Andile, M. and Makgato, M. (2006). *Factors associated with high school learners poor performance: A sportlight on Mathematics and Physical Science. Volume 26*(No. 2), pg 253-266.

Atebe, I. N. (2009). *Actual and the expected role of the H.O.D in Kakamega East District, Kenya. Volume.1*, pg 1-85.

Bungoma County Academic Committe. (2016). *KCSE 2016 Results Analysis*. Eldoret: Hallmark Printers.

Bush, T. (2011). *Theories of Educational Leadership and Management.* Retrieved from http//uk.sagepub.com.

CEMASTEA. (2004). *Strenthening Mathematics and Science in Secondary Education. 1.*

Condron, A. (2011). *How to Motivate Students: Top 12 Ways.* Retrieved from http//www.teachhub.com.

Elger, d. (2006). *Theory of performance*. Retrieved from http//www.webpageuidaho.edu

Farooq, S. et al. (2011). *Factors affecting students' quality academic performance.* Retrieved from http//www.google.com

Government of Kenya. (2005). *Secondary school syllabus* (Vol. 2). Nairobi: Kenya Institute of Eduction.

Government of Kenya. (2007). *Kenya Vision 2030*. Nairobi.: The Government Printer.

Hammond, P. (1998). *How can a Head of Department affect the quality of Teaching and Learning.* Retrieved from http//www.leeds.ac.uk.

Irvin, J. Meltzer, J. and Melinder, D. (2007). *Student Motivation, Engagement and Achievement*. Retrieved from http//www.ascd.org.

Kaloki, J.W. (2012). *Pupil-Teacher Ratio and its ipact on academic perfomance in public primary schools in Central Division, Machakos County.* Kenyatta university, Nairobi.

Kenya National Examination Council,. (2001). *KCSE Regulations and syllabuses, 2000 – 2001.* Nairobi.: KNEC,.

Kisakali, J, and Kuznetsov, D. (2015). *Modelling Factors Influencing Mathematics Learning and Performance in Tanzanian Secondary Schools.* Retrieved from http/www.scienceasia.asia.

Kishore, S. (2015). *Right to Education and Equality of Educational Opportunities. 16*(2), 5–19.

Kiwanuka, H. and Damme, J. (2015). *Factors affecting Mathematics achievement of first – year secondary school students in Central Uganda.* Retrieved from http//www.researchgate.net.

KNEC. (2004). *Kenya Natinal Examination Council Mathematics Report.* Nairobi: KNEC.

Kothari, C. R. (2013). *Research Methodology: Methods and Techniques*. New Delhi.: New Age International (P) Limited,.

Loveless, T. (2003). *Trends in Maths achievement: the Importance of Basic skills*. Retrieved from http//www.brookings.edu

Mbugua, K. Z. Kibet, K. and Muthaa, G. (2012). *Factors contributing to students' poor performance in Mathematics in Kenya Certificate of Secondary Education: A case of Baringo County, Kenya. Volume.2*(Number. 6), pg 87-91.

McGrew, K. S. (2007). Beyond IQ: AModel of Academic Competence and Motivation. Retrieved from http://www.iapsych.com/acmcework/map/htm

Ministry of Education. (2010). *Safety Manual for Child Friendly Schools*. Nairobi: Government Printer.

Mugenda, M.O. and Mugenda, G.A. (2003). *Research Methods: Quantitative and Qualitative Approaches*. Nairobi.: Acts Press.

Mutie E. K. and Ndambuki P. (1999). *Guiding and Counselling for schools and colleges.* : Nairobi.: : Oxford University Press,.

Mwendwa. (2013). *Factors contributing to students poor perfomance in Mathematics in public secondary schools of Tharaka south district* (Nairobi). Retrieved from http//www.erepository.uonbi.ac.ke

Oundo, B. M. (2013). *Factors affecting Mathematics Academic Counselling Services: The secondary school counselling perspective. Volume 1*(Number. 12), pg 1-8.

