

• EFFECTS OF FREQUENT ASSESSMENT ON ACHIEVEMENT AND

ATTITUDE IN MATHEMATICS IN KENYA

A CASE STUDY OF MIGORI DISTRICT ^

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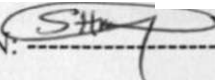
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**A RESEARCH PROJECT SUBMITTED IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE AWARD OF MASTER OF EDUCATION IN THE
DEPARTMENT OF EDUCATION PSYCHOLOGY
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DECLARATION

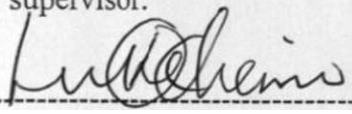
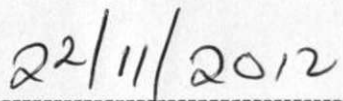
This research project is my original work and has not been submitted for approval in any other university.

SIGN: 

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This research project has been forwarded for examination with my approval as the

university supervisor.
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DEDICATION

I dedicate this work to God for giving me the knowledge and health to complete this project. I also dedicate this work to Epines Kagrizi my mother, Rose Eminza my wife, children, brothers and sisters for wishing me well and understanding me in times of need.

ACKNOWLEDGEMENT

I owe a debt of gratitude to Dr. Luke Odiemo of the department of Education Psychology for being patient with me during the time he supervised me. His pieces of advice on how I was to organize this work and concern for my progress retained me in the course.

The University of Nairobi through the co-ordinator of the department of Education psychology Dr. Karen Odhiambo. I owe you much gratitude for admitting me in the course to advance my Education.

I am also grateful to all teachers of Mathematics and their form four students for co-operating with me and giving me their valuable views. The typist of the research thesis too did a commendable job making it possible to compile these research findings.

I am perpetually indebted to you all.

God bless you.

ABSTRACT

The purpose of the study was to establish whether frequent mathematics assessment enables the learner to achieve high scores in form four. Most schools are employing this method yet they are not sure whether performance in mathematics can improve on using frequent testing. The findings will enable the teachers to employ those methods that have positive effects on the performance of learner and avoid those that are not fruitful to the learners in motivating high achievement in mathematics.

The researcher selected senior mathematics teachers and form students from public schools in Migori District. The sample was determined using simple random sampling technique recommended by Krejcie, 1970 (Appendix 4).

The instrument that the researcher used was a questionnaire for each selected student and the senior mathematics teacher in every school. The questionnaire consisted of closed ended questions to collect the primary data. Questionnaires were preferred by the researcher because they are relatively cheap, it is free from bias of the interviewer, the respondents have adequate times to give a well thought out answer to the question and communication to respondent is easier through a questionnaire.

The questionnaire was administered by the researcher. The study established that frequent assessment leads to improved performance at KCSE level. Most of the respondent strongly agreed that frequent assessment leads to higher achievement. Roediger and

Karpicke (2006) have stated hat frequent testing has a positive effect on retention and thus leads to high achievement.

This study established that frequent assessment reduces anxiety when sitting for exams and this leads to high achievement in mathematics. Dustin (1971) showed that students anxiety decreased in where frequent assessment was used. Also Dempster (1992) stated that frequent short testing tends to significantly reduce students anxiety. The studies completely agree with the findings in this study that frequent assessment reduces anxiety in exams leading to high achievement.

This study hypothesized that frequent assessment leads to high achievement in mathematics. The findings supported the hypothesis. If frequent assessment reduces anxiety then this leads to better performance at KCSE. According to responses from the respondents frequent assessment leads to better performance.

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CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

The problem with the study is that, it is not known whether frequent assessment motivates a learner to achieve higher scores in the final examination at the fourth form level in Kenya. Mathematics is one of the core subjects in secondary school curriculum. Performance in the subject is crucial for students' admission to scientific and technological professions. However, there has been persistent poor performance in this subject particularly in Migori District as revealed by the Kenya Certificate of Secondary Education examination results for the years 2007 to 2011 with mean scores of 3.00, 3.08, 3.02, 3.093 and 3.34 respectively (DEOs office Exams analysis Migori District). This denies students access to the competitive professions.

Factors contributing to this poor performance have not been exhaustively studied though irresponsible teachers resort to frequent testing. The objective of this study is to establish whether frequent classroom assessment (testing) in mathematics leads to higher achievement in the final examination in the Kenya Certificate of Secondary Examination. The study will be conducted in Public Secondary Schools in Migori District Migori County and correlation between frequent of classroom assessment (testing) on the final exams will be studied to see if at all it has a positive influence on performance or not.

There is widespread interest in improving the level of mathematics performance in schools. Apart from the economic benefits of better preparation of young people for the numeracy demands of modern work place and raising the overall skill levels of the work force, there are also social benefits tied to improving access for larger numbers of young people to post- school education and training opportunities and laying stronger foundation to skills for lifelong learning. The interest in raising levels of performance has led to a focus on identifying the range of factors that shape performance as well as understanding how these factors enhance the performance of students and that has led to the usage of frequent testing in most schools in Migori District. The question being asked by stake holders is whether frequent assessment has a positive influence on the final score in the Kenya Certificate of Secondary Examination.

The research that has been conducted in the world to show the relationship between frequent classroom assessment and the effect it has on the final achievement started in the 1920s,(Deputy,1929). The study was majorly conducted among the college students (80%) and less than 20% Focused on elementary and secondary schools (Bangert-Drowns, Kulik, J. K, and G, L, C, 1991).

Scholars research has shown that frequent testing will improve retention of the material tested (Roediger & Karpicke, 2006; Spitzer, 1939). Roediger and Karpicke (2006) have stated that frequent testing have a positive impact on future retention of the material. This positive effect is greater than the same amount of time spent studying the material, even when there is no feedback on errors made on the test. Because retention of material is an

important component of mastery learning, Wolf (2007) has stated that frequent testing is an important ingredient for mastery learning. Wolf has stated mastery learning is an important variable in student learning (2007). Richards (1979) found that even when there is no feedback for the frequent quizzes, students tend to better recall the information, and thus achieve higher scores on tests.

Ma (1995) found that in high school mathematics classes, frequent oral tests increased performance in problem solving skills of students in the treatment group compared with the control group. Townsend and Wheatley (1975) compared four types of treatments in frequent testing in college calculus classes. Group 1 had daily quizzes for 5-10 minutes and a midterm test. Group 2 took quizzes every four or five sessions and a midterm test, group 3 took 40-50 minute tests with a midterm test, and group 4 had only the midterm test. This study showed that group 1 had the highest achievement in mathematics. Another study also found more frequent testing had a favorable effect in high school mathematics classes (Khalaf & Hanna, 1992).

One study found that daily quizzes did not significantly improve students' scores in upper level math courses in high school, but it improved scores of students in the lower level courses such as in algebra classes (Dineen, Taylor, & Stephens, 1989). Furthermore, Kika, McLaughlin, and Dixon, (1992) compared two groups of students with different testing strategies in high school mathematics classes. In the first two months, the group 1 students took algebra quizzes once a week and in group 2, students took quizzes every two weeks. During the second two months the frequency was reversed, meaning that

group 2 received weekly tests while group 1 received biweekly tests. A questionnaire was administered in order to find students' preferences for the type of testing, and the results showed that learners preferred weekly quizzes. This study also found that there was a higher rate of improvement for lower ability students than for higher ability students. The literature shows very few studies regarding the effect on student achievement of giving quizzes daily rather than weekly. Dineen, Taylor, and Stephens (1989) found that students taking **daily** quizzes outscored the students taking **weekly** quizzes. Mawhinney, Bostow, Laws, Blumfield, and Hopkins (1971) compared three groups of students. One group had daily quizzes, the second group had weekly quizzes, and the third group had a test every three weeks. They found out students taking daily quizzes had more consistent learning habits and studied more daily.

