SAINT MARY'S UNIVERSITY OF MINNESOTA
NAIROBI CAMPUS

CHRIST THE TEACHER INSTITUTE FOR EDUCATION

Factors Affecting Academic Performance in Mathematics of Students at Langata High School

By

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DECLARATION

I, the undersigned hereby declare that this project is my original work, the fruit of field, library research; and critical reflections. It has never been submitted to any other university for academic credit. All sources and material used have been fully acknowledged.

Lufutu — 11th May 2005

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DEDICATION

To my beloved and best friend Mother Kembikisa Adolphine, who helped me to dig into and find this Pearl- Education, which I treasure within me.

To my Brother Imfumu Tsimba Evariste.

To all those who venture in the field of Mathematics.

To all Students and Teachers of Langata High School, Nairobi.

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ABSTRACT

Mathematics in education has always been highly regarded in every corner of the world. This is largely because of the place of mathematics in our lives. Mathematics plays a very important role in our lives, both ordinary as well as functional. Above all, Mathematics is central for academic life.

This study investigated factors affecting academic performance in mathematics at Langata High School. It was assumed that poor performance in mathematics was a result of poor learning of mathematics and negative attitudes towards the subject. This study therefore investigated the factors affecting the performance of students.

The survey design research was used to find out the factors affecting academic performance of students in mathematics. The target population consisted of students, teachers and administrators of Langata High School. The data of the questionnaire was analysed in terms of themes and connected with the objectives and research questions. This was done both qualitatively and quantitatively. Pie charts, tables, percentages, and graphs were used to present quantitative data.

It was generally found that the content of mathematics taught in secondary schools was relevant to the level of education and the needs of students. However, some topics seemed to very abstract, wide and very difficult to relate to daily life situations.

The attitudes of students towards mathematics were sought. It revealed that some students have positive attitudes towards the subject whereas others have negative attitudes towards

mathematics. This indicated that the students showed mixed feelings in terms of attitudes, which are very difficult to conclude as positive or negative. The majority of students strongly agreed that mathematics is very useful for their life. They found mathematics of assistance in gaining good jobs opportunities while few students found mathematics useless because their future life does not need mathematics at all. Thus they suggested that mathematics should be made optional. For them just elementary knowledge of mathematics was satisfactory.

Remarks were made that the majority of students do not have a good foundation in mathematics from primary school. By the time they reach form one, they have already acquired negative attitudes towards the subject. As a result they do not perform well in the subject. The study also showed that students believe that mathematics is a very difficult subject and only special students can do well in mathematics. Thus poor background was one of the factors affecting academic performance of students.

It was also found that the majority of the students were satisfied with the performance of the teachers in their teaching. Teachers used all the possible means to make their lessons very interesting. However, teachers admitted that they had some problems in handling topics like navigation, probability, direction of wind and water, and reflection. These topics seemed very wide and too abstract; caused problems of finding teaching aids related to these topics even if they found them it is hard to relate them to real life. They caused problems to both students and teachers. Teachers further stated that these topics should be removed from the syllabus. The result of the study revealed that the lack of textbooks, and students' poor foundation in mathematics from primary school, which leads to negative attitudes, are the major factors of poor performance in mathematics

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ABBREVIATIONS

CUEA: Catholic University of East Africa

CTIE : Christ the Teacher for Education

KSCE: Kenya Certificate of Secondary Education

S D: Standard Deviation

UK: United Kingdom

USA: United States of America

$\bar{X}$: Mean

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CHAPTER ONE

INTRODUCTION

Education is as old as humanity. Since human beings have been on earth from between two to four million years as some biologists estimate, people have been learning from one another and their environment for all time (Belot, 1994). Education is central to constructive changes in the contemporary world. It has been seen as a vital tool in imparting knowledge and empowering people as it broadens their minds and leads them to become useful members of society, as well as transform it.

In modern society, education has a great impact on the individual because it shapes the mind and prepares people to respond to the needs of society. The universal aim of education is to provide people with the minimum skills necessary for them to take their place in society, and for seeking further knowledge for themselves. It helps people to appreciate the cultural and moral achievements of humanity. Quality academic achievement is the answer to school problems. Good performance leads to prosperity and to the betterment of the individual in the society.

Mathematics in education has always been highly regarded in every corner of the world. This is largely because of the place of mathematics in our lives. Mathematics plays a very important role in our lives, both ordinary as well as functional. Above all Mathematics is central to academic life. A working knowledge of mathematics is essential too for a better understanding of others areas of education like Biology, Physics, Chemistry. It is used everywhere such in simple tasks as telling time from a

watch. counting money, and marking days, month and year. Mathematics is found in daily routines such as driving, cooking and even in sports.

Being crucial to our life, mathematics has been emphasized and promoted especially in the field of education and technology. At different levels of education, mathematics is intended to enable student to acquire clear and logical thinking skills needed to solve problems with accuracy, and precision as one encounters in daily life. Statistics, which is one part of mathematics, guides students towards management of his/her life collective as well as personal. It enables students to develop different skills like measurement, computation, estimation, and prediction, which form basic tools for gaining and furthering knowledge and understanding of other disciplines, especially sciences.

1.2 Langata High School

Langata High School is located in Langata division, which is within Nairobi Province under Kibera Division in Nairobi West. Langata High School is a public day school for both boys and girls. In the late 60's, the school was located at the present Wilson Airport.In 1983, it moved to where it is today. Most of the students come from Kibera, the biggest slum of Nairobi and others come from Ongata Rongai. The school has three streams. The mission of the school is to offer quality education to students so as to help them excel The school's Motto is To *Strive, to Excel, and to Serve.*

Langata High School endeavours to achieve the goals of education in its curriculum and through all the activities in the school. The school offers different subjects such as Christian Religious Education, English Language, Biology, History, Mathematics, Physics, Chemistry, Business Education, Kiswahili, Agriculture, Commerce,

Geography, Music, Art and Design. Langata High School provides Guidance and Counselling classes as a way to accompany the students. The school has three streams named after colours: Blue, Green, and Red. Each class has approximately 45 students totalling 520 students. The school participates in the annual drama and dance festivals organized by the Ministry of Education. Langata is famous for its musical band. They have won many competitions, which boost the confidence and morale of students.

There are 32 teaching staff and 16 support staff who help in the smooth running of the school and achieving its educational goals. Moreover, the school invites guest speakers from outside to give talks to the students on various contemporary issues such as drugs, alcoholism, AIDS. There are extra lessons during the holidays for form three and four students, paying special attention to some students who need more help in certain subjects like in English, Mathematics, Chemistry, Physics and Biology.

1.3 Statement of the Problem

Kenya is experiencing a high rate of economic growth; especially in the fields of science and technology which both require a firm foundation in Mathematics. Hence, Mathematics is a necessary tool for studying science and technology as well as a for cultivating development. In addition, as technology develops in the fields of industry and commerce, so does the need for Mathematics rise. There is no doubt that qualified Mathematicians are in short supply. Hence, there is a keen need to put effort into enhancing the teaching and the advancement of Mathematics.

Mathematics plays a vital role in people's lives and helps to raise the living standards of the world. Nevertheless, few people take the risk of being involved in the field of

Mathematics. This is the fact that mathematics is believed to possess a key value in education when compared to others subjects. Competence in this field is viewed as a gateway to opportunities and careers It is this kind of argument, which will encourage studying Mathematics.

Chebet (2001) said that despite mathematics being a core subject in Kenyan curriculum, the performance at national level has been consistently poor. This comes as no surprise as it has been noted that 80% of candidates of Kenya Certificate of Secondary Education fail in mathematics and the average mark is 13%. The reality is that few people take the risk of specialising in it and so there are few teachers of Mathematics in the education domain. Therefore, this is an investigation into factors affecting academic performance of students at Langata High School.

1.4 Objectives of the Study

This study had the following objectives:

1. To determine the factors affecting the academic performance of students in Mathematics at Langata High School.
2. To establish the methods used in teaching Mathematics at Langata High School.
3. To assess students' attitudes towards Mathematics and how they affect their academic performance.
4. To suggest ways for future improvement of the academic performance in Mathematics.

1.5 Justification of the Study

Langata High School is one of the schools that has poor academic performance in Mathematics at both the internal and national examinations. In the education domain, school personnel regularly use student assessment information to make important decisions about students and evaluate the teaching itself. Assessment of students' progress is very important at Langata High School and the factors affecting the performance of students in Mathematics should be identified. The identification of these factors will help improve the performance of students in Mathematics and, perhaps help students change their attitudes towards the subject. The study was done because, despite the efforts that had been made to improve performance of students in Mathematics, there continues to be poor performance.

1.6 Significance of the Study

Information gathered for this study will give the overall picture of the performance in Mathematics of Langata High School. The study aimed to solicit ways to improve academic performance of students in Mathematics and to create positive attitudes towards the learning of Mathematics.

It is believed that improved attitude and methodology will eventually bring good performance in Mathematics. In addition, education professionals may find the information useful in their effort to understand the influence of attitudes and methodology on the performance in Mathematics. The research will provide understanding for the Heads of department the schools and teachers on their attitudes and students' attitudes towards Mathematics, with an aim to making the necessary adjustments. This will help them to adopt effective methods of teaching Mathematics

and to enhance good academic performance of students. It is hoped the students will change their attitudes towards Mathematics and appreciate its importance in the society.

1.7 Limitations of the Study

The aim of the study was to find out the factors affecting academic performance of students in Mathematics at Langata High School. Therefore this study may not be relevant or applicable to other subjects and other schools in Kenya nor to other countries. The research was carried out in one school only

1.8 Definitions of Terms and Key Word

Academic: Attribute of education in school involving reading and study.

Attitude: A learned and relatively enduring tendency or predisposition to evaluate a person, a situation, or an event in a certain way and act in accordance with that evaluation.

Education: the process through which people discover that learning adds quality to their lives.

Factors: To influence something to occur.

Investigation: To discover and examine all the facts about a topic, to try to discover facts and information by research

Mathematics: The study of numbers, measurements and space.

Performance: An action or achievement considered in relation to how successful it is as measured in terms of scores, marks.

Teaching: The process of imparting knowledge through a variety of strategies.

1.9 Conclusion

This chapter located the school in which the study was done. The problem to be researched has been defined It has outlined the objectives of the study and given the justification. The significance of the study has been discussed as well as its limitations. Terms and key words have been defined. The report has now moved to the discussion of literature review of the research.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Many students today are poorly motivated to study Mathematics due to attitudes they have towards this subject. Methodology used by certain Mathematics' teachers affect the performance of students in Mathematics. The lack of positive attitudes and adequate methodology for teaching Mathematics creates an environment that is not conducive to learning. As a result the performance of students may be affected.

