FACTORS INFLUENCING OUTCOMES IN MATHEMATICS IN KCSE: A CASE FOR KANDARA SUBCOUNTY IN MURANG'A COUNTY, KENYA.

BY

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L40/10339/2018

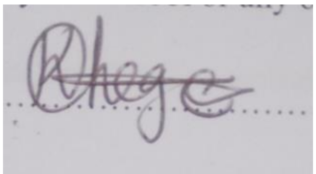
A RESEARCH PROJECT SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF DEGREE OF POSTGRADUATE DIPLOMA IN EDUCATION

UNIVERSITY OF NAIROBI

APRIL, 2022

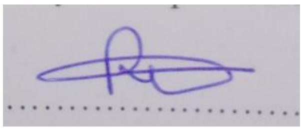
DECLARATION

This is original work that has never been presented at the University of Nairobi or any institution.

Signature……  Date…20/06/2022………

KELVIN CHEGE MWANGI

Declaration by the supervisors

Signature……  … Date……21/06/2022…

M/S ROSE AKINYI

DEDICATION

A dedication to Peter Mwangi, Lucy Wangari and all my siblings.

ACKNOWLEDEMENTS

I take this opportunity to thank Kandara SubCounty Education office for bearing with my incessant inquiries.

I thank all the teachers and students in Kandara subcounty. Specifically, I want to recognize teachers in Ngurwe-ini Secodary School for firm guidance during my Teaching Practice as well as duration of this study.

I cannot forget my supervisor Madam Rose Akinyi at UoN for firm supervision.

To you all I say be blessed.

ABSTRACT

Mathematics forms the basis for sciences, technology and engineering. A good grasp of mathematical concepts allows an individual to explore further in the field of sciences. Kenya has a long-term vision to be an industrial middle income country by the year 2030. This requires enough people knowledgeable in mathematics and in extension in sciences and engineering. However, performance in mathematics has consistently been dismal both at national level and locally, and a cause for alarm for education stakeholders as well as planners in the country. Consequently, urgent measures are needed to correct this trend. This study investigates the causes of this poor performance with regards to Kandara Sub County in Murang'a County. For several conservative years, the Sub County faced massive failures in mathematics at KCSE. Therefore, this study aimed at investigating both teacher and student attitudes towards mathematics and their influence towards performance in mathematics, how teacher training influences mathematics performance and finding out whether the availability of teaching facilities or lack thereof in Kandara SubCounty contributes to failure in mathematics.

The target population for the study is 8820 respondents in 57 schools of Kandara SubCounty comprising of 307 teachers and 8513 students in form three and form four. Through random sampling, the sample comprised of 60 teachers and 300 students spread in 15 schools of the sub county. In each school, the HOD mathematics plus three teachers selected through random sampling were surveyed. Also, in each school 20 students were surveyed. The tool used for collecting data was questionnaires. Data collected was analyzed using Microsoft Excel. Findings supported the hypothesis that lack of intensive professional capacity building for mathematics teachers, negative student attitudes towards mathematics, lack of investment in teaching resources had adverse impact on mathematics performance at KCSE. The study

recommends that use of technology in teaching, continuous capacity building to mathematics teachers and frequent exposure and use of interactive teaching techniques to be employed to improve the performance.

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INTRODUCTION

1.1 Background of the study

KNEC subject grouping places mathematics as a compulsory subject. Consequently, every learner in secondary school is required to take mathematics as an examinable subject. Further, mathematics is given in two categories: Alternative A and Alternative B. The total candidature in each category for the years 2018 and 2019 is summarized below.

Table 1

	CANDIDATURE	
	ALTERNATIVE A (121)	ALTERNATIVE B (122)
2018	658,904	1161
2019	694,445	1126

SOURCE KNEC, 2019

Data from KNEC shows that a majority of students are examined in mathematics Alternative A. Consequently, it is imperative to interrogate the performance in mathematics for Alternative A.

Kenya, through its Vision 2030, aims to achieve middle income status through accelerated innovation in science and technology and manufacturing. A strong foundation in mathematics creates influences learning capabilities in engineering, vocational education and other technical disciplines (Abdurrahman & Madugu, 2014). However, there has been dismal performance in the subject consistently alarming education planners and the government. As a compulsory subject, a poor grade in mathematics has a direct impact on the overall grade of the learner, and consequently, on prospects of furthering education in tertiary institutions. Mathematics performance in KCSE countrywide for five consecutive years is summarized in table 2.

Table 2

Year	**No. of candidates**	**Maximum score** **(paper 1 & 2) -**	**Mean score** **(paper 1 and 2**

			combined)
2015	**520,274**	**200**	**40.87**
2016	**570,398**	**200**	**41.20**
2017	**609,525**	**200**	**43.46**
2018	**658,904**	**200**	**41.1**
2019	**694,445**	**200**	**43.91**

Source: KNEC, 2020

The causes of such poor performance have been source of interest for curriculum planners, education scholars and other stakeholders for long. Karigi (2015) attributed poor performance in mathematics to insufficient resources in schools. Specifically, lack of enough teachers led to high workload which hampered effective engagement with each student. With introduction of free primary education, school enrollment increased without a corresponding investment in infrastructure and learning resources. Consequently, the quality of learning in secondary schools has deteriorated.

Negative attitudes in mathematics have impacted how mathematics is viewed and performed. Dowker, Cheriton & Horton(2019) found that positive attitudes in mathematics influenced student performance. Specifically, pupils with relatively positive view of mathematics showed btter scores in mathematics. Consequently, it can be inferred that negative attitudes have adverse effects in performance of mathematics. In a study linking attitudes to performance, Karigi (2015) found 81% of the students had negative attitudes towards mathematics.

There have been measures put in place to deal with this situation. The government of Kenya through TSC has been continuously employed teachers to bridge the gap of student teacher ratio. In 2009, the KNEC introduced mathematics alternative B as a measure to improve performance in mathematics. Also, programs such as SMASSE have been introduced to in-service teachers to improve mode of instructions and assessment to improve learning in mathematics. However, these measured have succeeded to certain extents and more needs to be done.

1.2 Statement **of the problem**

In the 2019/2020 budget, allocation from the National Government for education sector stood at 473 billion Kenya Shillings (The Standard, 2019). The government has also continued to employ more teachers to bridge the gap in the teacher-student ratio. Specifically, the government has come up with various initiatives to boost performances in Mathematics, sciences, engineering and Technology through SMASSE. In addition to improving the performance these subjects, SMASSE aims to uplift the standards of teaching and learning, enhance classroom for quality teaching and develop teaching and learning materials for mathematics and sciences (smasse, 2010).