Not all research studies show frequent quizzing to have significant benefit on student learning. Burk (1987) found that practice tests did not significantly improve students' actual tests and found that reviewing for a test was as effective as frequent testing. Bangert-Drowns, Kulik, and Kulik (1991) found that even though in a number of studies frequent testing improved student achievement, however, the effect sizes for these studies were not considerably large. In regards to final examination results, another study found there were no significant differences between frequent and infrequent quizzes (Grover, Becker, & Davis, 1989). Kulik and Kulik (1991) also found there is a diminishing return when increasing the number of quizzes. In another study, Noll (1939) states that frequent testing may have a negative effect on student learning since instructional time are

reduced. It therefore means that students will not cover the required course work causing a negative effect on exam results.

The literature included only one research study that compared effects of daily quizzes with weekly quizzes on high school student mathematics achievement. In this study, the researcher sought to answer two questions. Participants in this study were 69 high school sophomore students from one teacher's geometry classes. There were 38 female students and 31 male students. The high school was located in the southern part of the United States in a rural community with a population of over 95% Hispanic ethnic background. The average income of families in the community was about \$21,000.

The researcher selected one geometry teacher who taught six classes to participate in this study. Two of these six classes had a significantly greater number of students with low achievement and higher levels of disruptive incidents, so I selected the other four classes because they were more academically comparable. Selecting two classes for the control group and another two classes for the experimental group was done by random selection. An Independent t-score was used to examine the students' previous term scores to ensure that the two groups were academically comparable.

In the treatment group, the teacher administered a 10-minute daily quiz at the end of the class period to all students, while the control group received a 10-minute worksheet and a test on every Friday. At the beginning of the class period, the teacher returned the graded quiz to all students and spent about 5-10 minutes explaining the solution for each

question. For the students in the control group, the teacher spent the amount of time explaining the solutions for questions on the worksheets. During the study, both groups were exposed to the same class textbook, materials, lesson contents, and homework. The duration of the treatment was for one term of six weeks. At the end of the term, all students in the control and experimental groups took the same final exam. I used the SPSS program to find the mean scores of final examinations for both groups, and then I examined whether the mean difference between the two groups was significant.

At the end of the six-week term, students in all four classes received the same examination. The final examination was a comprehensive test which covered all the concepts taught throughout the entire duration of the term. These scores are the ones that students received on their report cards in the previous term. Students in the control group took a 55-minute test, which included lessons taught from Monday through Thursday. Student daily quizzes Every day during the last 10 minutes of class time, the instructor administered quizzes, and students received their grades the following school day.

In both groups students were given the same homework assignment. There were about 13 homework grades during the treatment. The policy for grading homework assignments was that if students completed just a few questions, they received 25, if they did half or about half, they got a score of 50, and if they did more than half of the assignments, they received a score of 75. If they did all or almost all homework assignments, they received a score 100. The SPSS program was used to find the mean scores of homework assignments for both groups, and then applied a pair-independent t-test to examine

whether the mean difference was significant. They received a score of zero for not turning in an assignment.

The previous term final scores from two classes in the control group and from the other classes in the experimental group were examined to determine whether the two groups were different with respect to mathematical achievement. I used an alpha level of .05, which is a measure of type I error and found a p of .021, indicating the two groups are not significantly different with respect to mathematics achievement. The first research question was whether the treatment had any significant effects on students' mathematics learning as measured by the final examination, that the mean of the final examination scores for the control group was 70.41, and the mean of the treatment group's final examination scores was 77.56. Because the p value is .024 and is less than alpha level of .05, it indicates a significant difference in the two groups' performances. The treatment group, which used daily quizzing, outperformed the control group. The effect size (ES) for this test is .33, indicating a moderate significance between the two groups. Table 1. The Mean Scores of Final Exams for Two Groups Experimental group (n=34) Control group (35) ESM SD M SD 79.56 11.96 70.41 11.52 .33 Note. ES=Effect Size

One limitation of the study is the duration of the treatment, which was for a six- week term, especially since the last six weeks were mainly allocated to reviewing for the final in all classes. Because the participants in this study were over 95% Hispanic students; there may be a problem with generalizing the results to students of other ethnic backgrounds. Future research could investigate the effects of daily quizzes on White,

African-American, or Asian students. Future research could also compare a group of students: with daily quizzes to another group without daily quizzes, but with daily homework. In the daily homework group, teachers would require parents to sign a monitoring sheet indicating that they had received their children's daily grades. Such studies could add to the body of research indicating that daily quizzing significantly improves student mathematics achievement.

In Malawi, Dr. William John Susu Wale-Banda conducted a research that investigated on teachers' perception of mathematics classroom assessment practices. A total of six teachers (three male and three female) were drawn from two primary schools in Malawi.

Teachers' perception of classroom assessment in Mathematics, five of the six teachers perceived assessment as a testing and classroom assessment practices were not clearly embedded in their teaching. Teachers experience and teachers education program did not seem to contribute much to teachers perception of classroom assessment, however teachers academic qualification seemed to influence teachers flexibly to accept new ideas.

Dr. William found that, teachers' perception of mathematics assessment affect the teaching of the subject. (Banda 2005). This was in agreement with assessment group of 1999 which found that the way teachers perceive assessment influence the way they teach and assess their students.

In Malawi there are over 5286 primary schools (Malawi ministry of Education, 2004) yet the researcher only used or researched on only two schools. This number is too small to be used for such a study. However his findings has shown that there other factors that affect Mathematics results. A research was conducted in Kenya in the year 2011 and the objective of the study was to determine the influence of attitude on performance of students in mathematics curriculum. By Sylvia A. Manoahl, Francis Chisikwa Indoshi², Lucas O. A. Othuon³

Students' Attitude towards Mathematics Curriculum across Gender Students' attitude towards mathematics was done with specific reference to the four elements of Mathematics curriculum namely: Objectives, Content, Methods and Evaluation. On objectives both girls and boys had a mean score of 3.8 displaying a positive attitude. On content, girls had a mean score of 2.7 displaying a neutral attitude while boys had a mean score of 3.5 displaying a positive attitude. On methods girls had a mean score of 2.3 displaying a negative attitude while boys had a mean score of 2.8 displaying a neutral attitude. Finally on evaluation, girls had a mean score of 2.4 displaying a negative attitude while boys had a mean score of 2.7 displaying a neutral attitude. In general, girls attitude towards Mathematics have a mean score of 2.8 displaying a neutral attitude while boys had a mean score of 3.2 displaying the same neutral attitude towards Mathematics curriculum. This finding shows that students attitude towards the elements of Mathematics curriculum may have affected performance at MT.. The overall attitude of students towards Mathematics is neutral. A study done by Webster and Fisher (2000) revealed that rural and urban students' attitude in Mathematics positively affects their

performance. It may be concluded from this study that the students' attitude affected their performance.

In this study, ANOVA test was done to determine whether gender has an effect on performance in Mathematics as shown in Table 5. The p-value was 0.2278 which is greater than 0.05 indicating that gender does not affect variation in Mathematics Test.

The objective of this study was to determine the relationship between attitude towards mathematics and performance in Mathematics Test across gender. To achieve this, first the researcher correlated two variables namely students' attitude towards Mathematics with specific reference to the four elements of Mathematics curriculum namely: Objectives, Content, Methods, and Evaluation with performance in Mathematics Test. Pearson product Moment Correlation was used to establish the strength and direction of the relationship that existed between the two variables. It gave rise to the following correlation matrices between students' attitude towards Mathematics curriculum and performance in Mathematics.

The correlation analysis for girls was X11, $r = .651$; X12, $r = .685$; X13, $r = .670$; X13, $r = .667$. While for boys the correlation analysis was X21, $r = .796$; X22, $r = .794$; X23, $r = .778$; X24, $r = .773$

Limitation in this research is that, the researcher has not told us' the number of schools researched on and the location. Resources in the school were not looked at yet they have a great influence on the learners achievement in mathematics. However the researcher

has made it clear that attitude affect performance in mathematics. However all researchers don't agree on one strategy that can improve mathematics performance in our schools, some believe the performance lies heavily on the preparation of the teacher (Erickson 1998). Others believe performance depends on the interest of the learner in the subject, if the learner has appositve attitude in the subject he or she will perform well in the subject. But if she or he has a negative attitude likewise she or will also perform poorly. Evidence from a scholar called Idah who said her wonderful performance was because she become a friend to the subject and scored 80% getting grade A plain in mathematics. "Saturday nation June 2nd 20012".