2.2 Teachers and Performance

Related literature on the causes of poor performance in Mathematics has suggested that poor teaching methodology remains at the core as the major contributory factor (Alien, 1992). A study on evaluation of teaching techniques in Mathematics and competence in Mathematics by Martin (1995) showed that the teachers surveyed rely heavily on closed type teaching techniques such as textbooks. Direct classroom observation further indicated that teachers lack ability to innovate and make teaching topical and dynamic was an attributed cause to the poor performance of students in Mathematics. Teachers stick to what they have learnt and they do not have time to adapt their teaching through reading and new methods. In the same area, Taylor (1979) indicated that the development of teaching skills should be regenerated in order to minimize the poor performance and develop competence in problem solving. Bogonko (1992) stated that relative inexperience and inappropriate training of mathematics teachers has been a major factor in defeating the end of getting enough successful students in scientific field.

Hersee (1987) referred to the former Prime Minister in UK's emphasis on the necessities of the skills in Mathematics and claimed that when young people left school at 16 years of age, they lacked basic numeric knowledge. He further stated that they required considerable training in Mathematics before they could be entrusted with simple tasks.

Tobin (1987) in discussing teaching techniques and approaches to Mathematics education criticised teaching styles in relying too much on "talk and talk". He suggested that teachers should involve students through group work and exercise during the lesson. He urged that syllabi for secondary Mathematics should enable the learner to become capable of much more than memorization. He proposed learning through discovery and problem solving, with less emphasis on methods.

Competence in Mathematics is as a result of learning through discovery. Martin (1995) indicated that methodology of teaching mathematics should revolve around discovery, investigation, understanding and problem solving. If the understanding is not translated into practical knowledge, then it does not serve its purpose at all. Mathematics should be presented to help the leamers think well and apply the delivered knowledge.

Quality and effective teaching is fundamental for the success of the students. Schiller (1994) found that students' academic performance depends to a greater extend on good leadership style. Schiller further stressed the importance of the teachers in achieving good academic performance of the students. Teachers are there partly to play the role of parents in schools. Their teaching should motivate students to achieve good performance by their way of imparting knowledge.

According to Glasser (1992), teachers need to learn that only by choosing to teach in appropriate and satisfying way can they satisfy both their needs and the needs of their students. Effective teachers manage students without coercion. While ineffective teachers may be just as concerned about students personally, when they teach they slip into the coercive practices that destroy their effectiveness. Lack of qualified teachers in Mathematics is a major problem for some schools. Few teachers are qualified in Mathematics. Therefore, the problem of staffing schools with properly qualified local teachers in Africa is a crucial one if quality of Education is to be matched with quantity (Mbiti, 1981).

Backer (1972) indicated that objectives should come first and results follow. If learning is directional and directed to bringing about desired behavioural changes, then it is necessary to identify in which way a learner may show that he has achieved the desired objectives in Mathematics. Objectives determine materials to be used, strategies, techniques to be manipulated and what activities the learner needs to engage in, so as to foster desired behaviour. Schools can be equipped with most state of the art facilities and rouse students morale and their desire to succeed but with low morale, poor teaching methods, low payment of teachers, negative attitudes, students are doomed to fail.

According to Dodd (1970), unsuccessful teaching emanates from un-preparedness, which brings omission of important elements while teaching. Inaccurate methods may be used or accepted as correct ones, poor timing, lack of logical presentation, lack of having interesting detail and interesting materials, boredom and restlessness in class bring about poor results. He concluded that it is only by thoughtful preparation that these faults can be avoided. Detail is a thoughtful process because the teacher asks

himself/herself three questions, who will be learning? What exactly will they be learning? How will it be achieved? Therefore, it is assumed that inadequate preparation will lead to unsuccessful lesson and poor performance by students.

Prince (1963) stated that teaching materials like books, models and other related materials may bring effective learning in classrooms, but their deficiency or misuse was found to curtail the whole process of learning. Teachers therefore have a responsibility to provide a variety of reading materials to supplement the textbooks. They should also be encouraged to buy all the textbooks they need for outside classroom learning.

2.3 Mathematics and Attitudes of Students and Teachers

Marjoram (1973) carried out a research on trends in Mathematics education in London, which aimed at comparing and analysing the sequence of performance year after year. The indication was that the situation depreciates as years go by. Ochola (1999) on her research on the factors contributing to poor performance in mathematics showed that positive attitudes, particularly liking for and interest in mathematics, lead to greater effort and in turn to higher achievement. She went on to state that the link between attitudes and achievement is not so close as might be expected because there are many factors, which contribute to both attitudes and achievement.

Eshiwani (1993) stated that among the significant factors contributing to poor academic performance in Mathematics are inadequate supply of equipment and materials, shortage of textbooks, badly trained teachers and practical irrelevance of curriculum. Yet according to Glasser (1975) students may have no confidence in their chances of succeeding in schools since problems at home with their parents concerned school

failure. Broken homes and poverty have led to lack of confidence among students and thus failure academically. Mark (1999) says that teachers' attitudes towards classroom tasks also portray the attitudes they have towards learners. If the teacher believed a task is very hard, he/she at the same time is saying that the students are not able to carry out the task. The attitude may affect the students into thinking that the task is beyond their knowledge therefore they are unable to do it or try it.

Teachers and students lack of positive attitudes and perceptions toward Mathematics affect academic performance. The outcome of any interaction in learning depends largely on the attitudes and perceptions of both learner and teacher. The students are able to detect if the teacher likes the subject matter in a mere interaction. The way the subject is taught can affect the entire learning process. The student's attitude toward Mathematics can be ascertained in the way he /she sees how simple or hard the subject. Many students have negative attitudes toward Mathematics and this can affect the whole process of learning. Since students' good academic achievement is the immediate objective of any school, positive attitudes influencing students' academic performance should be encouraged in all schools.

2.4.Classroom Climate or Atmosphere

Gerlach (1980) says that the teacher should ensure that learning occurs in a reasonable manner. He makes a summary of a good environment by quoting:

> In order to arrange the environment to provide optimum conditions of learning for pupils the teacher may arrange a field trip, bring in classroom objects for the students to observe and classify, display pictures. He may produce or use original instructional material; write, draw objects or charts all to facilitate learning.

Hence, there is a way objectives can be achieved without a conducive learning environment. A good environment should be one where teaching techniques allow students to participate in the learning. It should be one that uses more than one sense in the learning process. The teachers should make use of all the senses. Students have to see, touch what the teacher is talking in the classroom. Thus the importance of teaching aids in the process of learning.

In case of negative attitudes, the teacher is present to students' different ways of perceiving Mathematics. The teachers should strive to build good relationships with students, while stressing the importance of Mathematics. The interaction can help students acquire positives attitudes towards Mathematics, thus improve learning.

The teacher, therefore, has a great role to play in whatever kind of attitudes students develop. The atmosphere in the classroom is very important in teaching Mathematics. The classroom environment should be free of threat. Students should feel safe and ready to make mistakes. Both teachers and students need to believe that there is a lot of good in them. This will make each in the learning process become trustworthy, responsible people of integrity.

Ojore (2000) says that the crucial problem facing young learners in African schools spring from over-crowding in class. In such a situation, learners are reduced to numerical entities. Teachers hardly know the needs of each student. The slow- learners are the worst hit where students are not known individually.

Smey-Richman (1991) states that low teacher expectations are linked to poor academic performance of students when they are given fewer opportunities to interact and participate in classroom activities. For instance, researchers have recorded that compared with high achiever students in the class; low achievers are seated farther from the teacher. They are praised less frequently for success, provided with less feedback and are called on less frequently to respond to questions, and when called upon, are provided with less time. In the end, these students will perceive that the teachers' expectations are low, and often believe they have no chance for academic success and so over time, these students make fewer efforts to interact with the teacher. They gradually withdraw psychologically from learning in the classroom setting. Smey- Richman (1991) suggested that if community norms and expectations for teachers are low, parents may tend to over estimate children's degree of success in school and the calibre of education being received. Teachers should strive to help students acquire positive attitudes and perform well in Mathematics.

It is evident that education is of great value to people. Big obstacles are threatening modem education to achieve its goals, since student's good academic achievement is the immediate objective of the school. Positive factors influencing students' academic performance should be encouraged in all schools. Mathematics is more abstract subject than other sciences. It takes time for a student to understand Arithmetic, Matrix, and Algebra etc. This implies that there is a great need for a teacher to know how to communicate, for effective learning.

This chapter has considered a matter of teachers and students' academic performance in the literature. It has also examined the attitudes of students and teachers of mathematics as a subject. The issue of research into classroom climate or atmosphere were also discussed. The report has now moved to the research design and methodology.

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

This chapter highlights the research methodology used in the study. It describes the research design, target population description of samples and sampling procedures, and secondary instrument used for both data collection and analysis.

3.2 Research Design

The survey design was used in investigating the attitudes and opinions individuals hold towards performance in mathematics. Survey research design enables one to describe specific characteristics of a large group of persons, objects or institutions (Jaeger 1988).

3.3 Target Population

The study gathered information from the students, administrators and teachers of Langata High School.

3.4 The Study Sample and Sampling Procedures

The sample comprised of 143 out of 520 students male and female from forms two, three and four. Three out of six teachers of mathematics took part in the sample through observation and interviews. Five teachers took part in the research by answering the questionnaire for interview guide for teachers. The administration provided the report of the national examination. The use of tape recordings helped for the interviews with the teachers.

3.5 Description of Research Instruments

The study used a multi-technique approach to data collection to obtain a holistic view of the problem. The researcher used several types of instruments such as questionnaire, observation schedule, content analysis guide and interview guide. The questionnaires were designed to elicit data from teachers, students and administrators of Langata High School Three lessons were observed. Teachers and students were interviewed.

a) Questionnaire for Students

The questionnaire for the students had four parts according to the objectives of the research. The first was about demographic data in order to get student background. Students were asked their age, the occupation of their parents. In the same part, students were expected to give the level of education of their parents and the class they are in.

The second section consists of ranking some subject taken in the school according to students' interest or attitude towards the subject. After ranking the subject, students evaluated their teachers' performance in those subjects. For the third section, statements were constructed according to Likert scale response. The respondents were required to indicate whether they strongly agree (SA), agree (A), disagree (D), strongly disagree (SA), undecided (U). Lastly, students were asked to indicate their expectations on the teachers, administration, and government for the improvement as far as learning of mathematics is concerned.

b) Questionnaire for Teachers

The questionnaire for teachers had two sections. The first section was in form of Likert scale response where teachers were expected to indicate whether they strongly agreed (SA), Agreed (A), Undecided (UD), Disagreed (D), and Strongly Disagreed (SD) to the twelve statements constructed to assess their attitudes towards the subject they teach as well the attitudes of the students towards mathematics. The item was to assess the methods used in teaching mathematics.