Despite all these interventions by the government and other specific measures by education stakeholders within the Kandara SubCounty, mathematics continues to be poorly performed. In 2020, majority of students (63.8%) got D- and below in the KCSE (Kandara SCDE, 2020). The trend of performance in mathematics has remained stagnant in Kandara Subcounty over a period of four years. This trend has worried stakeholders and policymakers. Prevalent among the contributors is that students in the Subcounty have poor attitudes towards mathematics by both the teachers and the students. Mathematics teachers with favourable attitudes stimulate those attitudes in their students (Yara, 2009). In addition, Schenkel (2009) found student attitudes towards mathematics are highly correlated with their performance. Poorly trained teachers as well as inexperienced teachers do not deliver syllabus content effectively (Zhang, 2008). Some schools in the Subcounty have inadequate facilities in terms of classrooms, books and resources that hamper effective teaching of mathematics.

In view of this, the researcher embarked to explore teacher- centred factors, students attitudes and facilities that affect performance in Mathematics at KCSE as well as their extent.

1.3 <u>**Objectives of the Study**</u>

The study is guided by the following specific objectives:

i. To explore how students' and teachers' attitudes towards mathematics influence performance in Kandara SubCounty.

ii. To investigate if poor performance in mathematics in Kandara SubCounty is caused by inadequate teacher's training.

iii. To find out if availability of facilities contributes to dismal performance in mathematics.

1.4 **Research questions**

i. Are attitudes towards mathematics an influence in mathematics performance in schools in Kandara SubCounty?

ii. Does availability of resources impact performance in mathematics in Kandara Subcounty schools?

iii. Does teacher's training influence mathematics performance in Kandara Subcounty selected schools.

1.5 **Significance of the study**

The study results anticipates reasons on why there is massive failure in mathematics in Kandara as well as recommendations on the best measures that can be taken. Specifically, the study will provide important pointers to teachers, education officials and policymakers on the root causes of mathematics mass failures. The recommendations will give appropriate interventions that can be implemented.

The findings will form a foundation for future studies concerning factors influencing performance in mathematics. The study will also be helpful to educational stakeholders and curriculum planners on how best to improve teacher training especially with regards to mathematics teachers. The study will take stock of extent of facilities in the selected schools and how they influence performance and take appropriate measures.

1.6 **Scope of the study**

The scope of the study extends to teachers and students in secondary schools from randomly selected schools in Kandara. The selected schools were public schools. In addition, specific objectives extend to teachers' and students' attitudes, teacher capacity building and training and adequacy of facilities for teachers of mathematics.

1.7 **Assumptions of the study**

a. Schools follow approved syllabus by the KICD.

b. Students have similar entry behaviour at form one.

c. The teacher training follow the same training programme.

1.8 **Limitations of the study**

Kandara subcounty is expanse. Data collection was time consuming. However, the researcher selected random schools for data collection. The data gives findings for few schools and limits generalizations for large populations. Some respondents were reluctant to divulge information.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

A review of past studies and findings on contributors to poor performance in mathematics. These will be restricted to those studies that dealt with attitudes towards mathematics, teacher training and availability of facilities. They will give an important basis for this study.

2.2 Attitudes

An attitude is a set of emotions, beliefs or behaviours towards a certain entity. Students have different perceptions towards mathematics. Past studies have highlighted the indispensable role of attitudes in performance of mathematics. Therefore, a lot of studies have been done and a positive correlation between attitudes and the general performance of a student has been established.

2.2.1 Student attitudes

Schenkel (2009) found that student's attitudes influence learning by either facilitating or inhibiting learning of mathematics. Conversely, a student's performance in mathematics can also influence his or her attitude towards mathematics. Those students who perform better have favourable attitudes, while students who perform poor will have negative attitude towards mathematics (Motanya, 2018). Motivation, self-instruction and cooperative instruction are some of the strategies a teacher can use to improve students' attitudes towards mathematics (Ifamuyiwa & Akinsola,2008). Mbugua et. al (2012) also found that students' attitudes strongly influenced performance.

Wachira (2016) in his study on student attitudes towards mathematics found that half of the students, 53.9%, showed negative feelings towards mathematics as compared to 40.7% of the student respondents. The respondents exhibiting negative attitudes towards mathematics said that they found the subject to be neither interesting nor fun. He recommends that teachers should use a variety of measures to ensure student take interest in mathematics. This include use of ICT, giving of extra work to weaker students and increased assessment.

Karigi & Tumuti (2015) found a majority of students (72.5%) exhibited negative feelings towards mathematics. This group had negative attitude towards mathematics in all areas such as seeing and liking mathematics and not caring whether they failed in mathematics. Only a small minority of (27.5) had a positive attitude towards mathematics. They also found that the students recommended that teachers to encourage their students and they be induced to like mathematics as they join form one. The researchers recommended that schools to motivate their students and induce positive attitudes towards mathematics.

Oyugi (2018) found that 51.4% of the student respondents did not like mathematics, 14.3% were uncertain while 34.4% agrred that they like mathematics. On the same study they found that majority of the students face difficulties in solving mathematics problems. The researcher makes a case that attitudes towards mathematics should be moulded at a younger age preferably at primary school. The researcher argues that giving incentives to students may motivate to perform better.

Mohamed & Waheed (2011) in a study involving 195 high school students in Maldives found that student attitudes towards mathematics was medium scoring an average of 3.0 out of 5. This, however, is not translated into performance where majority of students failed in mathematics. The study recommends enhanced effort to improve attitudes as well as further studies.

2.2.2 Teachers' attitudes

Teachers' attitudes towards have an impact on student performance. These attitudes can either be towards their students or towards mathematics. These attitudes are instrumental in shaping attitudes of the learners. Generally, a teacher's attitude would be evaluated under the following basis as argued by Ogunniyi (1982): teacher's enthusiasm, resourcefulness, grasp of the subject matter

Mensah and Okeyere (2019) investigated teachers' attitudes and how they relate to student attitudes. Using descriptive design survey and a sample from high school students, the study showed teachers' attitudes have a positive correlation with student attitudes towards mathematics. Additionally, a teacher with favourable attitudes induce positive attitudes to his or her students (Mensah and Okeyere, 2019). There was also a significant correlation between a student attitude and his or her performance. Consequently, teachers' attitudes influences students' attitudes which impacts the students' performance in mathematics.