In this study the independent variable is frequent assessment and the dependent variable is the learners, score which is measured on the number of exams administered as trials for the preparation of the learner.

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1.2 Statement of the Problem

Although Kenya, like most developing countries, strives to improve the quality of education, the performance of students in mathematics both at primary school and secondary school remains poor (Education Research vol.16(3) November 2004). The knowledge of mathematics is of great value in scientific and technological fields. Mathematics is widely recognized as an important qualification for employment and further studies. It provides a unique type of experience in problem solving which is an essential of a complete education. The purpose of this study is to find out whether frequent testing of the learner in mathematics improves or leads to higher achievement in

the final Examination at form four level (KCSE) and whether this frequent testing affects attitude.

1J The purpose of the study

The findings will also identify other factors that influence a learner to achieve high scores in mathematics. A lot of funds have been and still are being used in administering frequent assessments so parents are beginning to feel the weight on fee payment which includes assessment fees. The same applies to our students, some are for frequent assessment while some still are not for it and they have their own reasons for not supporting it.

1.4 Objective of the study.

1. Is to find out whether frequent classroom mathematics assessment leads to higher achievement of the learner in the subject in the final exam.
2. The researcher is to find out the attitudes of the students towards frequent assessment.

1.5 Justification of the study

The research is important to teachers, the school management team, the learner, parents and to the researcher. The study will be helpful to the teacher because, if it is proved that frequent assessment motivates the learner to perform then the method will be reinforced. But if at all it is disapproved, it will be dropped and the alternative sort.

To the school management, the research findings will enable them to identify areas in which to invest in order to motivate student performance. The research findings will benefit the learner because; the findings will be for the benefits of the learner in improving their scores in mathematics.

Parents will benefit because the outcome will be for improvement of the performance of their children which is the main reason of them educating their children. To the researcher, the study will enhance the level of knowledge and skills that help to high level of academic qualification in the field of Education. Finally the findings of the study will form a basis for scholars, academicians and researchers who may be interested to pursue this area further.

1.6 Limitation of the study

The study will majorly limit itself to, whether frequent assessment motivates students to perform. The assessments referred to here should not be mistaken with the daily activities conducted by the teacher as he/she teaches. The assessments being referred to are like the weekly, mid-monthly examination, and the monthly exams. These assessments are either done jointly with other schools or individual schools organizes their own. Funds for these assessments are included in the fee, so it increases the amount of fee to be charged per a student.

CHAPTER TWO

LITERATURE REVIEW

2.0 introduction

This chapter presents a review of relevant literature of this study. It presents the theoretical review particularly Operant conditioning theory by B.F. Skinner. It also highlights on how gender affects student's performance in mathematics and also how economic class of the family, age of the learner and attitude of the learner in mathematics affects performance in the subject. And lastly related literature review on frequent assessment leading to higher achievement in mathematics.

2.1 Theoretical review

Operant conditioning by B.F. Skinner (March 20, 1904 - August 18, 1990) will guide this study. Skinner was an American psychologist who advocated for reforms and poet. He was a key contributor to the development of modern ideas about reinforcement theory. Skinner conducted an experiment with a naive animal which he placed in the box (Skinner box). The animal learnt that, when the lever was pressed, food was released into the food tray; the released food was a reward which reinforced energy of the rat to work more harder. The rat learnt that when the lever was pressed harder more food was got or released.

Skinner argued that internal needs and drives of an individual can be reinforced or ignored because people learn to exhibit certain behaviors based on what happens to them as a result of their behavior or radical school.

Reinforcement, punishment and extinction are the most common terms in this theory. There are two types of reinforcement: positive and negative. Positive reinforcement results when the occurrence of a valued behavior consequence has the effect of strengthening the probability of the behavior being repeated. The specific behavioral consequence is called a reinforce. A reinforce is something that occurring in conjunction with an act tends to increase the probability that the act will occur again. (Pryor 1999).

An example of reinforcement is when a learner does mathematics and gets a higher score and is praised by teachers or selected by the school to represent the school in some mathematics context. This is positive reinforcement that energizes the learner to work more harder. But a negative reinforcement results when an undesired behavior is withheld with the effect of strengthening the probability of the behavior being repeated.

Punishment and negative reinforcement are not the same., punishment attempt to discourage undesired behavior while negative reinforcement attempt to increase desired behavior. Therefore both positive and negative reinforcement have the effects of increasing the probability that a particular behavior will be learnt and repeated. Negative reinforcement might be a student who work very hard in mathematics and scores high marks, which makes the teacher to retain the student as a mathematics king of the class. The administration of the negative reinforcement should make it more likely that the student will continue to exert the necessary effort in the future.

Testwiseness arises from the practice effect of taking many tests and this may confer an advantage for experienced over naive subjects, when they are of otherwise even aptitude or intelligence etc. Sometimes people may organize test coaching in order to gain this advantage. However this research does not deal with testwiseness but the outcome of frequent testing in mathematics contains testwiseness.

The behaviorist approach emphasized drill because the theory states that learning occurs when a bond is established between some stimulus and a person's response to it (Bezuk et al., 2001). The argument in this case was that the more often a correct response is made to a stimulus, the more established the bond became. This theory promoted learning without meaning. The teacher in this case is the source of knowledge while the learner is the passive recipient. Constructivists on the other hand believe that learners construct their own learning; that is, mathematical knowledge emerges (Althouse, 1994; Bezuk et al., 2001; Baroody and Coslick, 1998).

Today most mathematics educators believe that children construct their own knowledge as they interact with their environment (von Glasersfeld, 1995; Baroody and Coslick, 1998; Bezuk et al., 2001). From the constructivist point of view, children construct their own understanding of mathematical ideas by means of mental activities or through interacting with physical models of the ideas (Althouse 1994; Bezuk et al., 2001; NCTM, 2000).

2.2 Constructivism today: the key assumptions

Constructivist view of learning acknowledges that children actively construct their own knowledge through personal interaction with natural phenomena and through social interactions with adults and peers. As a result, children hold beliefs about how the world operates even before come into formal learning situations.

The key assumptions in this view are as follows:

1. Learning outcomes depend not only on the learning environment, but also on the prior knowledge, attitudes and goals of the learner. Each learner builds a personal view of the world by using existing knowledge, attitude, interests goals and the like to select and make sense of incoming information. Ausubel, Novak and Henesian (1978) said that the most important aspect of any learning situation is the learner's prior knowledge. If this can be ascertained, one can teach the learner accordingly.
2. Learning involves the construction of knowledge through experience with the physical environment and through social interaction. One's personal knowledge can never be the same as the other individuals'. Because each individual makes sense of reality in their own was'. This is influenced by age. race, gender, ethnicity and prior knowledge base. By interacting with others they get the opportunity to access a different perspective apart from their own about the same type of reality. The sharing of multiple perspectives tend to enable the individual to modify their own understanding. Systematic open ended discussion and debates are useful in helping the individual create a personal view.

3. Constructing links with prior knowledge is an active process involving the generation, checking and restructuring of ideas or hypotheses.
4. Meanings once constructed can be accepted or rejected. The fact that an individual develops their own understanding by interacting with other people's conception of the same reality does not necessarily mean that the newly constructed meaning will automatically be accepted.
5. Learning is not passive. Individuals are purposive beings who set their own goals and control their own learning. The learner generates and controls feelings, and actions in effort to achieve the learning goal. Learners are not passive recipients of information. Instead they use their prior knowledge and experiences to engage their environment to enhance their existing knowledge structure (i.e., assimilation) and build their knowledge structures (i.e., accommodation). In other words, self-regulation is key to successful learning.
6. Learning is not simply a matter of adding to extending existing concepts, but may involve their radical re-organization.
7. Students frequently bring similar ideas about natural and social phenomena to the classroom. This is hardly surprising when one considers the extent of their shared experience, school life, hobbies clubs, TV, magazines, music etc.