The second section consisted of open-ended six items. Teachers were asked to give their views about the content of secondary school mathematics school syllabus, the topics they find difficult to teach, and the problems they face in teaching mathematics. In the same section, teachers assess the attitudes of their students towards mathematics. Lastly, teachers were asked to articulate their views on how to improve the learning of and mathematics the performance of the students in mathematics.

c) Interviews Guide for Teachers

The teachers' interview was designed to find out their attitudes and the attitudes of students towards mathematics and teaching in general. The interviews guide consisted of six items. Teachers were asked to give their opinions about the attitudes of studes towards mathematics, the content of the syllabus and the performance of the students in mathematics especially in the KCSE examination. The guide provided a room for teachers to give their suggestions on the improvement of the performance of school in mathematics.

d) Interview Guide for Students

It comprised of five questions where students were expected to list their favourite subject, then their performance in mathematics. The students were asked the problems they encounter in learning mathematics and the guide provided a room for suggestions towards the improvement

e) Observation Guide

The observation investigated the ways mathematics is taught, the involvement of the students in the process of learning and the use of teaching aids.

f) Content Analysis Guide

The administration provided the analysis report of KCSE national examination from 2000 up to 2004 to enable analysis of the performance of the school in mathematics.

3.6 Data Collection Procedure

Questionnaires were given to students ten minutes before the end of all the classes. They stayed with them for three hours. The interview involved the use of a set of predetermined questions, which were followed by probing questions. The questions were open-ended so as to allow respondents to express themselves freely. Interviews were carried out to the mathematics teachers and students. Teachers were asked to give their views about attitudes of students toward Mathematics, and the content they teach. Students then gave their attitudes towards Mathematics and the methods used by the teachers.

Both teachers and students were observed during the lessons in different classes taught by different teachers. The observation helped to check whether the teacher used such techniques as whole class discussion, group discussion, oral questions, class participation, teaching aids.

3.7 Data Analysis

The gathered primary data from the respondents helped to answer relevant questions pertaining to the study. Secondary data provided guidelines to the research and supportive materials Data collected was analysed according to the categories interview data and observational data. Interview and observational data were analysed separately and according to categories Students and teachers responses were categorised according to major interview questions. Observational data were analysed according to the teachers and classes observed. The questionnaires were designed in way that they could be interpreted using frequency distribution.

3.8 Conclusion

This chapter describes data. It has discussed the questionnaire, interviews guide, content analysis guide and class observation. The data following the administration of the questionnaire have been presented in chapter four.

CHAPTER FOUR

PRESENTATION AND DISCUSSION OF THE FINDINGS

4.1 Introduction

This chapter highlights the findings of the research and discusses them. The research was designed to achieve the following objectives: to find out the Mathematic teachers' perception and the methods used for teaching the subject, and to find out students attitudes towards Mathematics and the problem they encountered in Mathematics. Pie charts, tables, graphs and diagrams were used to present the findings.

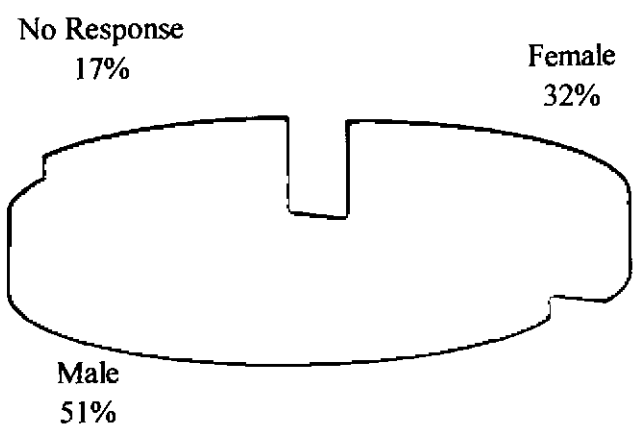
4.2 Demographic Distribution and Characteristic of the Respondents

4.2.1 The Demographic Distribution of the Respondents

In this section the demographic characteristics of the respondents, both students and teachers have been described and discussed. Students were asked to indicate their sex.

Figure 1

Sex of the Respondents



The study shows that more boys (51%) than girls (32%) participated in the research. The research consisted of one hundred twenty six respondents. There were sixty-five (65) boys compared to the number of respondents participated actively in the research. This shows that boy participated more actively than girls. The difference between boys and girls is 19.9%. The difference can be explained by the fact that data was collected at random, and it might not be reasonable to conclude that there are more boys in Langata High School than girls. The study reveals that both sexes were covered for the achievement of the objectives of the research. Twenty-one respondents did not reveal their gender.

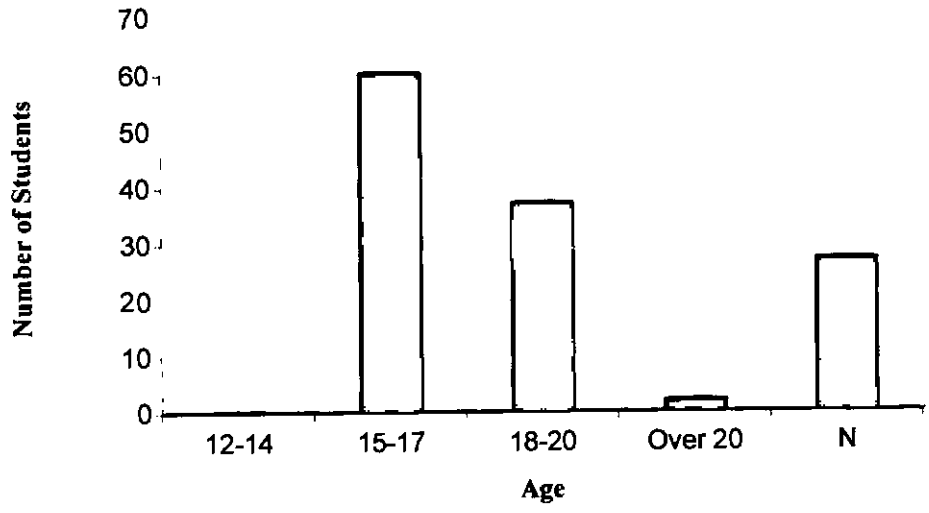
4.2.2 Students Respondents by Class

The majority of the respondents were in form three. Fifty-six (44.4%) out of one hundred twenty six were in form three. Thirty-eight (30.2%) were in form two. Twenty-eight (22.2%) in form four. Four respondents did not indicate their class. The information proves that the research was done in all the classes except form one. Form one students did not participate in the research because the research was done in January while forms ones were absent from the school.

4.2.3 Age of Students

Figure 2

Age of the Respondents



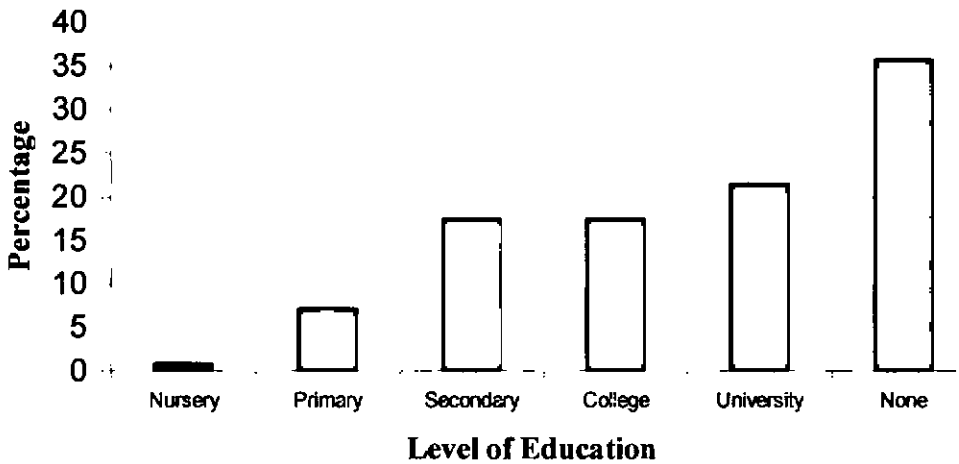
A great number (47.6%) of the respondents were between fifteen and seventeen (15-17) years old. Thirty-seven (29.4%) out of one hundred twenty six were between eighteen and twenty years old. Two respondents were over twenty years old. Twenty-seven (21.4%) of respondents did not reveal their age. The study revealed that the majority of the respondents were within stage of adolescence, a special period in human development. This is the age of curiosity, independence, freedom with a lot of sensitivity, stress and conflict with the parents and any authority. This age has a lot of impact on the academic performance of students because they tend to be in conflicts with parents and teachers. Some experience lack of concentration and attention due to many plans they have to make for the future. They look always for freedom and this brings a lot of confusion before they are brought to the right path.

4.2.4 Parents' Education

Parents' level of education has a significant impact on their children's performance in school. Parents also know that education is important and encourage their children. Parents who had the opportunity to formal education tend to help their children in their academics' tasks. Respondents were asked to indicate the level of education of their parents. The graph shows the level of education of the respondents.

Figure 3

Parents' Education



Parents have great impact on their children's academic performance. If they had the opportunity to receive formal education, they would be in a position to help and guide children in their studies. The information reveals that the majority of the parents of the respondents have received formal education at different levels. 36.1% parents out of one hundred twenty six respondents attended college/university. 20.6% had received secondary education.8.3% did only primary education. One parent (0.8%) attended nursery school. 34.5 % did not have access to formal education. The study shows that

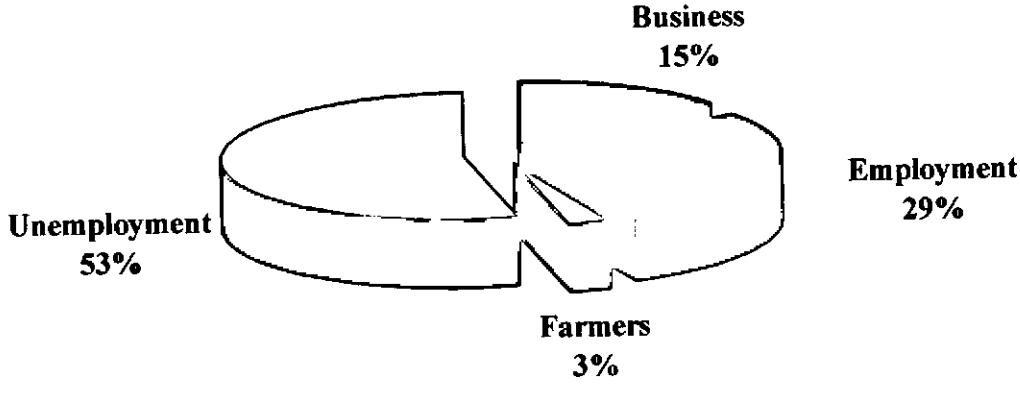
the number of parents who did not have formal education is still large. These parents are limited in their knowledge and understanding of the importance of education. Therefore the needs of their children in the academic matter are also affected. They are limited to offer support and assist their children when they face problems in their academic matter especially mathematics.