Standslause et.al (2013) found that teacher's attitude is vital in moulding the learners' attitudes towards mathematics. They also found that both the teacher's attitudes and learners' attitudes were a good predictor of student performance in mathematics. Teachers' creativity and innovativity in classroom, good grasp of mathematical content were recommended in order to stimulate learners' attitudes.

Wachira (2016) in a sample from selected schools in Nyandarua North found that 64.5% of the teachers has positive attitudes towards teaching of mathematics, 5.9% were undecided while 27.7% were found to have adverse attitude towards mathematics. Further, Wachira (2016) posits that changes in approach used for problem solving to one that greatly depends on teacher's attitudes is needed.

2.3 Teacher Training

Teacher training refers to policies, processes and capacity building for teachers to effect instruct learners, assess learners and implement curriculum. Consequently, effective teaching and learning and creating a conducive learning environment occurs when teachers have undergone relevant training to gain skills and knowledge. Kuluo (2018) found that the level of teacher training influenced student academic performance and student attitude towards learning. Further Kuluo (2018) noted a significant difference in mastery of content, content delivery and time management between trained teachers and untrained teachers. Therefore, poor mathematics performance can be as a result of teacher training.

Hafeez (2021) concurs that teacher training impacts students academic performance. Assessing student performance before and after teacher training, he found that there was improvement in performance after teachers had been trained. This is in agreement with Olowabi and Adedayo (2012) that student academic success is significantly impacted by level of teacher professional training. In addition, teacher training enables teachers to choose appropriate instructional method (Hafeez, 2021). Therefore, teacher training both pre-service and in-service are vital in improving student performance.

In addition, Unanma, Abugu, Dike, and Umeobika (2013) concluded that teacher qualification and student performance in Chemistry were correlated. This is in agreement with Aambusaidi and Yang (2019), and Metto, Karanjah, and Ivivi (2018) whose studies inferred that teachers' qualifications had influence on student performance.

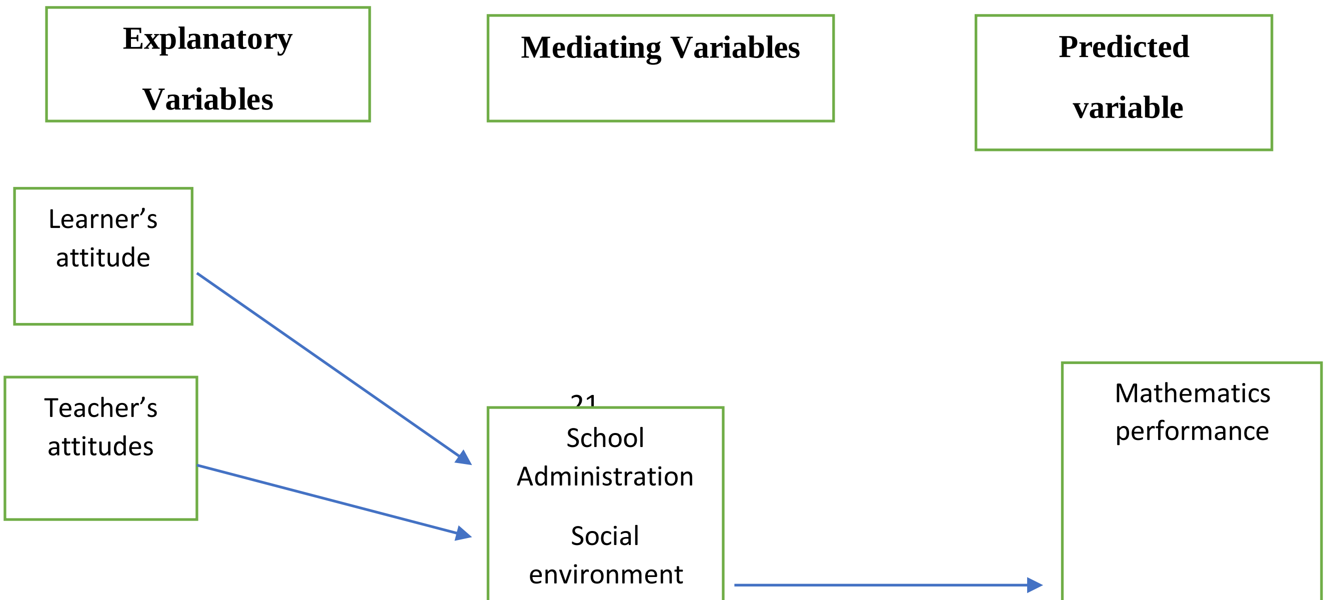
Conversely, Molenje (2020) found that no causal association between training of teachers and student outcomes in mathematics. Specifically, Molenje (2020) found that higher teacher qualifications have no impact in student academic performance. Agreeing with this assertion, Dahar, Dahar and Faize (2011) found that higher teacher qualifications have insignificant relationship to student academic performance in sciences.

2.4 Availability of resources

The resources available to teachers in a school setup for use in teaching can influence the student performance. These resources include textbooks, charts, mounted graphs, calculators, geometric sets and mathematical tables. As a result, they are crucial in learning of mathematics and lack thereof is detrimental to student performance. These are the teaching and/or learning facilities and they significant influences on student outcomes (Konyango et. al, 2018). This is in agreement with Mucai (2013) and Okongo et. al (2015)

Adino (2015) found that lack of enough resources such as calculators hindered syllabus coverage and consequently poor performance in mathematics. This finding concurs with Kamau (2020) and Yusta et. al (2016). Therefore, mathematics performance is influenced by the resources used in teaching the subject. Lack of enough books, charts and calculators greatly impact teaching of mathematics.

Theoretical Framework



CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

It involves an exploration of techniques deployed in data collection for this study.

3.2 Research Design

This is the framework and techniques employed by the researcher to answer the objectives of the study. This research study used cross-sectional descriptive research design. Through it, the researcher was able to gather and analyse data, examine, conceptualize and infer findings about the phenomenon under study. Since the researcher aims to describe, examine and infer a situation as it exists without manipulating any variable, descriptive research design becomes the best tool for the study (Siedlick, 2020). Consequently, a descriptive research study is best for generalizing facts about a condition or event. In addition, descriptive research design provides both qualitative and quantative data analysis.

3.3 Location of the Study.

The researcher selected 15 secondary schools in Kandara. Located 60 kilometers north-east of Nairobi, the Sub-County performs poorly among the subcounties in Murang'a. Additionally, mathematics has consistently been ranked as the poorly performed subject in Kandara Sub-County. Since the researcher has interest in the location, it is ideal location to carry out the study.