2.3 Attitudes towards Mathematics

Attitudes are seen as more effective and less cognitive than beliefs or values (McLeod, 1992) and often they are defined similarly, and used interchangeably, with dispositions (Brahier & Speer, 1995). In general, attitudes are directed towards something (in this

case, mathematics), are seen as either positive or negative, and are grounded in experience (McLeod, 1992). Way and Relich (1993) commented that "although definitions of attitude vary, they generally include the idea that attitudes are learnt, manifest themselves in one's response to the object or situation concerned, and can be evaluated." A key attitudinal dimension is mathematical confidence (see Ernest, 1988; Stevens, Olivarez, Lan, & Tallent-Runnels, 2004), and it has been identified as critical to effective numeracy development (Wilkins, 2000).

Mathematical Affective Views and Mathematics performance. Studies report that there is a correlation between affective views of mathematics and mathematical achievement. A study by Antonnen (1969) reported a strong positive correlation between mathematics attitude and mathematical achievement. Fennema and Sherman (1978) reported a positive correlation between perceived usefulness of mathematics and mathematical achievement, and more recently, Bouchey and Harter (2005) found that students' perceived confidence was a critical predictor of success in mathematics.

In reviewing New Zealand's performance in TIMSS, Garden (1997) reported: While a majority of students have positive attitudes to learning mathematics it appears that from a fairly young age there is an increasing proportion of students having lost interest in the subject, with a concomitant decline in their achievement, (p. 252), success in mathematical learning seems to lead to more positive affective views about mathematics, which then lead to greater success in learning mathematics, and so forth, with the converse also being the case (Marcou & Philippou, 1995).

In this sense, the cycle is related to issues of motivation and self-efficacy (Barkatsas, 2005; Marcou & Philippou, 1995). The literature suggests that there is an influential connection between Effective mathematical views and performance in mathematics (Ai, 2002;Schreiber, 2002), and so this relationship requires exploration.

2.3.1 Importance of frequent testing

Researchers have offered several possible explanations for why frequent testing should benefit teaching and learning. The first is that more frequent testing provides extrinsic motivation. Students work harder throughout the course because they want to get good grades on the tests (e.g., Curo, 1963; Dustin, 1971; Khalaf, 1989; Standlee & Popham, 1960). Second, frequent testing offers the student feedback or knowledge of their results giving them the opportunity to see their areas of strengths and weakness and giving the student more time to work toward eliminating the areas of weakness (e.g., Bangert-Drowns et al., 1986; McDaris, 1984; Standlee & Popham). The third possible explanation is what Standlee and Popham called "enforced activity" of the subject matter (p. 322).

The process of taking a test forces the student to process the information at a deeper level than they may otherwise. Fourth, Selakovich (1962) found that frequent testing leads to improved class discussion. And lastly, Dustin proposed that frequent testing may reduce stress since each test represents a smaller portion of the total grade. A substantial body of research has been conducted on the effects of frequent testing on students. One of the earliest studies was done by Turney (1931) and is a good example of the typical

frequency of testing study. A description of Turney's work will depict how most such studies have been conducted.

Turney studied the effects of frequent, short, objective quizzes upon the achievement of college junior and seniors taking educational psychology. He wanted to see if students would perform better when given frequent opportunity to determine their relative grades or standing in the class and whether this information motivated the students to study harder. He was interested in determining the effects of feedback on motivation. A modified version of the final exam was used as a pretest. The class section that scored the lowest on the pretest was determined to be the experimental group, the other as the control. The experimental group scored a mean of 85.2 and the control group scored 108.1. Both groups were given the same midterm and final exam; however, the experimental group was given an additional quiz each week while the control group was given only one additional quiz during the course.

Both classes were taught by the same instructor. The lectures, readings, and laboratory work were identical. The experimental group contained 40 students while the control group had 28 students. Turney did not use the tests to measure achievement. Only the final exam scores were used. The gains in knowledge were represented by the difference between the score on the final exam and the score on the pretest. On the final exam the experimental group scored 212.5, for a gain of 127.3. The control group scored almost the same, 212.4, for a gain of 104.7. Turney deduced that the 12 short quizzes led to the

experimental group gaining 21.6% $[(127.3 - 104.7)/104.7]$ more than the control group. Thus, he concluded that frequent testing increases learning.

Scholars research has shown that frequent testing will improve retention of the material tested (Roediger & Karpicke, 2006; Spitzer, 1939). Roediger and Karpicke (2006) have stated that frequent testing have a positive impact on future retention of the material. This positive effect is greater than the same amount of time spent studying the material, even when there is no feedback on errors made on the test. Because retention of material is an important component of mastery learning, Wolf (2007) has stated that frequent testing is an important ingredient for mastery learning. Wolf has stated mastery learning is an important variable in student learning (2007). Richards (1979) found that even when there is no feedback for the frequent quizzes, students tend to better recall the information, and thus achieve higher scores on tests.

Ma (1995) found that in high school mathematics classes, frequent oral tests increased performance in problem solving skills of students in the treatment group compared with the control group. Townsend and Wheatley (1975) compared four types of treatments in frequent testing in college calculus classes. Group 1 had daily quizzes for 5-10 minutes and a midterm test. Group 2 took quizzes every four or five sessions and a midterm test, group 3 took 40-50 minute tests with a midterm test, and group 4 had only the midterm test. This study showed that group 1 had the highest achievement in mathematics. Another study also found more frequent testing had a favorable effect in high school mathematics classes (Khalaf & Hanna, 1992).

2.3.2 Frequent testing on improving scores

One study found that daily quizzes did not significantly improve students' scores in upper level math courses in high school, but it improved scores of students in the lower level courses such as in algebra classes (Dineen, Taylor, & Stephens, 1989). Furthermore, Kika, McLaughlin, and Dixon, (1992) compared two groups of students with different testing strategies in high school mathematics classes. In the first two months, the group 1 students took algebra quizzes once a week and in group 2, students took quizzes every two weeks. During the second two months the frequency was reversed, meaning that group 2 received weekly tests while group 1 received biweekly tests. A questionnaire was administered in order to find students' preferences for the type of testing, and the results showed that learners preferred weekly quizzes.

This study also found that there was a higher rate of improvement for lower ability students than for higher ability students. The literature shows very few studies regarding the effect on student achievement of giving quizzes daily rather than weekly. Dineen, Taylor, and Stephens (1989) found that students taking daily quizzes outscored the students taking weekly quizzes. Mawhinney, Bostow, Laws, Blumfield, and Hopkins (1971) compared three groups of students. One group had daily quizzes, the second group had weekly quizzes, and the third group had a test every three weeks. They found out students taking daily quizzes had more consistent learning habits and studied more daily. Not all research studies show frequent quizzing to have significant benefit on student learning. Burk (1987) found that practice tests did not significantly improve students' actual tests and found that reviewing for a test was as effective as frequent testing.

Bangert-Drowns, Kulik, and Kulik (1991) found that even though in a number of studies frequent testing improved student achievement, however, the effect sizes for these studies were not considerably large. In regards to final examination results, another study found there were no significant differences between frequent and infrequent quizzes (Grover, Becker, & Davis, 1989). Kulik and Kulik (1991) also found there is a diminishing return when increasing the number of quizzes. In another study, Noll (1939) states that frequent testing may have a negative effect on student learning since instructional time are reduced. It therefore means that students will not cover the required course work causing a negative effect on exam results.

2.4 Gender difference in Mathematics achievement

Issues of gender have been a rich area, and probably initiated interest in research about affective factors and mathematics learning. Historically, the achievement of girls in mathematics, across a range of different contexts, was lower than that of the boys, and this was attributed to a variety of reasons including affective factors (Leder, 1992). In a meta-analysis of studies on "gender comparisons of mathematics attitudes and affect", Hyde, Fennema, Ryan, Frost, and Hopp (1990) found that, in general, female students held more negative attitudes to mathematics than male students, and these differences increased with age. They suggested that this was problematic because, "if females have more negative affect and attitudes about themselves and mathematics, they will ... learn less mathematics than males do" (p. 301).