4.2. 5 Parents' Occupation

Parents' occupation can affect the academic performance of their children. Lack of employment of parents leads children to poor performance in school. Some items were constructed for respondents to give the occupation of their parents. The pie chart shows the occupation of the parents.

Figure 4

Parents' Occupation



Despite the fact that the majority of the parents had received formal education at different level only 28.9% have access to employment. 53.6% of parents of the

respondents did not have employment or a job. 14.7% are engaged in private business while 2.8% are farmers.

The information revealed the background of the respondents and the problems they might be facing in paying school fees. One of the respondents suggested to the administration and government to reduce the school fees and if possible to find the appropriate time to send away students for school fees and not during the examination period. This greatly affected their performance.

4.2.6 Performance of Langata High School in KSCE (2000-2004)

The research was to find out the factors affecting academic performance of students in mathematics. The administration provided the analysis of KSCE examination from 2000-2004. The table below indicates the performance of the school.

Table 1

The Performance of Langata High School in KCSE (2000- 2004)

Year	A	A-	B+	B-	B	C+	C	C-	D+	D	D-	E	Mean Score	Mean Grade	Entry
2000	-	-	-	2	3	-	4	9	6	21	19	25	2.933	D	89
2001	1	1	2	-	-	2	1	9	4	12	259	21	2.969	D	78
2002	2	-	1	3	2	5	3	3	4	13	18	33	3.09	D+	87
2003	1	1	-	2	2	3	5	5	8	19	31	52	2.60	D	129
2004	-	1	1	2	3	3	6	4	8	18	30	47	2.71	D	123

The analysis of the four years shows that the performance of students in KCSE examination is generally poor. The mean of grade D confirmed the responses of teachers about the performance of the school in national examination. For four years the performance of students in mathematics at national level did not improve. The results showed that the performance of school in mathematics needs improvement. Teachers expressed their great concern about the performance of the school in KCSE. They are trying, but without books this may take long time.

One teacher had the following to say:

The performance of our School in the past few years had been very poor.

The other one added:

For the two years I have been in Langata High School, the performance in mathematics in KCSE has not been satisfactory.

In addition, another respondent yet said:

I have to admit that our school is not performing well in mathematics in KCSE.

The three teachers above said that the performance in mathematics has been poor in the past few years. They were however optimistic that with time the performance would improve. They are trying to put effort in improve the performance of their students.

4.3 Students' Attitudes towards Mathematics

Students' lack of positive attitudes and perceptions toward mathematics affects their academic performance (Ormond, 1999). The outcome of any interaction in learning

depends largely on the attitudes and perceptions of the learner, that is the way they view difficulties of the subject.

To establish students' attitudes toward mathematics, several items were used: Ranking of subjects according to the interest of the respondents, and the Likert scale was used also with statements connected to attitudes .The items on the Likert scale, students were expected to rate items on 1-5 scale. Strongly agree corresponded to weight 5, agree weight 4, undecided 3, disagree weight 2 and lastly, strongly disagree weight 1. Respondents expressed their views about mathematics: Enjoyment, usefulness, methodology, environment, performance, involvement and assessment.

4.3.1 Ranking of Subjects

Table 2

Responses on the Ranking of Mathematics

Position	Frequency	Percentage
1	12	9.5
2	8	6.3
3	8	6.3
4	16	12.7
5	9	7.1
6	12	9.5
7	14	11.1
8	10	7.9
9	3	2.4
10	1	0.8
11	-	-
12	4	3
Total	**94**	**74.6**

Students were given twelve subjects offered in the school to rank according to their interest, starting from their favourite subject to the least. Out of twelve subjects, fifty of the total students (39.7%) students ranked mathematics between one to five, while forty-four (34.9%) ranked mathematics between six to twelve. Thirty-nine (30%) students did not express their views on whether or not they liked mathematics. The large number of undecided respondents might show mixed feelings of students about the subjects. This might indicate their negative attitude towards the subject. This might show also that those students who could not articulate their views about mathematics are not interested in the subject at all. The ranking of the subject reveals that students tend to like humanities subjects more than mathematics.

4.3.2 Responses of Students on Attitudes towards Mathematics

Attitude is very crucial in education. One of the processes of assessing Langata High students' attitudes was the use of a Likert scale. Students were expected to rate items on 1-5 scale. Strongly agree corresponds to weight 5, agree weight 4, undecided 3, disagree weight 2 and lastly, strongly disagree with weight 1.

Table 3

Responses of Students on Attitudes from the Likert Scale

ITEMS	SA	A	UD	D	SD	$\bar{X}$	Standard Deviation
Mathematics is my favourite subject.	32	28	26	19	23	3.23	1.7
Mathematics should be made optional	52	16	16	12	26	4.35	2.9
I enjoy my Mathematics' class	37	29	23	19	22	3.40	1.82
I feel relieved after Mathematics' class	41	30	23	11	17	3.44	2.24
I fear Mathematics	23	17	18	15	53	2.6	2.5
My teachers motivate me to like Mathematics	59	28	16	10	22	3.94	1.4

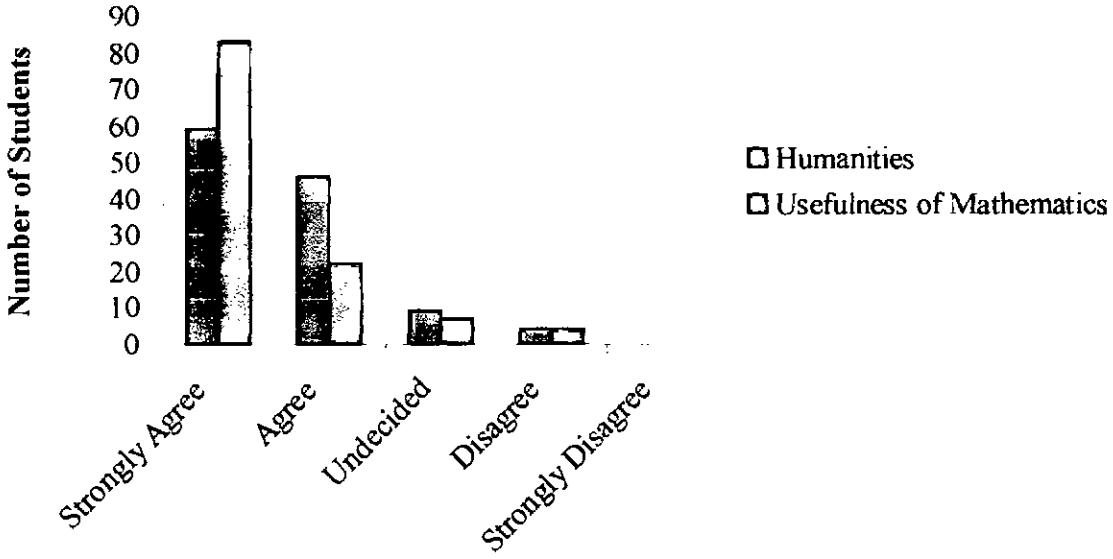
The table illustrates that a great number of students have a positive attitude towards mathematics. The mean ($\bar{X}$=3.23) indicates that students agreed with mathematics being their favourite subject. The contradiction comes with a very strong opinion from the same respondents about mathematics being made optional. The majority of the respondents sixty-eight (55.7%) opted for mathematics to be made optional. Sixty-six students expressed their enjoyment for mathematics' class. Seventy-one (56.3%) students feel relieved after mathematics class. The finding shows that sixty- eight (54.1%) students do not fear mathematics while forty students strongly agreed that they fear mathematics. Eighteen students did not articulate their feelings whether they fear or not mathematics.

4.3.3 Usefulness of Mathematics

Students were asked to compare humanities and mathematics and to assess the importance of mathematics in their lives. The graph below shows the findings to the items.

Figure 5

Responses on the Usefulness of Mathematics in Daily Life in Comparison to Humanities



The information shows the views of students about the usefulness of mathematics. The blue bar shows that 83 students found mathematics very useful. Twenty- two (22) students agreed that mathematics is very useful for their life especially to get a good job. Seven students did not articulate their views. Eight students believed mathematics to be useless for their life. These eight said that their future careers did not need mathematics, so they did not find the importance of studying mathematics. 59 students strongly agreed that they liked humanities and languages more than mathematics. 46 students agreed that humanities and languages are better than mathematics. Only five students said that

mathematics is better than humanities and languages. The usefulness of mathematics is strongly expressed by the responses of students and many of them indicated that mathematics helps them understand others subjects. Thus they believed that mathematics is important for their future despite the difficulty they encounter, compared with other subjects.

4.3.4 Teachers' Perceptions of their Mathematics Students

Langata High School has six teachers for mathematics, but only three teachers took part in the interview. Three teachers out of six were observed during their teaching. Five teachers answered the questionnaire. One of the three teachers is a student on teaching practice from Christ the Teacher Institute for Education.

The questionnaire for the teachers provided some items for the teachers to express their views about the attitudes of their learners towards mathematics. 2 teachers out of six said that their students had positive attitudes towards mathematics, while 3 teachers were undecided about the attitudes of their learners. The second part of the item consisted of open- ended items. In this section, 4 out of 5 respondents said that some students had negative attitudes towards mathematics. Students believed that mathematics is a very difficult subject. This attitude probably came from the primary level and it was very difficult to remove it from the head of students. One teacher articulated it clearly that students are afraid and lack interest in mathematics. The cause of negative attitudes is the popular belief that mathematics can be done only by bright students and special skills are needed to perform well.

The attitude of the learner is very crucial in education. It determines students' effort to the learning process and performance in the subject. If the learners like the subject, they will strive to perform well despite the difficulties they encounter. They will make an effort to succeed. The perception of the teacher can also affect the attitudes of the students. Some teachers indicated that students' poor background in mathematics affect their attitudes and their performance. The teachers stated that some students are slow learners so it was very difficult to expect a good performance from those students. If the teachers believe that students are slow learners with poor background, this might be a barrier to the achievement of educational goals. Teachers can be prejudiced towards some learners and will not rnake an effort to help these students change their attitudes. If the observations of the teachers are not changed, this could be one of the factors affecting academic performance of students in mathematics.