3.4 Sources of Data.

Data of the study was collected using questionnaires. Bhandari (2022) states that a questionnaire is a series of questions used in obtaining data from respondents. The questionnaire tool was chosen since the data obtained in free from the researcher's prejudice and bias.

3.5 Target Population

This is the entirety of individuals that a researcher aims to conduct study and make inferences from (Loiuse, 2018). There are 57 public schools in Kandara Sub-County. Table 3 summarizes the population by categories.

Table 3

Category	Size
Head of Institutions	57
Head of Department, Mathematics	57
Mathematics teachers	307
Students	8,513

Source: SCDE Kandara 2020.

3.6 Sample Size and Sampling Techniques

Gall and Borg (2003) suggest that a third of the population to be an acceptable sample size. Therefore, the sample comprises of 15 schools with a summary of sample size from each population category given in table 4.

Table 4

	Population Size	Sample Size	Size from each school
Head of Department, Mathematics	57	15	1

Mathematics teachers	307	45	1
Students	8,513	150	10

The schools to be included in the study were selected using stratified random sampling. The schools were divided into three strata: subcounty day schools, subcounty boarding and extracounty schools. Excluding Extra County schools and using a simple random sampling, 15 schools were chosen to be included in the study.

Teachers selection followed systematic sampling. By writing the names of the teachers on a paper and selecting every fourth name in the list, 60 teachers were chosen. For schools with two or more streams, the stream and students to be included were obtained through random sampling.

Thus, in total the sample size was 180 comprising of 15 HODs, 15 teachers, and 150 students.

3.7 Research Instruments

The information required by the researcher was gathered in an organized way to make meaningful analysis. The information was sought from respondents through open-ended as well as closed questionnaires. The data sought was limited to the objectives of the study: students' attitudes, level of training of teachers and availability of facilities in the school.

The researcher developed two sets of questionnaires according to the category of the respondents. The student's questionnaire had two sections. Section A aimed at gathering background information while section B aimed at assessing student's attitudes towards mathematics. Teacher's questionnaire had two sections. Section A aimed at gathering background information while Section B aimed at gathering information on the teacher's training,

3.8 Data collection and Analysis

Permission from the head of the institution was obtained and granted. The HOD Mathematics in the institutions helped in choosing the students and the teacher to include in the study. Once selected, questionnaires were distributed and appropriate time allowed for respondents to fill. Once filled, the questionnaires are collected, edited for accuracy and consistency. At the same time, the researcher interviews the head of the institution.

Both quantitive and qualitative data is fed into Excel for analysis and presented as frequency tables, pie charts.

3.9 Ethical Issues

Before collecting data in a school, the researcher obtained permission from the head of the institution. Additionally, the researcher obtained consent from both teachers and students before the questionnaires were distributed. Also, the aims of the study were disclosed to participants. An assurance was given that confidentiality will be maintained and data obtained is strictly for academic purposes only. The researcher strived to avoid questions that would sought sensitive information from the respondents.

CHAPTER 4

RESULTS AND FINDINGS

4.1 Introduction

The findings of the research are presented and interpreted. The study investigated influences of poor outcomes in KCSE in mathematics in Kandara. Specifically, the researcher wanted to answer the following questions:

i. Do attitudes towards mathematics contribute to dismal outcomes in mathematics in Kandara SubCounty?

ii. The extent to which unavailability of student resources contributes towards poor performance in mathematics in Kandara Subcounty?

iii. Does teacher's training influence outcomes in mathematics in selected schools in Kandara Subcounty?

The findings are presented as frequency tables, charts, and rates.

4.2 Response Rate

This is percentage of participants as compared to those who were asked to participate in the study. Out of 360 respondents, 312, representing 89%, returned the questionnaires. The return rate meets the threshold of 60% return rate for descriptive research. Consequently, the response rate was found adequate to make inferences about the objectives of the study.

Table 5

Respondents	Sample size	Number returned	Rate in %
Mathematics teachers	30	27	93

Students	150	128	85
Totals	180	155	86

4.3 Demographic analysis of the Respondents

To put the study into a social context, background data was requested from participants. This included age, gender and type of the school.

4.3.1 Age

Table 6

	Frequency	
Age	Students	Teachers
10 – 14	32	0
15 -19	96	0
20 – 29	0	4
30- 39	0	16
40 - 49	0	5

50 - 65	0	2

Table 6 shows that majority of the students at 62% were aged between 15 to 19 years. This is consistent with the mean ages of secondary students in form 3 and 4. Half of the teachers were aged 30 – 39.

4.3.2 Gender

Table 7

	Frequency	
Category / Gender	Teachers	Students
Male	16	68
Female	11	59

Table 7 shows that a majority of the teachers at 59% were male compared to 41% female. Additionally, male students were slightly more than female students at 53% against 47% respectively.

4.3.3 Type of school

The are three categories of school in Kandara Sub-County: National schools, ExtraCounty schools, and Sub-County schools. However, data obtained by the researcher from Education Office showed good performance in mathematics in national and extracounty schools but poor performance in subcounty schools. Therefore, the respondents of the study came from subcounty schools. These are classified into two: day schools and boarding schools.

Table 8

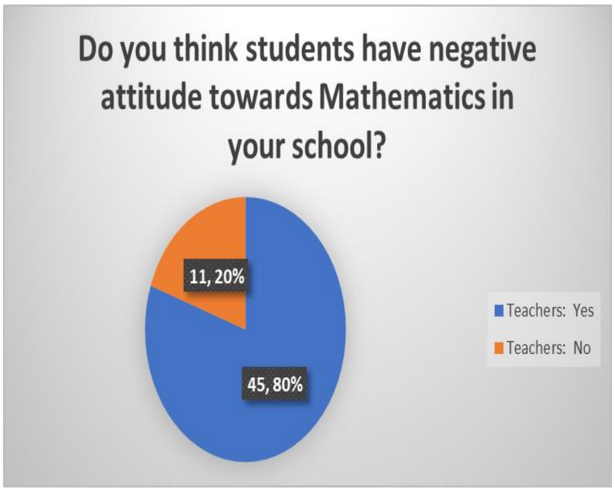
Category of school	Number of schools in the sample
Day schools	11
Boarding schools	4
Total	15

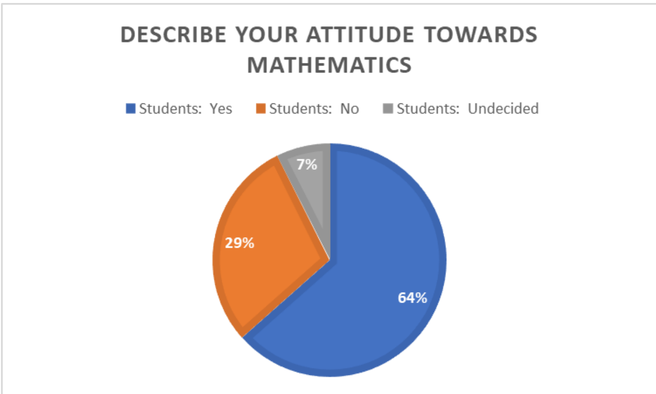
Table 9

	Frequency		Total
	Day schools	Boarding schools	
Students	98	30	128
Teachers	14	13	27

4.4 Attitudes towards mathematics

Exploring students' attitudes towards mathematics was an objective of the study. The questionnaire asked respondents to respond “Yes” or “No” to the question: “Do you have negative attitudes towards mathematics?”