Young-Loveridge (1992) explored the attitudes towards mathematics of Nine-year-old children in New Zealand and found that boys generally liked mathematics more than girls. More specifically, the boys held more positive views about mathematics than the girls (74% cf. 46%), and a significantly higher proportion of the boys perceived themselves as being good at mathematics than the girls did (44% cf. 24%).

2.4.1 Gender differences on effects of frequent Mathematics testing

When frequent mathematics testing is administered to both boys and girls, there is no gender differences that emerged for mathematics performance but levels of Mathematics Anxiety and Testing Anxiety were higher for girls than for boys. Girls and boys showed a positive correlation between mathematics Anxiety and Testing Anxiety and a negative correlation between Mathematics Anxiety and mathematics performance. Testing Anxiety was also negative correlated with mathematics performance, but this relationship was stronger for girls than for boys. When controlling for testing Anxiety, the negative correlation between mathematics Anxiety and performance remained for girls only. Regression analyses revealed that mathematics Anxiety was a significant predictor of performance for girls but not for boys.

Our study has revealed that secondary school children experience Mathematics Anxiety. Importantly, we controlled for testing Anxiety which is typically not controlled for in Mathematics anxiety studies. Girls showed higher levels of Mathematics anxiety than boys and high level of Mathematics Anxiety were related to poorer levels of mathematics performance. As well as potentially having a detrimental effect on 'online' mathematics

performance, past research has shown that high levels of Mathematics Anxiety can have negative consequences for later mathematics education.

Therefore Mathematics anxiety warrants attention in the mathematics classroom, particularly because there is evidence that mathematics Anxiety develops during the primary years. Furthermore, the study showed no gender difference in mathematics performance, despite girls reporting higher levels of Mathematics Anxiety. These results might suggest that girls may have had the potential to perform better than boys in mathematics however their performance may have been attenuated by their higher levels of Mathematics Anxiety. Longitudinal research is needed to investigate the development of Mathematics anxiety and its effect on mathematics performance.

2.4.2 The role of frequent testing on students anxiety

The benefit of frequent testing is its effects on test anxiety. Research has shown that test anxiety and student achievement are highly correlated (Cassady & Johnson, 2002; Deffenbacher, 1980). A study has shown that more frequent short testing tends to significantly reduce student anxiety (Dempster, 1992). Moreover, Dustin (1971) showed that student anxiety decreased in classes where frequent testing was used. Connor-Greene (2000) found that daily quizzing was a major factor of student motivation in learning the material (Fig. 1). Many students have stated that frequent quizzing is a motivator for them to study more and they learn more (Feldhusen, 1964). Glenn (2007) has stated that frequent testing forces students to study more for the tests and recall the content materials more efficiently.

2.43 Role of frequent testing in improving retention

Research has shown that frequent testing will improve retention of the material tested (Roediger & Karpicke, 2006; Spitzer, 1939). Roediger and Karpicke (2006) have stated that frequent testing have a positive impact on future retention of the material. This positive effect is greater than the same amount of time spent studying the material, even when there is no feedback on errors made on the test. Because retention of material is an important component of mastery learning, Wolf (2007) has stated that frequent testing is an important ingredient for mastery learning. Wolf has stated mastery learning is an important variable in student learning (2007). Richards (1979)

More recently, as part of a large Australian project, Rothman and McMillan (2003) examined the influences on Year 9 students' achievement in numeracy. Gender was shown to be a statistically significant influence with the achievement of females lower than that of the males.

However, this result is at odds with the results of Australian students in PISA 2000 (Lokan, Greenwood, & Cresswell, 2001) and TIMMS (Mullins, Martin, Gonzalez, Gregory, Garden, O'Conner, Chrostowski, & Smith, 2000). While gender differences were statistically significant in the Rothman and McMillan study, they were not as prominent as the differences noted for socioeconomic status (SES).⁶ Grootenboer & Hemmings

2.5 Socio-economic Status effects on achievement in mathematics

There has been a long-standing understanding that SES has a significant effect on achievement in mathematics education (Atweh, Meaney, McMurchy-Pilkington, Neyland, & Trinick, 2004). The Rothman and McMillan (2003) report noted that:

[t]he effects of socioeconomic status on student achievement [in numeracy] were significant at two levels. There were small but significant effects of SES within schools, and there were larger significant effects of SES between schools. By far the greatest influence on between-school differences was the school's mean socioeconomic status, (p. 30).

Similarly, Peard (2002) quantitatively showed that SES has a prevailing influence on the mathematical achievement of school children. In short, the literature seems to be consistent in confirming that students who attend low SES schools achieve significantly lower than students who attend high SES schools. Further-more, often SES is closely related to ethnic background (Atweh et al., 2004).

However when frequent assessment is administered to low economic status schools, their performance improves as shown by a study by Debra Johnson auth Angela Rudolph (2001). Improvement of low status schools reforms them. One of the Consortium's studies, supported by the Chicago Annerberg Challenge, studies examples of low status school improvement and assesses the progress of school reform. One of the Consortium's studies examined students in 19 Chicago elementary schools who were given

intellectually stimulating assignments in mathematics and writing. Over a three-year period, the progress of more than 5,000 students in grades 3, 6, and 8 was followed.

Students who received more challenging, intellectual assignments showed greater than average gains on the lower tests of basic skills in reading and mathematics and demonstrated higher performance in reading, mathematics and writing on the Illinois Goals assessment program (Newmann, Bryk & Nagaoka, 2001, January). Students in some very disadvantaged Chicago classrooms were given intellectual challenging assignments, and contrary to some expectations, these children benefited from exposure to such instruction. The study suggests that if teachers, administrators, policymakers and the public at-large place more emphasis on authentic intellectual work in classrooms, yearly gains on standardized tests in Chicago could surpass national norms.

Intensifying learning helps build high achieving schools, which in turn are most likely to produce successful, high-achieving students. High-achieving schools are rigorous schools. They develop rigorous standards, a rich curriculum, knowledgeable and skilled teachers, and meaningful learning experiences as essential elements (Wheelock, 1998).

2.6 Ethnicity differences in mathematics achievement

Research conducted in a range of countries has shown that the dominant ethnic group achieves better in mathematics than indigenous or minority groups (Bouchey & Harter, 2005; Demie, 2001; Ladson- Billings, 1997; Rothman & McMillan, 2004; Tate & D'Ambrosio, 1997). This pattern has also been reflected in New Zealand where

Maori and Polynesian students had lower achievement levels in international studies compared with their European /Pakeha peers (Garden, 1997; Walker & Chamberlain, 1999). Furthermore, the data from a PISA study revealed that there was a large gap between the mathematical literacy of the relatively high achieving Pakeha group and the Maori and Pasifika students (May, 2003). These findings are also reflected in New Zealand studies where the same pattern of achievement is continually repeated (e.g., Crooks & Flockton, 2002).

2.7 Causes of racial and ethnic difference in academic achievement

There are several explanations for the observed differences in mean test scores among racial/ethnic groups. Some of these differences appear to be related to home and school characteristics. For example, high mathematics and science scores are associated with having more family resources and learning opportunities in the home. This relationship holds for all groups, but Whites tend to have more of these advantages than Blacks or Hispanics (Peng, Wright, & Hill, 1995). In addition, many minority students are more likely than Whites to attend schools with the following characteristics that are associated with lower performance: poor school climate, less-qualified teachers, low curriculum requirements, less press for achievement, and more "low-track" programs.

Minority students also are generally less likely to be ready for school, have lower academic expectations, are less engaged in learning, and take fewer advanced courses. When taken together, these home, school, and individual factors are associated with **about 45% of the variation among** groups in mean NAEP mathematics and science scores

(Peng et al., 1995). The remaining variation is less understood. Several researchers have explored whether differences in mean scores among racial/ethnic groups stem from certain questions with a test that are especially troublesome for minority students. These "differential item functioning" studies generally find that if a question is relatively hard or easy for one group, it has that same characteristic in all of the other groups studied. However, researchers are usually at a loss to explain why the few aberrant questions behave as they do (Zwick & Ercikan, 1989).