4.3.5 Teachers Attitudes towards Mathematics

Langata High School has six teachers for mathematics. Five teachers out of 6 took part in the study. Their attitudes towards the subject they teach are positive. They like mathematics as their teaching subject. 3 out of 5 teachers saw the content of the syllabus very wide, too abstract for the students. Some topics are irrelevant for the needs of the students and the real world because the knowledge cannot be applied efficiently and concretely. They stressed that those topics like navigation, vectors, 3-dimensional geometry, probability, quadratic equations, leaner programming, direction of wind and water are very difficult to teach and very confusing for the students. These topics are difficult to plan practical examples to demonstrate. Students found them very difficult because they are not concrete and real.

4.4 Methods used in Teaching Mathematics.

Both teachers and students responses on the methods used in teaching mathematics at Langata High School have been considered in this section.

4.4.1 Teachers' Responses on the Methods Used in Teaching Mathematics

Competence in mathematics is as a result of learning through discovery (Martin, 1995). Quality and effective teaching is fundamental for the success of the students. Shiller (1994) stated that students' academic performance depends to a significant extent on the teacher. The methods used in teaching mathematics can help students in achieve good performance. Since methodology is very important in mathematics, students were asked to rate the performance of their teachers in their teaching of several subjects taken in the school. The item consisted in scoring excellent with weight 5, good 4, fair 3, poor 2, and very poor with weight 1. Fifty-two students (41.3%) out of one hundred twenty six rated their mathematics' teacher's performance in teaching mathematics excellent. Twenty-five (19.8%) saw the performance of their teacher in mathematics as good. Twenty-three (18.3%) ticked fair. Nineteen (15.1%) students found the their teachers performance in mathematics very poor while seven (6%) students did not express their views concerning the performance of their teacher in the classroom.

4.4.2 Students Responses on Methodology

Methods used in teaching mathematics can help students achieve good performance. Since methodology is very important in mathematics, students were asked to rate the performance of their teachers in their teaching mathematics. The Likert scale was used to assess the methods used in teaching mathematics.

Table 4

Responses of Students on Methods used in Teaching Mathematics

ITEMS	SA	A	UD	D	SD	$\bar{X}$	Standar Deviatio
I like group work during Mathematics' lesson	44	43	18	13	7	3.8	1.5
I like the way Mathematics is taught	42	37	10	15	16	3.4	2.8
I do exercise on the board in class	26	33	18	19	28	3.03	2.28
The teacher involve me during the teaching	37	46	18	7	12	3.56	2.11
The environment in the classroom is good	54	29	16	10	17	3.7	2.3
My teacher enjoys teaching Mathematics	70	18	18	9	12	4.02	1.7

The information revealed that the majority of students were satisfied with the methods used by the teachers in teaching mathematics. The Likert scale items were used for students to assess the methods used by their teachers in teaching mathematics. The students were very positive about the performance of their teachers in classroom. Seventynine (62.7%) students out of 126 respondents indicated that their teachers performed very well in the teaching of mathematics while Thirty one (24.6%) others disagreed with the way mathematics is taught by their teachers. Sixteen (12.7%) students did not express their views about the methods used in teaching mathematics.

The mean ($\bar{X}$=3.4) shows that the majority of the students were satisfied with the way mathematics is taught. The information shows that the teachers involved students in the process of learning. Eighty three (65.9%) students out of 126 respondents indicated that the teachers involved them in the process of learning through different strategies; whereas 19(15.1%) students found themselves left out by the teachers in the classroom.

7(6%) students did not express their views about the interaction between them and the teachers. The mean ($\bar{X}$ = 3.45) confirmed the responses given by the students. Group work and questions are some of the strategies used to involve students because slow learners need a lot of attention and they are very active in small group. The study shows that the teachers used group work for increased efficiency of their teaching. Students believed that the performance of teachers in teaching mathematics does not really contribute to the poor performance in mathematics.

4.4.3 Interaction between Teachers and Students

Items were constructed for students to evaluate their interaction with their teachers in the classroom. Relationship between learners and teachers is very crucial in the process of learning. Students learn well from the teacher they like and who likes them. They feel safe to make a mistake. Even if the subject is difficult they feel that the teachers like them they will change their attitudes towards the subject. Students felt that sometimes teachers caused tensions in the class by the use of the cane or abusive language. Some teachers shouted at the students and they felt humiliated and became indifferent towards about mathematics. A few students suggested that teachers should stop corporal punishment for them to change their attitudes towards the subject. When the teachers abused them, they tended to become indifferent about the subject and the teacher and this affected their performance. Many students resigned themselves to passivity and indifference because of the fear of punishment. Causing tension in students' minds has a negative impact on the students. It leads to a negative attitude to the subject and the teacher. Above all, learning cannot take place in the state of tension. Thus the performance is also threatened.

One of the students said:

> *Teachers should stop corporal punishment. Some students became indifferent to mathematics because sometimes they are harassed by the teachers. Since then they do not care about mathematics.*

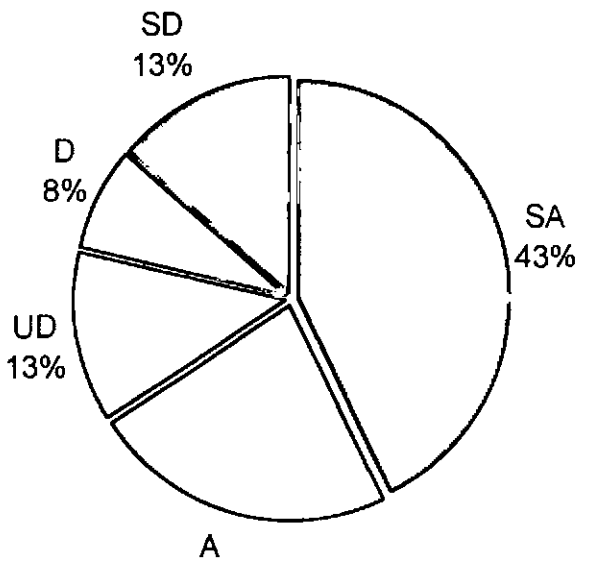
Interaction between teacher-students is very crucial in the process of learning. The information revealed that some students do not like mathematics because of their relationship with the teacher.

4.4.3.1 Environments in the Classroom

One of the items constructed for students consisted in assessing the environment in the classroom. Learning can take place only in a safe, and peaceful environment. If the environment is not free of threat, the learning process can be at risk and thus the performance of students might be affected. Teachers should create a conducive environment in the classroom for learning to take place and the achievement of educational goals. Students were expected to rate items on 1-5 scale. Strongly agree corresponds to weight 5, agree weight 4, undecided 3, disagree weight 2 and lastly, strongly disagree with weight 1. The figure below illustrates the findings.

Figure 6

Environments in the Classroom



Students were asked to assess the climate of their classroom and how this affects their performance. 83 (65.8%) students out of 126 said that the climate in the classroom was very conducive for learning. 17(13.5%) students found the environment not conducive. This may be justified by previous views of the students such as the use of corporal punishment by teachers. Few (13.5%) students stressed that teachers should get rid of their cane and abusive language for them to learn mathematics well. Students should feel safe and free make mistakes. People learn by making mistake so students should be allowed to make mistakes for them to learn free of fear. 10(7.9%) students did not express their opinions about the climate in the classroom.

Generally speaking however, students had positive attitude towards the environment in the classroom. Great number stated that the environment was very conducive in the classroom. They feel free to ask questions and get the explanation needed.

4.4. 4 Class Observation

4.4.4.1 Techniques used in Teaching Mathematics

One of objectives of class observation was to find out the techniques used in teaching mathematics, like whole class discussion, involvement of the students during the teaching, group discussion and assignment.

Mathematics requires a lot of learner's involvement. It is a subject targeted in developing problem solving skills and higher order thinking skills. The skills in mathematics and good performance in mathematics can be best achieved when students are involved in the process of learning through questions, exercises and group work. The lack of involvement of students in the process of learning is one of the causes of boredom, and lack of concentration on the part of students. As they are not involved their performance might be affected. Some students said that one of the reasons for poor performance in mathematics was that sometimes teachers did quite not involve slow learners in the process of learning. They did not take time to explain fully and check if students have understood the content. Out of 3 lessons observed, 2 teachers involved students in the process of learning through questions. The teacher in form two asked three students to solve the problems on the board and the other in form four asked some questions to students in the class. In all the three lessons observed, teachers did not make use of group work. One of the three teachers was busy marking the assignment of the students for the entire lesson.

b) The Use of Teaching Aids

Teaching aids if well chosen and effectively used facilitate effective learning. Learners retain and learn well what they see, touch, smell, hear and taste. It is very important to involve all the senses in the process of learning because this helps students conceptualise the abstract. The inappropriate use of teaching aids can lead to poor performance. In two out of three observed lessons, the use of chalkboard was very effective. Teachers used chalk to demonstrate how to solve a problem. In one of the observed lessons, after demonstrations, the teacher invited three students to attempt problems on the board. One out of three teachers made used of a chart. The teacher wrote the summary of the lesson on the chart and students were able to read it. The teacher who used the chart was on teaching practice; this may be justified as one of the reasons the teachers made used of all the teaching aids. The whole lesson was spent in marking the previous exercise. The textbooks were not referred to during the three lessons. Two teachers asked students to read their textbooks in their spare time and for assignment. An overhead projector was not used during the three lessons. This revealed that many times teaching aids are neglected in mathematics lessons, and often not used appropriately.