From data above, 21 teachers (80%) against 6 teachers (20%)believe that their students have a negative attitude towards mathematics. In comparison, 81 (62.9%) students have poor attitudes toward mathematics. Additionally, 37 students have positive outlook towards the subject while 9 students have a mixed feeling about the subject.

The study sought to determine whether attitudes have a bearing in the performance in mathematics. The researcher asked the students to state the mathematics performance since they joined form one. The table below summarizes the responses according to student attitude.

Table 10

	Frequency					Totals
Rate	Poor	Average	Good	Very Good	Excellent	
Positive	0	5	14	7	11	37
Negative	43	29	5	3	2	82
Undecided	7	2	0	0	0	9
Totals	50	36	19	10	13	128
Percentage	39%	28%	15%	8%	10%	

The study found that four times as many students performed poorly as those who performed excellent at 39% against 10%. A majority of students with negative attitude performed poorly at 43 out of 128 (52%) while a majority of the students with positive attitudes had excellent performance at 11 out of 37 students (30%). These findings concur with Hwang and Son (2021) that the student attitude towards mathematics as an examinable subject influences performance. That is, negative attitude in mathematics leads to poor performance.

The researcher asked teachers whether they believed mathematics was poorly performed in their schools. The table 11 summarizes their responses.

Table 11

Response	Number of teachers	Percentage
Yes	18	67
No	9	33

Twice as many teachers believe that mathematics is poorly performed in their schools at 67% and 33% respectively.

The researcher asked students to state the grade they expect to get in KCSE. The table 12 summarizes the responses.

12

A plain	A minus	B plus	B plain	B minus	C plus	C plain	C minus	D plus	D plain	D minus	E
25	10	7	8	4	25	10	18	13	5	3	0

Comparing attitudes and the expected grades, the distribution is as follows.

13

	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	E	
Positive Attitude	18	2	7	1	2	5	1	1	0	0	0	0	37
Negative attitude	5	8	0	7	2	15	8	17	12	5	3	0	82
Undecided	2	0	0	0	0	5	1	0	1	0	0	0	9
Totals	25	10	7	8	4	25	10	18	13	5	3	0	128

The study found that students with negative attitudes generally have poor prospect in mathematics performance.

The researcher asked the respondents statements that gauge the extent of their attitudes towards mathematics. The responses are summarized below.

4.4.1 I find mathematics applicable in life

Table 14

	Number of respondents	% out of the total
S.A.	21	16%
A.	19	15%
U	2	2%
D.A	39	30%
S.D	47	37%
Totals	128	100

KEY: S.A – Strong Agree, A. – Agree, U – undecided, D.A – Disagree

S.D. – Strongly Disagree

Asked whether they find mathematics applicable in life, 67% disagreed, 31% agreed. Only 2% were undecided.

4.4.2 I find mathematics as a subject difficult

Table 15

	Frequency	Percentage
Strongly Agree	49	38%
Agree	32	25%
Undecided	9	7%

Disagree	21	16%
Strongly Disagree	17	13%
Totals	128	100

4.4.3 I find mathematics lessons lively and enjoyable

Table 16

	Frequency	Percentage
S.A.	21	16%
A	25	20%
U	2	2%
D.A	29	23%
S.D.	51	40%
Totals	128	100

KEY: S.A – Strong Agree, A. – Agree, U – undecided, D.A – Disagree

S.D. – Strongly Disagree

The researcher asked the respondents whether they find mathematics lessons lively and enjoyable, 40% and 23% had strong disagreement and disagreement, 36% agreed while 2% were undecided.

4.4.4 Students in your school love mathematics

Table 17

	Frequency	Percentage
Strongly Agree	22	17%
Agree	25	20%
Undecided	6	5%
Disagree	41	32%
Strongly Disagree	34	27%
Totals	128	100

4.4.5 I get anxious and afraid when approaching mathematics exam

Table 18

	No. of students	%
S.A.	45	35%
A	38	30%
U	0	0%
D.A	23	18%
S.D.	22	17%
Totals	128	100

KEY: S.A – Strong Agree, A. – Agree, U – undecided, D.A – Disagree

S.D. – Strongly Disagree

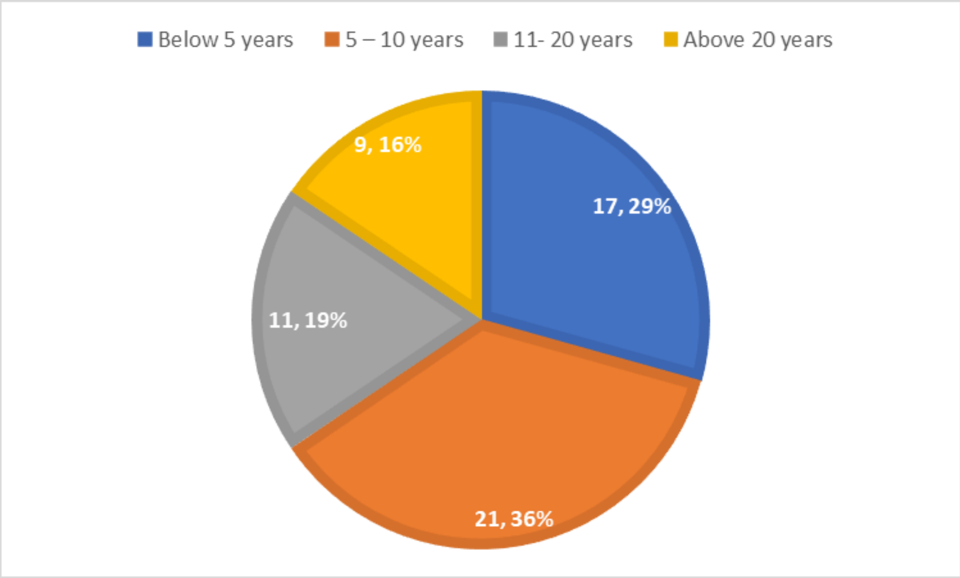
The researcher asked the respondents whether they get afraid and anxious when approaching mathematics exam. 35% strongly agreed, 30% disagreed respectively, while a total of 35% disagreed with the statement. No respondent was undecided.