Whatever the reason for the large differences among racial/ethnic groups, they do not appear to stem from readily observable item characteristics.

2.8 Racial and ethnic differences on effects of frequent mathematics testing.

It has been suggested that performance assessments will reduce differences among groups by reinforcing appropriate curriculum changes and by providing students with hands-on opportunities to demonstrate their knowledge and understanding of scientific principles, not simply by recalling facts, but by constructing solutions (Shavelson, 1997). These measures emphasize the process by which students generate solutions, not just the correctness of the solution itself (Baxter, Shavelson, Goldman, & Pine, 1992; Carey & Shavelson, 1989). The underlying theory is that individuals approach problem-solving differently because of varying styles, not differing abilities (Paris, Lav/ton, Turner, & Roth, 1991). Accordingly, proponents of performance assessments expect that these measures will narrow the differences in scores among groups because they are designed to allow for this individual variation (Neil & Medina, 1989) and they put less emphasis

on guessing, exposure to science-related activities outside the classroom, testwiseness, and other presumably extraneous factors (Jenkins & MacDonald, 1989; M. Johnson, 1990).

Whether performance assessments will in fact reduce gender and racial/ethnic differences in science test scores is an open question. Jovanovic and her colleagues (Jovanovic & Shavelson, 1995; Jovanovic, Solano-Flores, & Shavelson, 1994) explored science achievement in several content domains (e.g., physics, chemistry, earth science) with performance assessments and traditional testing methods (i.e., multiple choice, short answer). They found that males and females generally had similar means on both types of measures. The few significant differences that emerged depended on the specific science content domain assessed. For example, girls had a slight advantage on tasks related to earth science and ecology (e.g., classification of leaves and rocks), whereas boys had an advantage on activities related to electricity (Jovanovic & Shavelson, 1995). These differences occurred regardless of the method of measurement used. Hence, students' prior science-related experiences may play a role regardless of the type of test used (Jovanovic et al., 1994).

Relatively little is known about whether performance assessments will reduce the racial/ethnic differences that are found with multiple-choice tests. The few studies that have been done suggest that they will not have much effect (Linn, Baker, & Dunbar, 1991). For example, the 1992 NAEP mathematics assessment contained both regular (short) constructed response tasks and extended response items (Peng et al., 1995). There

were considerable differences in scores in favor of White students over Hispanic or Black students. Among eighth-grade students, Whites were two to three times more likely than Hispanics or Blacks to correctly answer the two regular constructed response tasks.

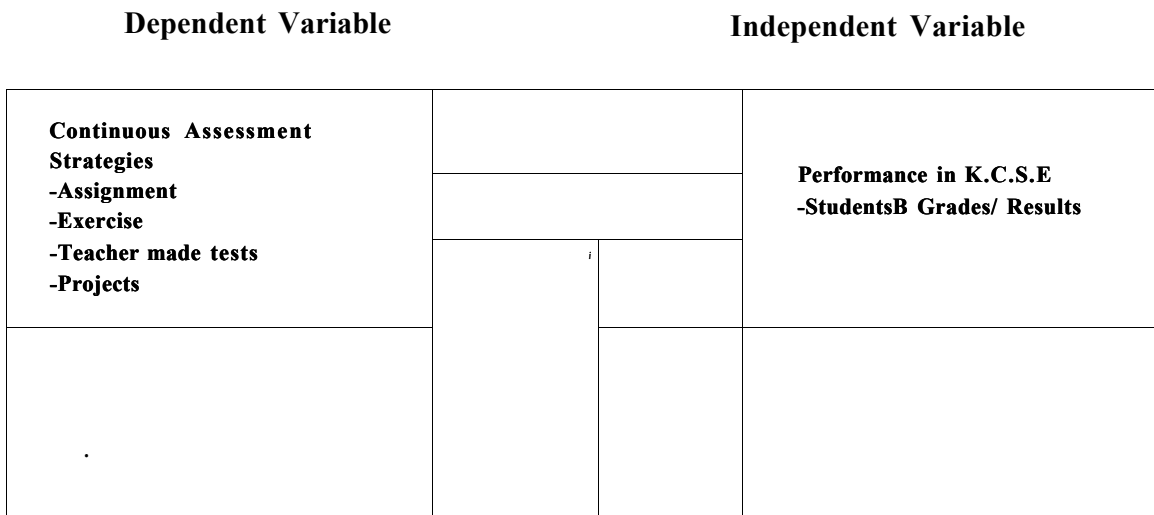
The difference were even more dramatic on the extended-response task, where 49% of White eight-grade students gave at least a minimal response compared to 16% of Hispanic students and 13% of Black students (Mullis, 1994). Similarly, in 1992, NAEP conducted a supplemental assessment of fourth-grade students' oral reading proficiency (including accuracy, rate, and overall literacy development) in addition to the regular NAEP assessment of reading. This study found that the gap between White and minority students on traditional measures of reading corresponded to the gap between them in oral reading (Pinnell et al., 1995). To our knowledge, there are no published studies that compare the scores of racial/ethnic groups on performance assessments and multiple choice tests in science.

2.9 Hypothesis

H₁ Frequent classroom assessment of mathematics leads to higher achievement in K.C.S.E. result

H₀ Frequent assessment does not lead to higher achievement in K.C.S.E.

2.10 Conceptual Framework



Extraneous Variables
 -Teacher qualification
 -Teaching facilities
 -School environment

Figure 1: Conceptual framework

Figure 1 shows the conceptual framework of the study. The conceptual framework clearly indicates that frequent assessment strategies being used by the teachers are likely to contribute to students' performance at four levels in secondary schools. Students attending schools where the teachers were using frequent assessment strategy tools regularly could perform better. There are also extraneous factors that may influence the relationship between frequent assessment strategies being used and student's performance in .o. level examinations, such as teacher's qualifications, available teaching facilities, and school environment.

CHAPTER THREE

METHODOLOGY

3.0 Introduction

In this chapter, the methodological structure of the study is presented. The chapter is divided into six sections. The first section outlines the research design, followed by a description of the participants, the description of the schools, the instruments used, procedure for data collection, and lastly a description of how the data were analyzed.

3.1 Research Design

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The purpose of this research is to establish whether frequent mathematics testing influences achievement of high scores in the final examination at form four levels. The research method chosen was used to collect data that was used to this particular reason. There are several design used in this case for example classical experimental, quasi experimental, case study and survey method. The purpose of a case study like this one, seeks to determine, attitude of the learner towards frequent mathematics testing, effects of testing on gender and on ethnicity. Since the focus of a case study is typical selection of subjects were carefully done to ensure that the unit selected were representative of those it was to be generalized to.

Descriptive research sought to find answers to questions through the analysis of variables relationship. A descriptive research design was used to evaluate the effects of frequent mathematics testing in Migori District. This design was chosen because it helped the

researcher to get the primary data required to determine the effects frequent mathematics testing. The design, also provided a guide in the collection, analysis and interpretation of the observations faster.

3.2 Targeted Population

The targeted population included senior mathematics teachers in public schools and sampled form four students in the schools from Migori District, Migori County in Kenya.

3.3 Sample selection and sample size

The researcher selected senior mathematics teachers and form four students from public schools in Migori District. The sample size selected corresponded to the population of the form four class in the school. As school that had more form four members had a bigger sample taken while a school with few candidates also the sample taken was small.

While taking the sample especially in mixed secondary schools besides the number corresponding with the size of the class, gender was looked into. A class that had more males, had more males in the sample than females. The same applied to the teachers, a school that had more streams had more mathematics teachers taken. The sample was determined using simple random sampling technique recommended by krejcie, 1970 (Appendix 4).

3.4 Research Instruments

The instrument that the researcher used was a questionnaire for each selected student and the senior mathematics teacher in every school. The questionnaire consisted of closed ended questions to collect the primary data. Questionnaires were preferred by the researcher because they are relatively cheap, it is free from bias of the interviewer, the respondents had adequate times to give a well thought out answer to the question and communication to respondent is easier through a questionnaire. The questionnaire was administered by the researcher.