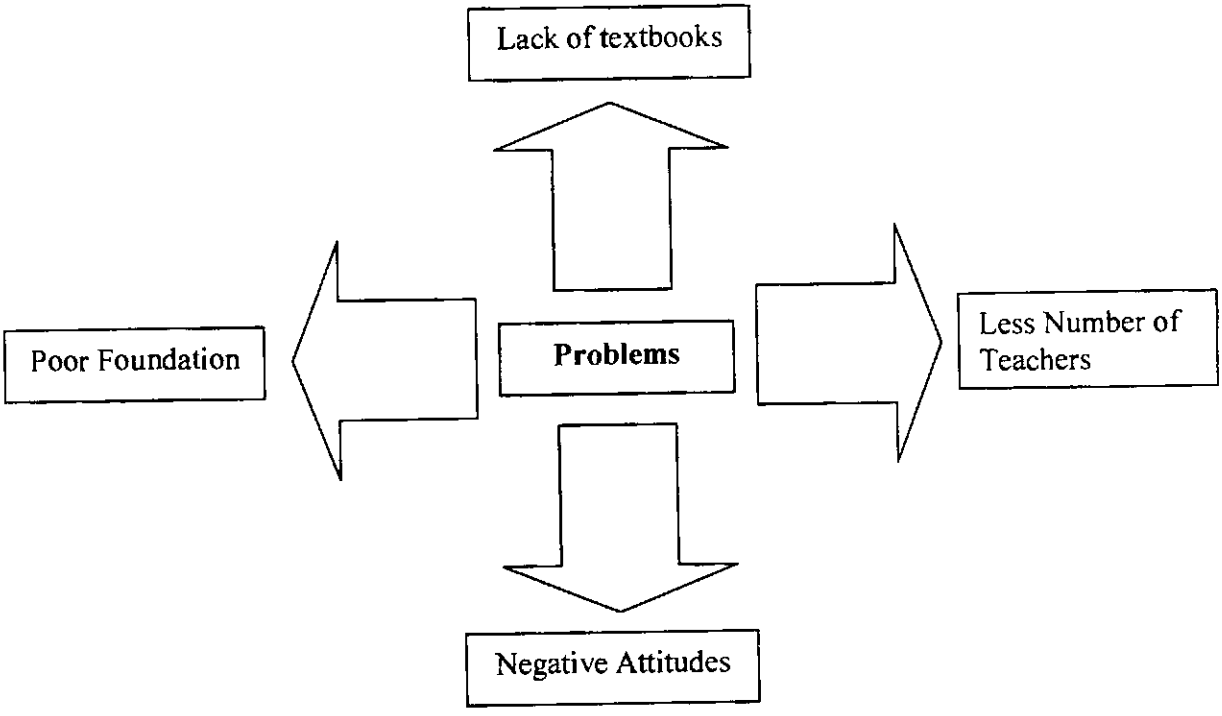
The involvement of the students in the learning process is crucial in education. The students are at the centre of learning. When the teachers neglect this important strategy of learning, they might not achieve the goals of education. So the teachers are expected to involve students in the process of learning through questions, teaching aids, and group work.

4.4. 5 Problems Encountered in Teaching Mathematics

The questionnaire provided room for the teachers to point out the problems they encountered in teaching mathematics.

Figure 7

Problems Encountered in Teaching Mathematics



The five teachers pointed out that they encountered the following problems in their teaching. The first and major problem in teaching mathematics was the lack and inadequacy of textbooks and mathematical instruments. Teaching aids are lacking for teachers to help students understand mathematic. Students also did not have the textbooks needed for their learning. Some topics like geometry need mathematics instruments, but since students did not have them it was very difficult for them to draw and deepen the knowledge imparted by the teachers.

The second problem was that some students lacked a good foundation in mathematics. Three teachers stated that the students come from poor background, which made them perform poorly in mathematics. A good foundation in mathematics is crucial. Learners need to be familiar with the necessary mathematical skills for them to go further in their learning. They need time and teachers' attention. The skill in mathematics is developed in the learner gradually. The caring teacher has to make sure that they get what is taught in order to achieve the goals of learning.

One of the teachers noted:

> *My students had poor foundation from primary school; this makes them perform poorly in mathematics.*

Lastly, one of the problems faced by the teachers was the lack of enough teachers for mathematics. Teachers found themselves overloaded with work. The high number of students in class did not help them care for the slow learners. Besides, the number of mathematics' teachers is not enough. Teachers found themselves doing more than required. For them to achieve the educational goals they need more time and the school should to employ more teachers for mathematics. This will create room for teachers to care for slow learners. Students as well as teachers expressed this feeling.

Another teacher said the following:

> *The main problem is that students have very poor background in mathematics from primary school.*

Yet another teacher further also commented:

> *Students do not have interest in learning mathematics. They fear the subject.*

In addition another yet had to say:

> *Some topics are too abstract and students found them very difficult to relate mathematics concepts with real life situations. Topics like navigation, probability, direction of water and wind are very difficult to teach and for students to understand.*

The main problem in learning mathematics is the lack of textbooks. Teachers as well as students pointed out this strongly in their responses. Students lack mathematical tools like tables, textbooks, rulers and these are fundamental instruments in learning mathematics.

4.5 Performance

The main objective of the study was to assess the performance of students in mathematics. Items were constructed for students to assess their performance in mathematics .The table reveals students' opinions of their the performance in mathematics.

Table 5

Responses on the Performance by Students

ITEMS	SA	A	UD	D	SD	$\bar{X}$	Standard Deviation
I perform well in Mathematics.	20	29	21	30	26	2.9	-2.1
I wish I could do better in Mathematics	94	21	7	2	2	4.6	0.71
My Maths' homework is always ready	38	39	18	20	11	3.6	1.54

In the Likert scale, some items sought to determine the performance of students in mathematics. Performance shows the quality of learning in a particular school. Through performance, a school can be judged in its achievement of educational goals. Students were asked to assess their performance in mathematics. 49 (38.8%)out of 126 students performed well in mathematics. 53(42.1%) performed poorly and 21(16.6%) students did not articulate their views about their performance in mathematics. Amazingly 115(91.3%) students out of 126 expressed their strong wish to perform well in mathematics. The will is there but there are factors which limit them to fulfil their wish and which the teachers had identified. Two (1.5%)students did not want to perform well in mathematics. The mean ($\overline{X}$=4.6) indicates the strong will of students to perform well in mathematics. This might be justified by the discouragement of a lot of effort some had put in performing well but they never succeeded. This could be explained also by different motivations expressed by students in the open-ended item related to attitudes. Some expressed that they needed mathematics to get a good job for life; some said that they did not need mathematics at all.

Those who had positive attitudes towards the subject worked very hard to improve their performance. The item on the student workload showed that 77(61.1%) students out of 126 respondents had their homework ready for the next day while 30(23.8%) students did not care about their homework, some even did not mention anything about their homework. Practice helps them realize their wish. Teachers found the performance of students very poor. 2 out of 5 students indicated that their students performed very poorly in mathematics.

The following statement was generally made:

> *Students do not perform very well despite the effort we are making to improve their performance*

4.5. 1 Teachers' Responses to the Interview Guide Items

Responses on this section are based on the views given to the six items in the interview guide for teachers. Three teachers out of six were interviewed. The interview was face to face with the researcher. The responses are presented in summarized reports because some responses were similar.

4.5.2 Causes of Poor Performance

4.5.2.1 Access to Textbooks

A teacher established:

> *The lack of textbooks for students is contributing to the poor performance of students in mathematics.*

Another had to say:

> *Lack of mathematics' instruments and adequate textbooks for students do not help students practice and perform well in mathematics. Even if they had positive attitudes, the lack of textbooks will still affect their performance.*

The next respondent stated:

Students do not have textbooks; the only resources for their study are the notes given by the teachers. The lack of textbooks is the major cause of poor performance. Parents should make an effort to buy textbooks for the students.

4.5.2.2Attitudes Towards the Subject

Teachers were asked to assess the attitudes of students towards mathematics.

The teacher noted:

> *Students' negative attitude towards mathematics is affecting their academic performance in this subject.*

Another also agreed:

> *Students join Form One with negative attitudes towards mathematics. This belief comes from the primary school and it is very difficult to remove it from their heads. They believe in mathematics being a difficult subject.*

However, another disagreed:

The attitudes of my students towards mathematics are quite good even their performance is quite well. But in general the students of our school do not perform well in KCSE because of fear of mathematics.

There are many causes affecting the performance of students apart those mentioned above. Three teachers stressed that many students are slow learners who need more time and special attention outside the classroom. The big number of students in each class does not help teachers follow slow learners individually. Because there are few teachers in mathematics' department they do not have a chance to teachers to help these students, they found themselves overloaded with work.

4.5.3 Students' Responses to the Interview Guide Items

Responses to this section are based on the answers given to five items in the interviews guide for students. Responses in this section are presented in a summarized report.

Students from form two; three, and four took part in the interview. There were three boys and two girls.

4.5.3.1 Attitudes Towards Mathematics

The majority of the interviewers had positive attitudes towards mathematics.

One student said:

Mathematics is my life. I like it very much since my primary school.

The other added:

Mathematics is my best subject.

Another one had to say:

Mathematics helps me understand others subjects like Biology, Physics, chemistry

The other added:

I like Mathematics despite my poor performance

The last respondent said:

Mathematics is my favourite subject and I perform very well.

4.5.3.2 Performance

The five students, who were interviewed, admitted that they perform well in mathematics.

One respondent said the following:

> *I am very happy with my performance in mathematics. I never failed mathematics since my primary school. I like my mathematics' teacher and I do a lot of exercises in my spare time.*

Another respondent stated:

> *My performance is quite well. Before I used to perform better than now but I should make an effort to do more practice after school.*

The other respondent noted:

> *I pass with low grade but I would like to perform better than this because I want to become an accountant.*

4.5.3.3 Learning Strategies

Teachers gave similar responses on the strategies used in teaching mathematics.

One respondent said:

> *The use of teaching aids is very powerful and helpful in teaching mathematics. They made the abstract become concrete to students. I use them very often in my teaching.*

The second had this to add:

> *The use of daily life situation, illustrations and demonstrations during the teaching make the lesson very interesting. Students know how to apply mathematics in their daily life situation. Group work and involvement of students are part of my teaching strategies.*

The other one stressed that:

> *Mathematics' language is too abstract and difficult to understand. I use illustration to help my students understand mathematics. I motivate them and I give sometimes easy assignment to make them change the belief of mathematics being a difficult subject.*

4.5.3.4 Opinion of Teachers on Improvement of Students' Attitudes

Respondents suggested several ways that can help create and change their attitudes towards mathematics.

The respondent said the following:

> *Encouragement and uses of simple methods in the teaching of mathematics will help students like the subject.*

The other added:

> *Demonstrations, illustrations will make a way out from mathematics being abstract to real life.*

The other had this to say:

> *Learning should be student centred. I mean the students should be involved through group work, questions. Teacher should allow them create their own way of solving problems. Interaction between teacher and students is very crucial in education. Students should feel free of making mistake. A lot of attention should be given to the slow learners.*

4.5.3.5 Improvement of Learning of Mathematics

One of the items of the students' questionnaire consisted of suggestions on how to improve the learning of mathematics at teacher, administration and government levels. This section gave the suggestions of students on the items concerning the improvement of learning.

a) Teachers

Teachers have a great role to play in imparting knowledge. The incompetence of teachers can be seen in poor performance of students. Therefore the training of teachers should be taken with great care.

The majority of the students suggested:

> *Our school needs qualified well-trained teachers for us to learn mathematics well. The school should employ more mathematics teachers and give them the opportunity to go for in service training.*

Others yet added:

> *Adding more qualified teachers will make a difference in our performance in mathematics.*

b) Methodology

Few students expressed their anxiety about the way mathematics is taught but the majority were happy about the methods used in teaching mathematics.