Redman, T. and Wilkinson, A. (2006). *Contemporary Human Resource Management.* London.: Pearson Education Limited.

Sinyolo, et al. (2007). *Teacher supply, Recruitment and Retention in six Anglophone sub-saharan African countris*. Retrieved from http//www.thecommonwealthlibrary.org

SMASSE. (1998). *INSET System in Kenya.* Nairobi.: CEMASTEA.

Smith, M. K. (1996). *Curriculum theory and practice: the encyclopaedia of informal education*. Retrieved from www.infed.org/biblio/b-curric.htm.

Talbot, C. (2013). *Theories of Performance*. Oxford.: Oxford University Press,.

Tapia, M. (2011a). Academic Exchange Quarterly. Retrieved May 4, 2019, from http://www.rapidintellect.com/

Tapia, M. (2011b). *An Instrument to Measure Mathematics*. Retrieved from http//www.rapidintellect.com.

Thomas, S. and Scott, A. (2011). *Management: Leading and collaborating in a Competitive World.* New York.: Mcgraw Hill Irwin,.

Umar, T.S. Adamu, A. and Sadiq, M.A. (2014). *The causes of poor performance in Mathematics among public senior secondary school students in Azare Metropolis of Bauchi State, Nigeria.* Retrieved from www.iosrjournal.org.

Wanyonyi, P.W. (2013). *An assessment of factors affecting students' performance in Mathematics at KCSE level in secondary schools in Kakamega county.* Kenyatta university, Nairobi.

Zan, R. and Martino, P. (2009). *Attitude towards Mathematics. Volume 3*, pg 157-168.

Appendices

Appendix A: Interview schedule for Principals

The purpose of the study is to determine factors that affect performance in Mathematics in Bungoma West sub – county. Please respond to this questions honestly. Your responses will be treated confidentially and will only be used for purposes of the study.

1. How is the performance in Mathematics in the school?

2. How is your staffing in the school in relation to Mathematics?

3. In your opinion, what is the main factor(s) affecting the performance in Mathematics in the school?

4. Have you put any measures in place to improve the performance in Mathematics in your school? Kindly, name them if any.

5. Is fees payment a challenge to most students in the school?

6. Do students with fees problems receive any assistance from other organizations?

7. Is there any policy on Mathematics in the school? If any, please name it.

8. In your opinion, what measures should be put in place to improve the performance in Mathematics in Bungoma West sub – county?

Thank you for your time.

Appendix B: Questionnaire for Mathematics HODS

The purpose of the study is to determine factors that affect performance in Mathematics in Bungoma West sub – county. Please, respond to this questionnaire honestly by ticking (√) in the appropriate box. Your responses will be treated confidentially and will only be used by the researcher.

Section I

1. Sex: Male ( ) Female ( )

2. What is your level of educational qualification?

   Masters ( ) Degree ( ) Diploma ( ) Untrained ( )

   Other ( )

3. For how long have you taught Mathematics
   a) In this school .....
   b) Elsewhere .....

4. (a) What is your total teaching load per week?
   .....

   (b) How many lessons for Mathematics do you have per week?
   .....

   (c) Apart from classroom teaching, do you have other responsibilities?
   Yes ( )

   No ( )

If yes, please specify.....

5. What is the average class size in the school?

≤ 30 ( ) 30 – 40 ( ) 40 – 50 () ≥ 50 ( )

21

6. What is the Mathematics textbook: student ratio?

1:1( ) 1:2 ( ) 1:3 ( ) 1:4 ( ) 1:5 ( )

more than 1:5 ( )

7. What is the main course book used in the school?

.....

Apart from the course book, what are the other reference books?

i)

ii)

iii)

iv)

v)

8. Apart from textbooks, what are the other teaching – learning resources?

i)

ii)

iii)

iv)

v)

Section II

Please, indicate your honest opinion about the following statements.