4.5 Teacher training

Another objective was to investigate whether teacher training impacts student outcomes in mathematics. The researcher asked the teachers to state the duration they have been teaching mathematics.

Table 19

Duration in service in (Years)	Number of teachers	Percentage
Below 5	8	30%
6 to 10	15	55%
11 to 20	3	11%
Above 20	1	4%
	27	100



The study found that 8 teachers had less than 5 years teaching experience and a majority had between 5 and 10 years of experience.

Table 20

Highest qualification	Number of teachers	Percentage
Diploma	1	4%
Bachelor's Degree	22	81%
Postgraduate Diploma	3	11%
Masters	1	4%
Doctorate	0	0%
Total	27	100

Almost all teachers (81%) stated that their highest qualification is a bachelor's degree. There were no teachers with doctorate degrees.

Table 21

		Frequency				
	Statements	**SD**	**D**	U	**A**	**SA**
1.	Majority of students submit assignments on time	5	9	0	11	2
2.	Students are always active during the lesson	8	9	0	6	4
3.	I feel adequately trained to teach mathematics	0	0	0	13	14
4.	Mathematics teachers go for their lessons in time	4	5	0	8	10
5.	Instructional methods are student-centred	7	11	2	4	3

Asked whether their students finish mathematics assignment in time, 2 teachers (7%) strongly agreed and 9 teachers disagreed. On training, all of the teachers agreed that they are adequately trained to handle secondary mathematics. However, some teachers (67%) believed the instruction methods they use in teaching mathematics is not student-centred.

The researcher asked teachers whether they have attended in-service training to enhance teaching of mathematics. Table 22 below summarizes the responses.

Table 22

	No. of Teachers	%
"YES"	8	30.4
"NO"	19	69.6
	27	100

Twice as many teachers (69.6%) have no in-service training to enhance mathematic teaching as compared to 30.4%.

Additionally, the researcher sought to know whether the respondents have attended a mathematics seminar or workshop in the last one year. Table 23 below summarizes the responses.

Table 23

	No. of teachers	%
"YES"	5	19
"NO"	22	81
	27	100

It was found that 22 teachers (81%) have not gone to any capacity building workshop for mathematics in the last one year.

4.6 Availability of resources

On availability of teaching and learning resources, the findings are summarized below.

The researcher sought to know KCSE mean for mathematics in the previous year. Table 24 below summarizes the responses.

Table 24

Type of school	A plain	A minus	B plus	B plain	B minus	C plus	C plain	C minus	D plus	D plain	D minus	E	Total
Day school	0	0	0	0	0	0	1	1	2	4	2	1	11
Boarding school	0	0	0	0	1	1	0	0	2	0	0	0	4

Generally, boarding schools performed better than day schools.

In addition, the respondents responded to the number of mathematics teachers in their school

Table 25

	Frequency				
Type of school	1-3	4-7	8-11	12 or more	Total
Day schools	4	6	1	0	11
Boarding	0	1	3	0	4

Schools					

Boarding schools were found to have better teacher student ratio as compared to day schools.

The researcher asked the respondents to respondent whether their school has enough teaching and learning resources. Table 26 below summarizes the responses.

Table 26

	Frequency		Total
	Day school	Boarding school	
YES	3	5	8
NO	14	5	19
Total	17	10	27

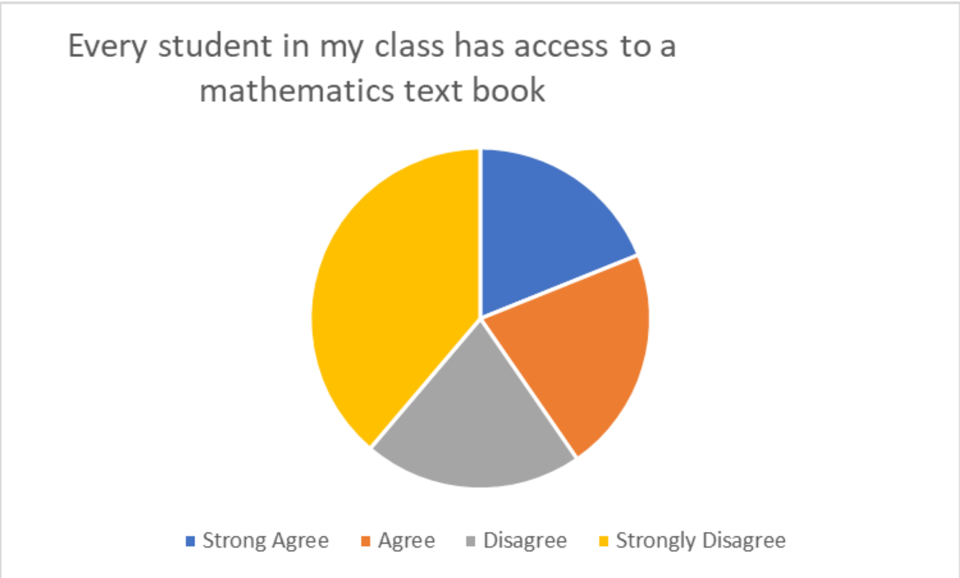
From the table above, it can be deduced that most day schools don’t have enough teaching and learning resources. Three teachers from day schools believe their schools have adequate resources against 5 teachers from boarding schools.