The majority of respondents said:

> *The use of teaching aids, illustrations, demonstrations made learning very effective. Teaching aids help us connect the abstract with real life situations.*

Interaction between students and teachers is crucial in the learning process. Some students felt that they were felt out of the process of learning. The involvement of students is not enough.

They suggested:

> *Teachers should take care of the slow learners and should try to build a good relationship with students. Corporal punishment, abusive language, harassment should be stopped for effective learning of mathematics.*

The others respondents noted:

> *Teachers have to take teaching seriously. They have to be committed to their duty and be present for each lesson and teach effectively.*

c) Administration

- The majority of the respondents suggested that the administration should buy textbooks for students.
- Mathematics classes should be in the morning hours.
- Administration needs to check the attendance of the teachers. Some teachers do not take their job seriously.
- The administration should give the opportunity to evaluate the teachers each week.
- Motivation of the best students with a token and motivation of teachers who do their work very well.

- Employ more qualified teachers.
- Organise seminars for teachers.
- Encourage students interaction with others schools.
- Encourage mathematics clubs.

d) Government

-Employ qualified and more teachers for Langata High School.

-Buy textbooks for students and build more classrooms.

-Revise the syllabus for mathematics. Some topics are irrelevant.

-Make mathematics optional.

4.6 Conclusion

The findings analysed and interpreted in chapter four revealed the information about the factors affecting academic performance of students in mathematics. The responses of respondents on attitudes towards mathematics, the methods used in teaching mathematics and the performance of students in mathematics were analysed and interpreted in this chapter. Conclusions and summary are given in the next chapter.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents a summary of the findings of the study with conclusions derived from them. The chapter highlights also the recommendations on how to improve performance in mathematics. Lastly, the chapter will provide suggestions for further study.

5.2 Summary

This study investigated factors affecting academic performance in mathematics at Langata High School. The researcher assumed that poor performance in mathematics was a result of poor learning of mathematics and negative attitudes towards the subject. This study strove to answer these questions:

What are the factors affecting the academic performance in mathematics? Do attitudes affect the academic performance in mathematics? Does the teaching methodology affect the academic performance?

The survey research design was used to find out the factors affecting academic performance of students in mathematics. The target population consisted of students, teachers and administration of Langata High School. The sample comprised of 126 out of 520 students boys and girls from forms two, three and four. 143 questionnaires were distributed to the students but only 126 were used for the research. 17 questionnaires for students got lost. The questionnaires for students were designed to elicit responses on attitudes, and methodology used in teaching

mathematics. Five out of six teachers of mathematics took part in the research through questionnaire and interviews. The questionnaires for the teachers were designed to investigate the attitudes of students towards the subject, methods used for effective learning of mathematics and the problems encountered in teaching mathematics. Interview guides were also designed for teachers as well as for students. The researcher used document analysis of KCSE performance to investigate the performance of school in KCSE. The researcher observed three lessons to find out the methods used in teaching mathematics.

The data of the questionnaire was analysed in terms of the themes connected with the objectives and research questions. This was done both qualitatively and quantitatively. Pie charts, tables, percentages, and graphs were used to present quantitative data.

The study found generally the content of mathematics taught in secondary schools relevant to the level of education and the needs of students. However, some topics seemed to be very abstract, wide and difficult to relate to daily life situations. It was also revealed that teachers found those topics very difficult to teach; they found them too wide and abstract to relate to real life.

The study revealed that a great number of students have positive attitudes towards the subject whereas others have negative attitudes towards mathematics. This indicated that the students showed mixed feelings in terms of attitudes, which are very difficult to conclude as positive or negative. The majority of students strongly agreed that mathematics is very useful for their lives. They found mathematics of assistance in gaining good jobs opportunities while few found mathematics useless

because their future life does not need mathematics at all. Thus they suggested that mathematics should be made optional. For them just elementary knowledge of mathematics was satisfactory.

It was also discovered that teachers contributed to negative attitudes of students towards the subject. Students have great interest in mathematics but teachers do not sometimes provide for them a conducive environment for effective learning. The study revealed that the use of corporal punishment, harsh language and harassment made some students dislike the subject. Slow learners became indifferent to mathematics due to the lack of good teacher-student interaction.

It was also remarked that the majority of students do not have a good foundation in mathematics from primary school. By the time they reach form one, they have already acquired negative attitudes towards the subject .As result; they do not perform well in the subject. The study also showed that students believe that mathematics is a very difficult subject and only special students can do well in mathematics. Thus poor background was one of the factors affecting academic performance of students.

The study also investigated the methods used in teaching mathematics. It was found that the majority of the students were satisfied with the performance of the teachers in their teaching. Section B of the questionnaire of students sought the views of students on the teachers ' performance in the classroom; the majority of the students said that mathematics teachers were excellent in their teaching. They used all the possible means to make their lessons interesting. However, teachers admitted that they had some problems in handling topics like navigation, probability, direction of wind and water, reflection. These topics seemed very wide and too abstract; they cause problems of finding teaching aids related to these topics even if they found

them ` it is hard to relate them to real life. They cause problems for to both students and teachers. Teachers went on saying that these topics should be removed from the syllabus. Few students also remarked that the lack of seriousness of teachers in their teaching contributed to both negative attitudes and poor performance in mathematics. They stressed that some teachers were not present in the classroom at the appropriate or indicated time or when they were expected to be there.

In terms of methodology, it was found that textbooks are the major teaching aid in the learning process and were the major problem in Lanagta High. Both students and teachers highlighted the seriousness of the lack of adequate teaching aids in the school. Students do not have textbooks for their learning. The study clearly revealed that the lack of textbooks in the school is the major factor of poor performance of students in mathematics. This was indicated in all the responses from both students and teachers.

The study also showed that the teachers work load needs to be reduced. Six teachers for mathematics for 520 students seemed very demanding for the teachers. The inadequate number of teachers of mathematics does not give time for them to follow slow learners outside of the classroom. The inadequate number of teachers in the school may be contributing to t he poor performance of the slow learners.

5.3 Conclusions

Findings and summary of the research can be concluded as follows:

- The content of mathematics taught in secondary school is generally relevant. However some topics are abstract and wide to the real daily life situation.

- Students have mixed feelings about their attitudes towards mathematics. The majority of students like mathematics and have a great desire to perform well in the subject. However the desire alone is not enough, mathematics teachers need to motivate students in their learning process especially slow learners.

- Teaching aids facilitate the learning process. They make the abstract become concrete and understandable. It was however noted that students lack basic materials like textbooks for the achievement of good performances .The lack of textbooks and other mathematics instruments at Langata High School contributes to the poor performance of students in mathematics. Adequate and appropriate facilities will make learning easier and effective for both teachers and students.
- The six teachers have the ability to achieve educational goals in mathematics. But adequate number of mathematics teachers will make a difference in the performance of students in Langata High School. Slow learners need a lot of attention if they are to perform well.

- Mathematics concepts need time to be mastered by students. This is done step by step with a lot of patience from the teachers. Students need to be introduced to those concepts gradually otherwise mathematics becomes difficult and this leads to negative attitudes. A good foundation in mathematics is the key to good performance. Nevertheless, the majority of the students have a poor foundation in the subject from primary school. Hence this is the major factor that is affecting the academic performance of students in mathematics.

All in all, the findings concluded that poor performance in mathematics was the result of poor foundation in mathematics which leads to a negative attitude, lack of textbooks for students, adequate teaching aids and inadequate number of teaching staff of mathematics all are contributing factors.

5.4 Recommendations

The findings revealed that students have a strong desire to perform well in mathematics, and so in order to improve their performance in mathematics the researcher recommends the following:

5.4.1 Teachers

- Promote good relationships with students and provide conducive environment in the classroom.
- Use positive reinforcement to change the negative attitude of students towards the subject. Encourage them to like mathematics by stressing the usefulness of the subject.
- Avoid corporal punishment and abusive language.
- Teach at the pace of students and show the relevance of each topic. Use teaching aids related to each topic.
- Involve students in the teaching process and encourage group work or discussion during the lesson.
- Participate in in-service programmes with teachers from others schools.
- Take the teaching seriously and read to update the knowledge. This will bring you confidence in your subject matter.

5.4.2 Administration

- Employ more qualified, trained teachers.
- Organize seminars to update and refresh teaching of methodology.
- Provide adequate teaching aids for teachers and student especially textbooks for students.
- Program mathematics classes where possible in the morning hours.
- Regular inside supervision and inspection of teachers to ensure that teachers take the teaching seriously.
- Encourage the students to evaluate their teachers in their performance in their teaching.
- Limit the number of students in a class.

5.4.3 Government/ Ministry of Education

- Employ more trained, qualified teachers of mathematics.
- Review the content of the mathematics syllabus is too wide and abstract. Irrelevant topics need to be removed from the syllabus. Such as navigation, direction of water and wind.
- Mathematics should be given special emphasis at primary school level. The government should ensure that qualified professional mathematics teachers are available for primary school.
- Regular supervision and inspection of the teachers is required to ensure teaching and learning process.
- Limit the number of students in a class for effective teaching.
- Organizer seminars, workshops and in - service programme for teachers to refresh their teaching.

5.5 Suggestions for Further Research

The study has revealed that there are areas, which need further research for the improvements of performance .The following areas are:

- Need to investigate the causes of poor foundation in mathematics at primary school level.
- Carry out a research on the dimensions of learning in teaching mathematics as a tool for effective learning.
- Carry out a research on the training of primary school mathematics' teachers.

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APPENDIX I

ST. MARY'S UNIVERSITY OF MINNESOTA, NAIROBI CAMPUS
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DEPARTEMENT OF EDUCATION
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Email: kembikisa@hotmail.com

Questionnaires for Students

Title: ***Factors Affecting Academic Performance in Mathematics*** **in Kenyan Schools**

Dear Respondent,
I am a student of Christ the Teacher Institute for Education, Tangaza College.
I am doing a research on the Factors Affecting Academic Performance in Mathematic in Kenyan Schools.
Therefore you are kindly asked to respond to the questions to the best of your knowledge. All your responses will be highly appreciated and will be treated with confidentiality.

INSTRUCTIONS
This questionnaire has three sections. Please read and follow carefully the instructions given for each section.

SECTION A
Please tick ( ) the appropriate response from the statements given below.

You are in: ( ) Form1 ( ) Form 2 ( ) Form 3 ( ) Form 4

Gender : ( ) Boy ( ) Girl

Age: ( ) 12-14 ( ) 15-17 ( ) 18-20 ( ) over 20
Father's occupation: ..... Mother's occupation: .....