Key: SD – Strongly Disagree; D – Disagree NS- Not Sure; A – Agree SA – Strongly Agree

Statement	SD	D	NS	A	SA
When teaching Mathematics, I put into consideration the student's individual differences					
When teaching Mathematics, I use different methods for solving questions to enhance understanding					
I encourage students to discover several methods of solving Mathematical questions					
I spare time for remedial lessons / work for my students					
I use practical examples from real life in teaching mathematical concepts and setting of examinations					
I assist students who were away during the lesson(s) to understand the concepts covered					
I follow all the policies and programmes put in place for the Mathematics department					
I allow colleagues to teach for me topics or sub – topics that are challenging to me					
I conduct lesson observation with colleagues in the Mathematics department to help in improving performance in Mathematics					
Workshops and seminars have helped me to improve on teaching methodology and performance in Mathematics					

Section III: Methods of teaching

Please, indicate your honest opinion about the methods of teaching.

Key: SD – Strongly Disagree: D – Disagree: NS – Not Sure: A – Agree: SA – Strongly Agree.

Method used	SD	D	NS	A	SA
Lecture					
Demonstrations					
Experiments					
Project Work					
Field Work					
Group Discussions					
Simulations/Skits					

In your opinion, what do you think are the key factors affecting the performance of Mathematics in the school?

i)

ii)

iii)

iv)

v)

Thank you for your time.

Appendix C: Students' Questionnaire

The purpose of the study is to determine factors that affect performance in Mathematics in Bungoma West sub – county. Please, respond to this questionnaire honestly by ticking (√) in the appropriate box. Your responses will be treated confidentially and will only be used by the researcher.

SECTION A: GENERAL INFORMATION

1. Sex : Male ( ) Female ( )

2. Category : Boarder ( ) Day scholar ( )

3. Do you face any challenges in fees payment?

4. Do you often miss classes? Yes ( ) No ( )

   If yes, what could be the main reason?

   Lack of school fees ( )

   Any other ----------

5. When you miss classes, do you update your work in Mathematics?

   Yes ( ) No ( )

6. Do you find Mathematics to be an interesting subject? Briefly explain your answer.

7. Do you have discussion groups?

Yes ( )

No ( )

If yes, when do you hold discussions?

During class lessons ( )

Outside the normal class lessons ( )

8. Do you ever consult your Mathematics teacher whenever you face challenges in Mathematics?

9. Apart from the subject teacher, do you ever consult other Mathematics teachers?
   Yes ( )

   No ( )

   If no, briefly state why .....

   .....

10. Do teachers use teaching – learning resources during Mathematics lessons?

    Yes ( )

    No ( )

    If yes, name any three

    i)

    ii)

    iii)

11. Are there any Mathematics policies put in place?

Yes ( )

No ( )

If yes, please name them

i) .....

ii) .....

iii) .....

12. In your own opinion, what do you think are the key factors affecting the performance in Mathematics in the school?

i)

ii)

iii)

iv)

v)

SECTION B: This section seeks students' information on attitude towards Mathematics.

In the table below, please tick whichever you feel is appropriate in the spaces provided.

KEY: Strongly Disagree, Disagree, Agree, Strongly Agree, Not Sure

NO.		SD	D	A	SA	NS
i)	I like Mathematics because I feel it is an important subject					
ii)	I enjoy solving Mathematics questions					
iii)	I like all topics of Mathematics that we have covered					
iv)	My performance in Mathematics is satisfactory					
V)	I ask and answer questions during Mathematics lessons					
vi)	I do remedial work on my own					
vii)	I consult my Mathematics teacher(s) quite often					
ix)	I never consult any Mathematics teachers in the school					
x	I consult fellow students when certain questions/topics challenge me					
xi)	My Mathematics lessons are interesting					
xii)	I feel happy when my Mathematics teacher fails to attend to his/her lessons					
xiii)	I complete the assignments on time without anyone's assistance					
xiv)	My friends have influenced me to dislike Mathematics					
xv)	I dislike Mathematics because some concepts are too abstract					

SECTION C: This section seeks students' information on their level of motivation in Mathematics.