The researcher tried to make the language used as simple as it is possible. This made the respondent to be independent and therefore gave the answer that was not influenced by anybody. A simple language enabled the interviewee to identify the direction the question was taking, for that case avoiding irrelevancy by the respondent.

3.5 Data collection and procedure

The researcher visited the schools to collect data from the sampled population in person. The researcher introduced himself/herself to the head of the institution and request to talk to the senior mathematics teachers. The researcher explained why he/she was meeting them and then requested them to fill the questionnaire independently and then handed it in back to the researcher. The same was applied to the form four students.

3.6 Data Analysis techniques

The data was coded and the following were the key that were used

5 - Strongly agree

4 - Agree

3-Neutral

2 - Disagree

1 - Strongly disagree

After coding the findings, it was run through the statistical program for social science (SPSS). The qualitative data was analyzed using descriptive statistics. The researcher examined all completed questionnaires and filled the information in a frequency table. The magnitude of the correlation between the variables was then calculated. Chi-square test was used to show the correlations between the variables. The Chi-square test was used to test for dependency/independence of the variables.

The quantitative data was analyzed using quantitative methods and presented by use of tables, frequencies, percentages, statistical measures of relationships between the independent and dependent variables. The result was used to draw conclusions and in making of recommendations.

3.7 Ethical Issues

When collecting facts, the researcher treated people with due respect and courtesy and treated the response of the respondent with a lot of privacy. The names of the responded were not captured instead gender were used. The questionnaires was administered

through voluntary informed consent and the participants were assured that no harm would result from any information given either in filling the questionnaire or answering any and even giving your view. All the participants were treated with high respect.

CHAPTER FOUR
DATA ANALYSIS, PRESENTATION, INTERPRETATION AND
DISCUSSION

4.1 Introduction

This chapter presents the findings on frequent assessment and its relationship with performance at KCSE. The data has been analyzed and discussed in the following thematic areas:

1. Response return rate
2. Demographic characteristics of the respondents
3. Effect of frequent assessment on attitude of students and teachers
4. Relationship between frequent assessment on performance at KCSE
5. Frequent assessment and effect on anxiety of students in the exam
6. Discussion

4.2 Response return rate

The number of students sampled for this study was 200. Questionnaires were distributed to them by the researcher. The number of students who returned their questionnaires were 196 which represents 98% of the total. The table below presents this information.

Table 1 Questionnaire return rate for students

	Frequency	Percentage
Returned	196	98
Not returned	4	2
Total	200	100

Only four students did not return their questionnaires representing 2%. However this has been considered insignificant as Hunt,(2001) under his studies in probability sampling argues that at 5% alpha 2% is not significant to affect the results of study findings. The intended target was achieved for this study. Also there were questionnaires for teachers who teach mathematics. The intended sample was 40 and all of them managed to return their questionnaires representing 100%.

Table 2 Questionnaire return rate for teachers

	Frequency	Percentage
Returned	40	100
Not returned	0	0
Total	40	100

4.3 Demographic characteristics of the respondents

This section focused on the demographic profile of the respondents selected for this study. The section provided a basis for understanding and evaluating the composition of the respondents and to determine if the respondents in terms of gender, marital status, and age.

4.3.1 Distribution of the respondents by age

The study was interested in finding out the age of teachers and students who took part in the research. The respondents were asked to state their age brackets. A summary of results for teachers and students is as shown below.

Table 3 Distribution of students by age

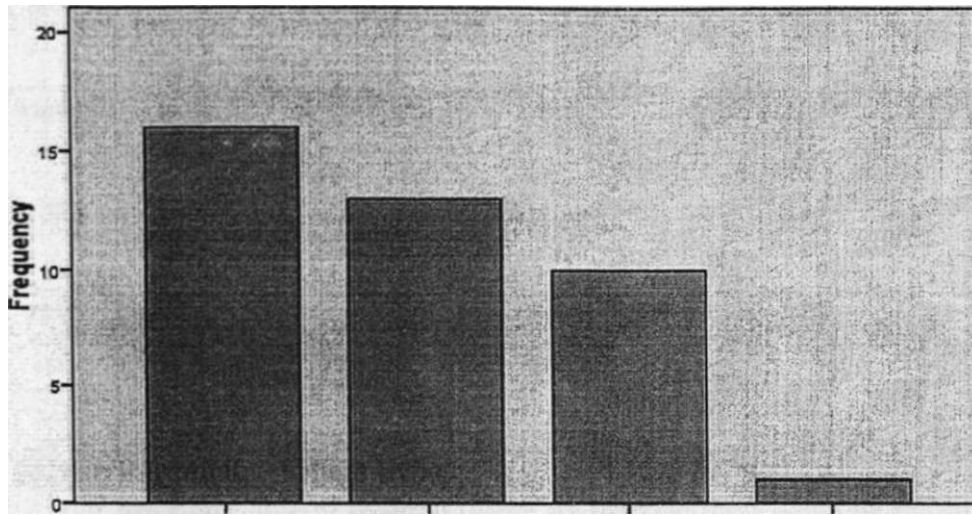
Age in years	Frequency	Percentage
13-16	14	7A
17-20	169	86.2
21-24	6	3.1
>24	7	3.6
Total	196	100

Most of the students were aged between 17-20 years(86.2%), followed by 13-16 years (7.1%), then we had greater than 24 years(3.6%), and finally those aged between 21-24 (3.1%). This trend is shown because most students in secondary school level are within the teenage with very few above twenty years.

Table 4 Distribution of teachers by age

Age	Frequency	Percent
20-30	16	400
31-40	13	32.5
41-50	10	25.0
51-60	1	2.50
Total	40	100

Graph 1: Distribution of teachers by age



There are many teachers in the age bracket of 20-30 years (40%) and very few in the age bracket of 51-60(2.5%). It seems most of the teachers currently teaching mathematics are young and newly employed. This may have arisen due to many retirements and new generation taking over.

4.3.2 Distribution of respondents by their marital status

The study was interested in finding out the marital status of students and teachers. They were asked to state their marital status. The tables below show the respondents marital status.

Table 5 Marital status for students

	Frequency	Percent
Married	14	1~\
Single	182	92.9
Total	196	100

As can be seen from this table of students, some are married these could be the students who had dropped out of school but have found that life without education is unbearable and that is why they are back in school.

Table 6 Marital status of the teachers

	Frequency	Percentage
Married	29	72.5
Single	11	27.5
Total	40	100

Some teachers are single these could be the young teachers who were recently employed we cannot also not rule out divorce cases.

43 J Distribution of respondents by gender

The researcher wanted also to know the gender of the responded because some researchers have found that gender has an influence on mathematics achievement. The distribution is shown below:

Table 7 Gender of students

	Frequency	Percentage
Female	112	57.14
Male	84	42.86
" Total	196	100

The number of female students outnumbered their counter parts the male students because in Migori District there are many girls secondary schools and with a very large enrolment. There is only one boys school in this District the other schools are mixed secondary schools.

Table 8 Teachers gender

	Frequency	Percentage
Female	11	27.5
Male	29	72,5
Total	40	100

The male mathematics teachers are more than their female counter parts because previously mathematics used to be seen as a boys subject. However this wrong belief is outdated and that is why there are now many female teachers teaching mathematics, this will motivate more girls to have apposite attitude towards the subject and therefore improve girls score in it.

4.4 The attitude of students and teachers towards frequent mathematics assessment

This study was interested in establishing the attitude of students and teachers towards frequent assessment in mathematics. The respondents were asked whether they like the policy of frequent assessment in mathematics in their school. The correlation coefficient between attitude and performance showed $r = 0.45$ at $p = 0.01$ showing a strong correlation coefficient.