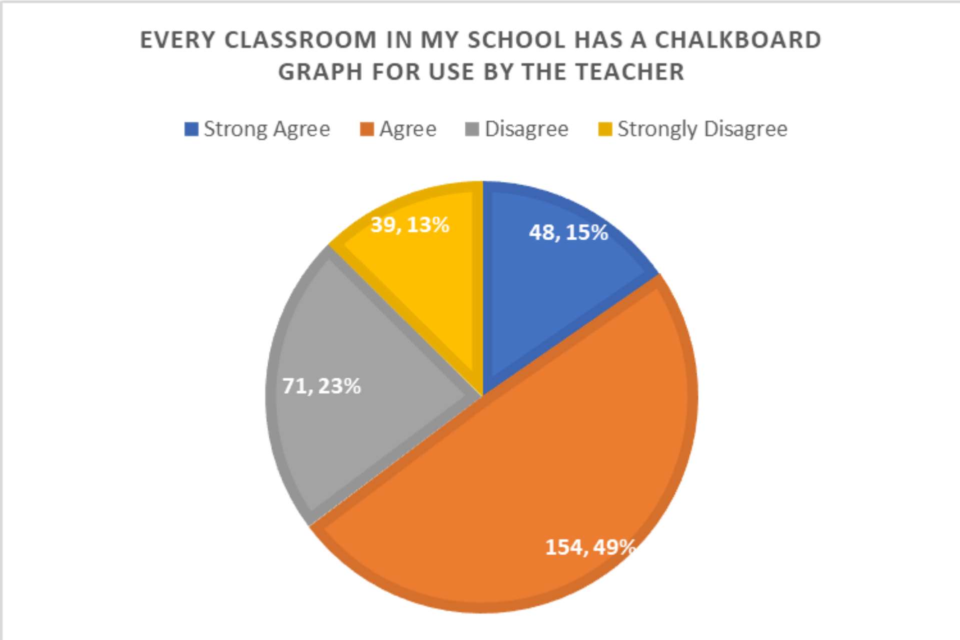
The researcher asked students to respond to the following statements. Table 27 below summarizes the responses.

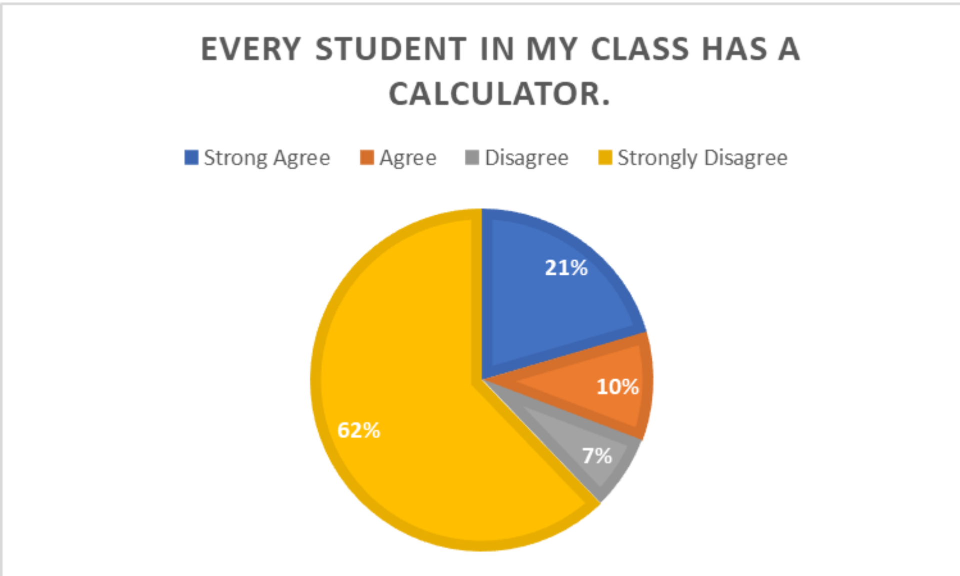
Table 27

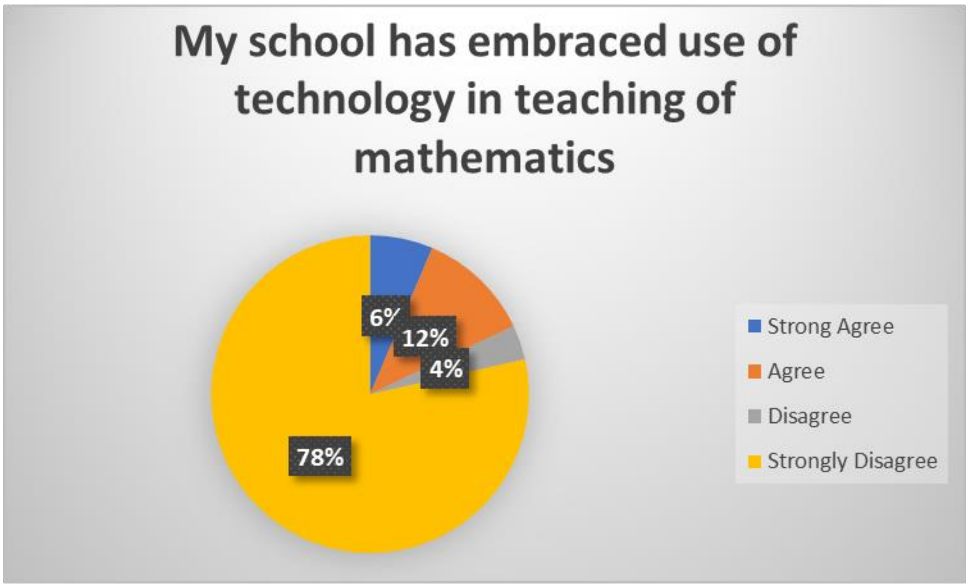
	Frequency				Total
Statement	SD	D	A	SA	128

Every student in my class has access to a mathematics text book	41	34	20	33	128
Every classroom in my school has a chalkboard graph for use by the teacher	11	15	64	38	128
Every student in my class has a calculator.	52	29	25	22	128
My school has embraced use of technology in teaching of mathematics	64	31	12	19	128




EVERY CLASSROOM IN MY SCHOOL HAS A CHALKBOARD GRAPH FOR USE BY THE TEACHER
Strong Agree
Agree
Disagree
Strongly Disagree
48, 15%
154, 49%
71, 23%
39, 13%


EVERY STUDENT IN MY CLASS HAS A CALCULATOR.
Strong Agree
Agree
Disagree
Strongly Disagree
21%
10%
7%
62%



4.6.1 Inadequacy of textbooks, revision materials and Limited access to library materials hinders effective teaching and learning of mathematics .

Table 28

	Number of teachers	Percentage
S.A.	20	74%
A	7	26%
U	-	-
D.A	-	-
S.D	-	
	27	100

KEY: S.A – Strongly Agree, A – Agree, U – Undecided, D.A – Disagree, S.D. – Strongly disagree

All teachers except one (SA=74%, A=26%) agreed with the statement that inadequate textbooks, revision materials and limited access to library materials adversely impacts performance in mathematics.