In the table below, please tick whichever you feel is appropriate in the spaces provided.

KEY: Strongly Disagree, Disagree, Agree, Strongly Agree, Not Sure

NO.		SD	D	A	SA	NS
i)	I derive my motivation of excelling in Mathematics from my teacher					
ii)	I derive my motivation of excelling in Mathematics from its importance in career choice					
iii)	I feel motivated when my teacher gives positive comments about my performance in Mathematics					
iv)	I'm motivated because my siblings encourage me to perform well in Mathematics					
v)	I take challenges from previous exams to perform better in the subsequent exams					
vi)	I solve some Mathematics questions everyday					
vii)	I do my own remedial work and present to the teacher for marking					
viii)	I carry out research in the library to expound on the knowledge learnt in class					
ix	I normally request my teacher for past KCSE papers to acquaint myself to KCSE exams					
x	The methods used by my teacher motivate me to perform well in Mathematics					

Thank you for your time.

Appendix D: Permission to conduct research

MINISTRY OF EDUCATION, SCIENCE & TECHNOLOGY
State Department of Education

Telegrams "EDUCATION" Sirisia
Telephone: 0735-713327
E-mail: scdesirisia@gmail.com
When replying please quote:

SUB-COUNTY EDUCATION OFFICE
Bungoma West Sub-County
P.O Box 36-50208
SIRISIA

30th/05/2017.

REF: BGW/ED/ADM/7/VOL. 1(90)

TO WHOM IT MAY CONCERN,

RE: PERMISSION TO CARRY OUT RESEACH

This is to inform you that the bearer of this letter Mr Francis Kituyi , has been granted authority to carry out research project in your institution. This is in fulfillment of his master of science in Education at Strathmore university. Please accord him the necessary support in your school.

SUB-COUNTY EDUCATION OFFICE
BUNGOMA WEST
P. O. Box 36,
SIRISIA - 50208

ANDREW K. MIBEI
SUB-COUNTY DIRECTOR OF EDUCATION
BUNGOMA WEST

Strathmore UNIVERSITY

12th April 2017

To whom it may concern

RE: REQUEST TO CONDUCT RESEARCH

This is to certify that Francis Kituyi (Admission No. 088938) is a Master of Science in Education student at Strathmore University. To complete his Master's degree, he is required to write a dissertation applying the knowledge and skills he has acquired.

His dissertation is entitled "**Factors Affecting Performance of Mathematics in Bungoma Weet Sub-County**".

He is also required to collect data from schools and other respondents in Bungoma West Sub-County.

We shall appreciate any assistance given to him.

Yours sincerely,

M A Kyala

Dr. Magdalene Dimba
Director of Research
School of Humanities and Social Sciences

REPUBLIC OF KENYA

THE PRESIDENCY

MINISTRY OF INTERIOR AND COORDINATION OF NATIONAL GOVERNMENT

Telegram: "DISTRICTER" BUNGOMA WEST
Telephone:
E mail: dcountycom.sirisia@gmail.com

THE DEPUTY COUNTY COMMISSIONER
BUNGOMA WEST SUB-COUNTY
P.O BOX 100-50208
SIRISIA

When replying please quote
REF: EDU/G/VOL.III/15

Date: 30th May, 2017

TO WHOM IT MAY CONCERN

RE: **PERMISSION TO CARRY OUT RESEARCH.**

This is to inform you that the bearer of this letter Mr. Francis Kituyi, has been grant authority to carry out Research Project in your institution. This is in fulfillment of h Master of Science in Education at Strathmore University. Please accord him the necessa support.

DEPUTY COUNTY COMMISSIONER
BUNGOMA WEST SUB-COUNTY

C. K. Koech
For: Deputy County Commissioner
BUNGOMA WEST SUB COUNTY