Highest level of education of your Father: ( ) primary ( ) Secondary ( ) College ( ) University
Highest level of education of your mother: ( ) primary ( ) Secondary ( ) College ( ) University

SECTION B
Rank the subjects below according t o your most favourite to your least one from 1 to 12.
( ) English ( ) Geography ( ) History ( ) Physics ( ) Kiswahili
( ) Biology ( ) Mathematics ( ) Commerce ( ) Chemistry ( ) CRE
( ) Agriculture ( ) Business Education

How would you rate your teachers' performance in teaching?

Subject	Excellent	Good	Fair	Poor	Very Poor
Biology					
Commerce					
Chemistry					
Computer					
Agriculture					
Kiswahili					
Physics					
English					
Geography					
Mathematic					
Business Education					
CRE					
Social Education and Ethics					

SECTION C

Instructions: Please tick ( ) the appropriate response from the statements given below.Where

S A= Strongly agree; **A** =Agree **UD** =Undecided **D** = Disagree **SD** = Strongly disagree

#	ITEMS	SA	A	UD	D	SD
1	Mathematics is my favourite subject.					
2	. Mathematics should be made optional					
3	My Maths' homework is always ready for the next day.					
4	I like humanities and languages subjects					
5	I perform well in Mathematics.					
6	I like group work during Mathematics' lesson.					
7	I enjoy my Mathematics' class					
8	I like the way Mathematics is taught					
9	I feel relived after Mathematics' class					
10.	The environment in the classroom is good.					
11	My teacher enjoys teaching Mathematics.					
12	Mathematics is useful for my future					
13	My teachers motivate me to like Mathematics					
14	I wish I could do better in Mathematics					
15	I fear Mathematics					
16	I do exercise on the board in class					
17	The teacher involve me during the teaching					
18	My teacher uses teaching aids during the lesson					

SECTION D

SUGGESTIONS:

1.What do you think need to be done in order to learn Mathematics well at these different levels?

A) Teachers

_____

_____

_____

B) Administration

_____

_____

_____

C) Yourself

_____

_____

_____

D) Government

2 What is the value of learning Mathematics in your life?

Thank you for your collaboration.

APPENDIX II

ST. MARY'S UNIVERSITY OF MINNESOTA, NAIROBI CAMPUS
CHRIST THE TEACHER INSTITUTE FOR EDUCATION, TANGAZA COLLEGE. DEPARTEMENT OF EDUCATION
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Uhuru Gardens
Tel. 605013
Email: kembikisa@hotmail.com

Questionnaires for Teachers

Title: ***Factors Affecting Academic Performance in Mathematics* in Langata High School**

Dear Respondent,
I am a student of Christ the Teacher Institute for Education, Tangaza College.
I am doing a research on the Factors Affecting Academic Performance in Mathematic in Langata High Schools.
Therefore you are kindly asked to respond to the questions to the best of your knowledge. All your responses will be highly appreciated and will be treated with confidentiality.

INSTRUCTIONS
This questionnaire has two sections. Please read and follow carefully the instructions given for each section.

SECTION A
Please tick ( ) the appropriate response from the statements given below.

I teach in: ( ) Form1 ( ) Form 2 ( ) Form 3 ( ) Form 4

Instructions: Please tick ( ) the appropriate response from the statements given below. Where

S A= Strongly agree; **A** =Agree **UD** =Undecided **D** = Disagree **SD** = Strongly disagree

#	Items	SA	A	UD	D	SD
1	I like teaching mathematics					
2	I like mathematics as a subject					
3	I like the content of the syllabus					
4	My students like mathematics					
5	My students perform well in mathematics					
6	I do not have problem in teaching mathematics					
7	I use teaching aids					
8	I make my lessons very interesting					
9	I involve my students in my teaching					
10	My students do group work					
11	My students do exercise on the board					
12	I give homework					

SECTION B

Please your views on the following questions in the space below.

1. Which form do you teach?

2.How do you the content of the secondary mathematics school syllabus ?

3. Which topics do you find difficult to teach? Why?

4.How do you see your mathematics student's attitudes?

5. What problems do you face in teaching mathematics?

6. What do you think is needed to improve performance in mathematics?

Thank you for your collaboration.

APPENDIX III

OBSERVATION GUIDE

1. Teaching methods

Technique	Yes	No
Whole class discussion		
Group discussion		
Involvement of students		
Students solving problems on the chalk board		
Home work/ Assignment		

2. Use of Teaching Aids

Teaching aids	Used appropriately	Not used at all
Chalkboard		
Textbooks		
Chart		
Projector		

APPENDIX IV

INTERVIEW GUIDE FOR TEACHERS

1. How many years have you been teaching?

2. How has the KCSE performance of your school in Mathematics?

3. What kind of learning strategies do you use in your class to help students understand Mathematics?

4. What is the common problem of students in learning Mathematics?

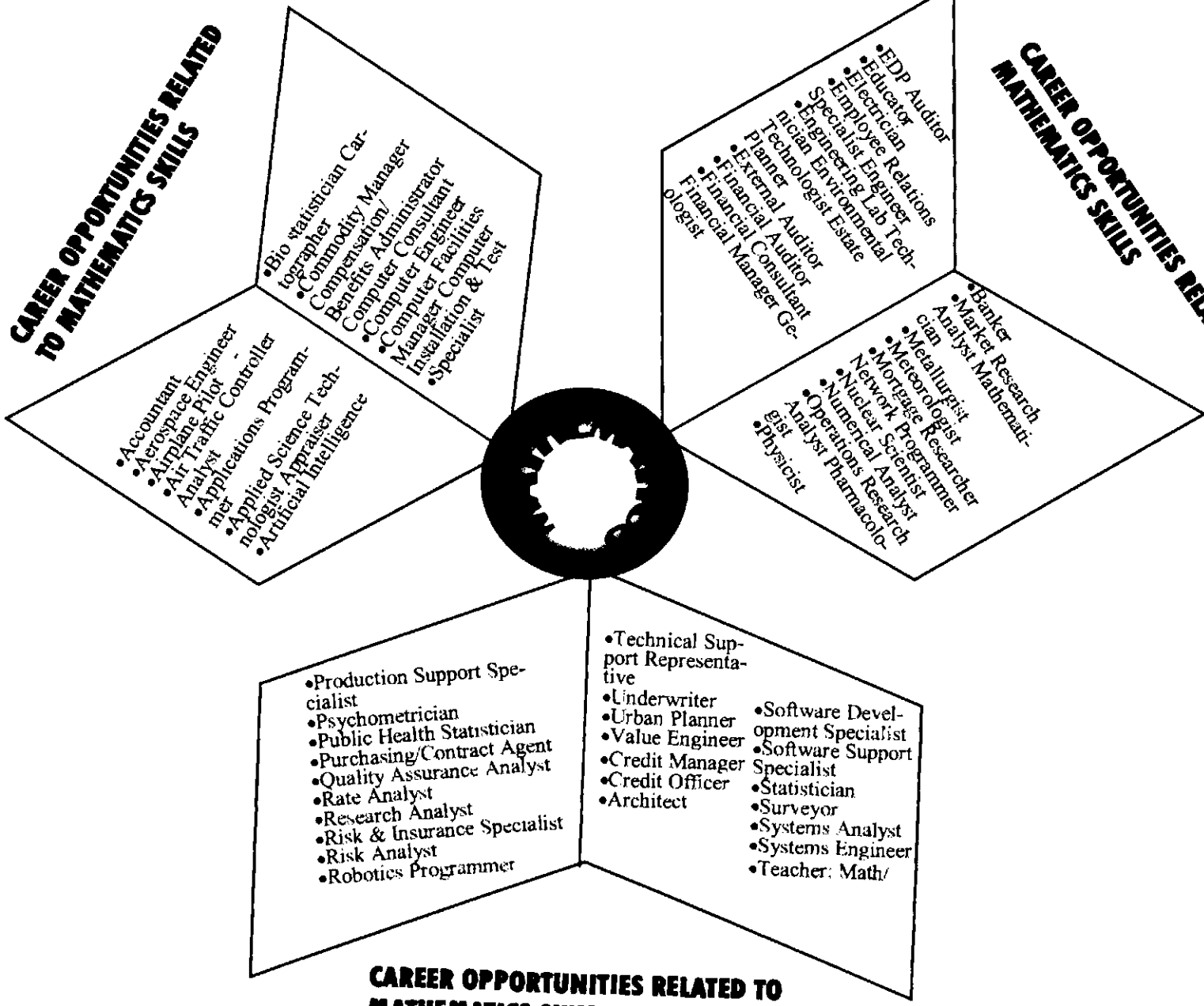
5 What is the attitude of your students towards Mathematics?

6. How can the attitude problem be solved?

APPENDIX V

INTERVIEW GUIDE FOR STUDENTS

1. In which form are you?
2. What is you're your favourite subject? Why?
3. How is your performance in Mathematics?
4. How has been your past experience in Mathematics?
5. What do you suggest to be done to help students learn Mathematics well at these different levels: Teachers/ yourself/ Administration/ Government?


CAREER OPPORTUNITIES RELATED TO MATHEMATICS SKILLS
•Bio statistician Cartographer
•Commodity Manager
Compensation/ Benefits Administrator
Computer Consultant
•Computer Engineer
•Computer Facilities Manager Computer Installation & Test
•Specialist
•Accountant
•Aerospace Engineer
•Airplane Pilot
•Air Traffic Controller
Analyst
•Applications Programmer
•Applied Science Technologist Appraiser
•Artificial Intelligence
CAREER OPPORTUNITIES RELATED TO MATHEMATICS SKILLS
•EDP Auditor
•Educator
•Electrician
•Employee Relations Specialist Engineer
•Engineering Lab Technician Environmental Technologist Estate Planner
•External Auditor
Financial Auditor
•Financial Consultant
•Financial Manager Geologist
•Banker
Market Research Analyst Mathematician
•Metallurgist
•Meteorologist
•Mortgage Researcher
Network Programmer
•Nuclear Scientist
•Numerical Analyst
•Operations Research Analyst Pharmacologist
•Physicist
CAREER OPPORTUNITIES RELATED TO MATHEMATICS SKILLS
•Production Support Specialist
•Psychometrician
•Public Health Statistician
•Purchasing/Contract Agent
•Quality Assurance Analyst
•Rate Analyst
•Research Analyst
•Risk & Insurance Specialist
•Risk Analyst
•Robotics Programmer
•Technical Support Representative
•Underwriter
•Urban Planner
•Value Engineer
•Credit Manager
•Credit Officer
•Architect
•Software Development Specialist
•Software Support Specialist
•Statistician
•Surveyor
•Systems Analyst
•Systems Engineer
•Teacher: Math/