4.6.2 Availability and effective utilization of teaching and Instructional materials have a great potential of improving performance in mathematics in KCSE

Table 29

	Number of teachers	Percentage
S.A	21	78%
A	6	22%
U	-	-
D.A	-	-
S.D	-	
	27	100

KEY: S.A – Strongly Agree, A – Agree, U – Undecided, D.A – Disagree, S.D. – Strongly disagree

All the teachers agreed with the statement in the questionnaire: "availability and effective use of teaching and learning materials has a positive impact on mathematics performance" (SA=78%, A= 22%)

CHAPTER 5

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

A summary of the study, interpretations, conclusions and implications for future research. Data obtained from Kandara SubCounty Education offices showed that 2067 and 1094 students out of 4952 got mean grades E nd D- respectively in 2020 KCSE. This presents a challenge when it comes to furtherance of tertiary education. The researcher wanted to understand the roots of the massive failure in mathematics continuously witnessed at KCSE in Kandara. However, the study was limited to it's objectives: how both students' and teachers' attitudes towards mathematics impacts performance, how teacher training impacts mathematics performance, and how adequacy or lack thereof of resources in schools impacts performance.

To answer those questions, a descriptive study approach was adopted targeting 15 of the worst performing schools in Kandara. From each school, four teachers were chosen. Additionally, in each school 20 students were chosen selected. Data was obtained through use of a questionnaire.

5.2 Findings Summary

Most teachers (80%) agreed that students have negative attitude towards mathematics. In comparison, 64% of the students described their attitude towards mathematics as negative. 29% of students have a positive attitude while the undecided was 7%. Therefore, among the respondents there is agreement that attitudes towards mathematics by students are negative.

Majority of those who performed poorly in mathematics since joining form 1 (83.6%) described their attitude towards mathematics as negative while a majority who posted excellent grades had positive attitudes (69.6%). This shows a causal relationship between mathematics performance and attitudes.

65% of the teachers had less than 20 years of experience in teaching mathematics as compared to 35% who have more than 20 years of experience. Furthermore, all the teachers were qualified to teach in school with majority having bachelor's degree as their highest qualification (87.5%). However, the study found that few teachers are exposed to in-service training, workshops and seminars for mathematics teachers. Out of 56 teachers, 39 have not attended a seminar in the past one year. This represents 69.6% of the teachers.

From the study, it was generally observed that boarding schools are better equipped with resources and teachers than day schools. Consequently, boarding schools in the study showed better performance than day schools. In terms of teachers, boarding schools had more teachers than day schools. Majority of teachers in boarding schools (70%) believed that their schools are equipped with enough infrastructure and teaching and learning resources in mathematics as compared to 36% of teachers in day schools who believed they do not have enough resources.

5.3 Conclusion

It can be concluded that students in Kandara SubCounty show negative attitudes towards mathematics. They perceive mathematics as inapplicable in daily life, boring and extremely difficult. Consequently, continuous dismal performance can be attributed to these negative feelings that hinder learning and understanding of mathematical concepts.

Inferences can also be drawn from the study that teacher training and exposure have a positive effect in mathematics performance. Although mathematics teachers in Kandara have requisite qualifications, lack of exposure greatly reduces innovative teaching.

The study concludes that teaching and learning resources available in a school affects mathematics performance. While some schools in Kandara have enough taechers as well as enough infrastructure and resources to teach mathematics, most of them especially day schools are ill-equipped. Consequently, these schools are greatly disadvantaged in teaching of mathematics.

5.4 Recommendations

The researcher makes the following recommendations:

i. Teachers to inculcate positive feelings and attitudes in students towards mathematics.

ii. Teachers should make mathematics a life subject. Students should be able to relate mathematics concepts to their daily experiences.

iii. Continuous training in form of seminars and workshops through initiatives such as SMASSE should be regular.

iv. Deplyment of ICT facilities in planning, assessment and teaching and learning of mathematics .This will help to ease inadequacies in resources as well as make mathematics lessons lively.

v. Employment of enough teacher of mathematics

5.5 Recommendations for future studies

This research was limited to attitudes towards mathematics, teacher's professional training and adequacy of resources for teaching mathematics. Future studies should seek to explore the extent attitudes contribute towards academic performance.

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Appendices

Student Questionnaire.

Tick as appropriate. Put a cross (×) or a tick (✓) to indicate your choice.

SECTION A

1. Gender.

   M

   F

2. What is your age? 12 – 14 ………….

   15 -18………..

   Above 18 ……..

3. In which class are you currently in?

   form 3 ☐
   form 4 ☐

SECTION B

1. What is your recent grade in mathematics? (previous term's grade)…………..

2. What grade do you expect to get in mathematics at KCSE? (Circle your choice)

   A A- B+ B B- C+
   C C- D+ D D- E

3. Describe your attitude towards mathematics

   Positive

   Negative

   Undecided

Teacher Questionnaire

1. Gender. Male …….. Female …….
2. Age
   a. 21- 30 …………….
   b. 31-40 …………
   c. 41 – 50 …………
   d. Above 50 ………..
3. Category of school

Category	Tick where appropriate
Boarding school	
Day school	

SECTION B

1. State the highest level of academic qualification?
   - ☐ Diploma
   - ☐ Undergraduate Degree
   - ☐ Postgraduate Diploma
   - ☐ Masters
   - ☐ Doctorate
2. What is your duration that you have been teacher of mathematics at secondary school?
   - ☐ Below 5 years
   - ☐ 5 – 10 years
   - ☐ 11- 20 years
   - ☐ Above 20 years
3. Have you taken any in-service professional training since your employment geared towards enhancing teaching of mathematics?
   Yes

   No
4. Do teachers attend mathematics workshops or seminars in the last two (2) years

   YES

   NO

5. Do you believe that mathematics is poorly performed in your school?
   YES----

   NO----
6. Do you believe your school has enough mathematic teachers?

   YES

   NO

7. Does your school have enough teaching and learning facilities?
   Y………………. N……………..
8. How many teachers of mathematics are in your school?
   1 -3
   4- 7
   8-11
   Above 12

9. State the KCSE school mean in mathematics for the previous year.

10. Would you say students in your school have negative attitude towards Mathematics?

    a. Y………………………………… (b.) No……………

11. The following statements relate to the adequacy of teaching and learning resources for mathematics.

Statement	SD	D	U	A	SA
Inadequacy of textbooks, revision materials and Limited access to library materials hinders effective teaching and learning of mathematics					
Adequacy and effective use of teaching and Instructional materials have a great potential of improving performance in mathematics in KCSE					