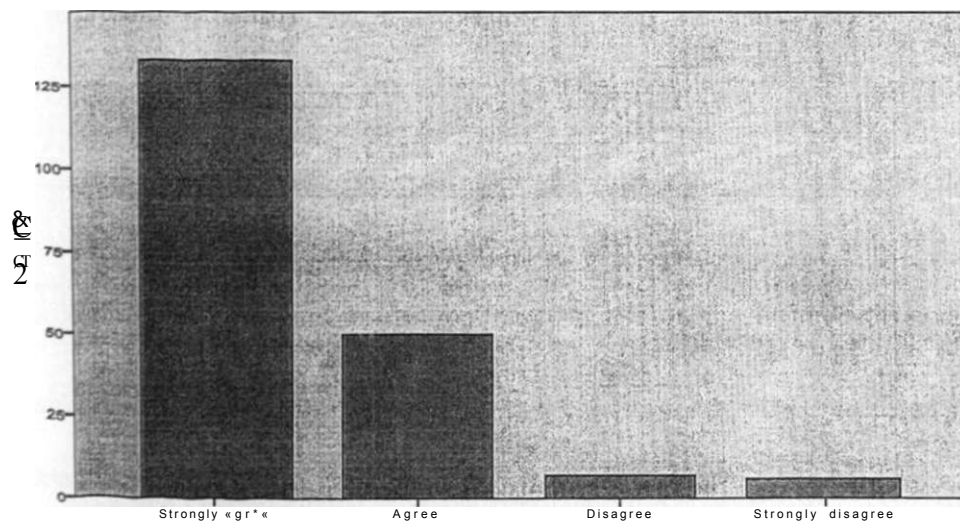
The table below is a summary of the distribution of their responses.

Table 9 Summary of Students response on policy of frequent assessment

	Frequency	Percentage
Strongly agree	136	69.4
Agree	49	25.0
Disagree	5	2.5
Strongly disagree	6	3.1
Total	196	100

The graph below presents results for the response on the attitude of students towards frequent assessment in Mathematics.

Graph 2 Students attitude towards frequent assessment



Most of the students strongly agreed that they would like the policy of frequent assessment (69.4%), very few students strongly disagreed with the policy of frequent assessment. $r = 0.860$. Thus students have a positive attitude towards frequent assessment.

The $\chi^2 = 230.082$, $df = 3$ and $P = 0.01$. The relationship is significant.

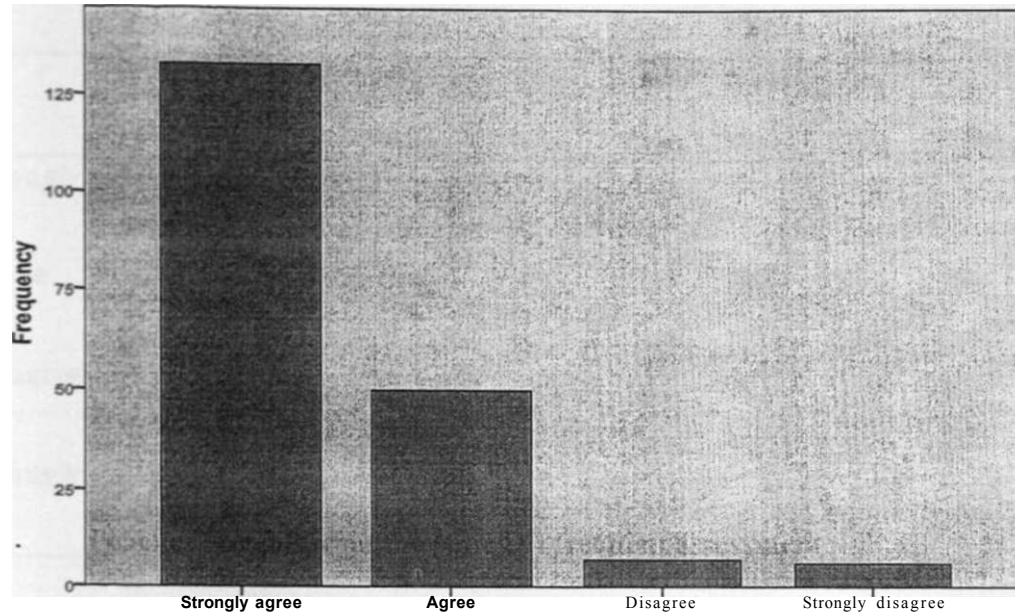
The study was also interested in finding out the attitude of teachers towards frequent assessment. The teachers were asked to state whether they liked the policy of frequent assessment. Table 10 is a summary of the response of teachers.

Table 10 Teachers distribution

	Frequency	Percentage
Strongly agree	26	65.0
Agree	12	30.0
Disagree	2	5
Strongly disagree	0	0
Total	40	100

Graph 3 below is a summary of the results for teachers response on the policy of frequent assessment.

Figure 3 Teachers response on the policy of frequent assessment



$Z = 4.40$ with $\pm = 0.98$ for teachers supporting frequent assessment. Both students and teachers support frequent assessment by 94.4% and 95% respectively.

4.5 Effects of number of tests administered to the learner on performance at KCSE

The student's responses to the statement, the exams we do in a term are and the responses on frequent assessment keeps the students focused were correlated by running their responses through Pearson correlation coefficient which showed $r = 0.199$ and $P = 0.01$. This is a strong correlation that is existing between the testing occasion and frequent assessment keeping the students focused. The students were also asked whether the number of tests improve their performance at KCSE. The correlation coefficient between number of tests done and effect on performance $r = 0.123$, $P = 0.05$. This relationship is significant.

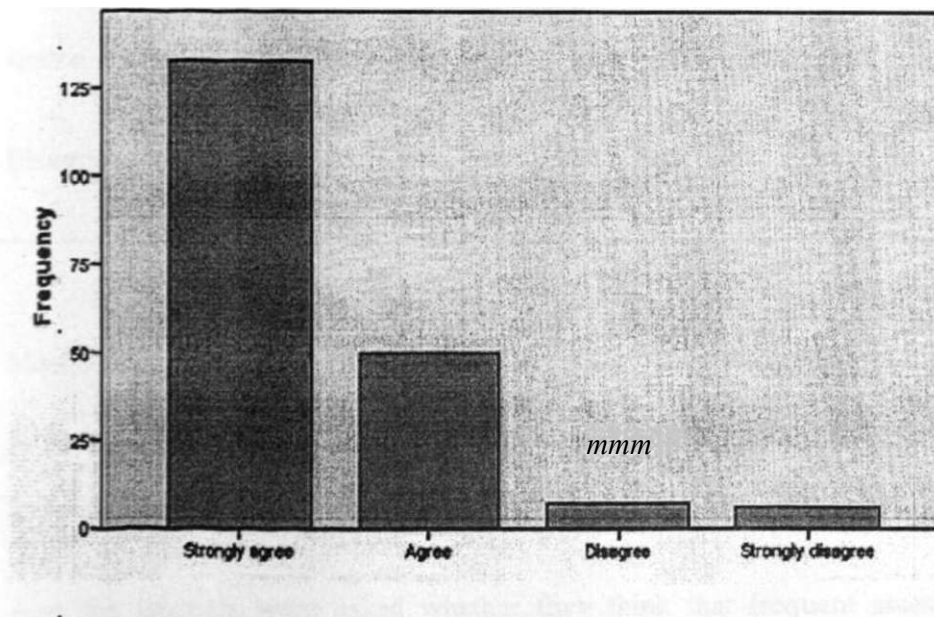
Table 11 is a summary of the results given by the student respondents.

Table 11 Number of tests and performance at KCSE

	Frequency	Percentage
Strongly agree	133	67.9
Agree	50	25.5
Disagree	7	3.6
Strongly disagree	6	3.0
Total	196	100.0

The results can also be presented in a bar graph in figure 3 below

Graph 4 frequent assessment and improvement in performance



Most of the students felt that the more the number of assessments then the better they will perform at KCSE. Since Mathematics is a practice subject then the more one does it the better they are likely to perform.

The $\chi^2 = 268.44$, $df = 3$ and $P = 0.01$. The relationship is significant.

Also the teachers were asked whether they think that frequent assessment enhanced performance in mathematics. The table 12 below is a summary of the response from the teachers.

Table 12 Summary of frequent assessment and performance at KCSE for teachers

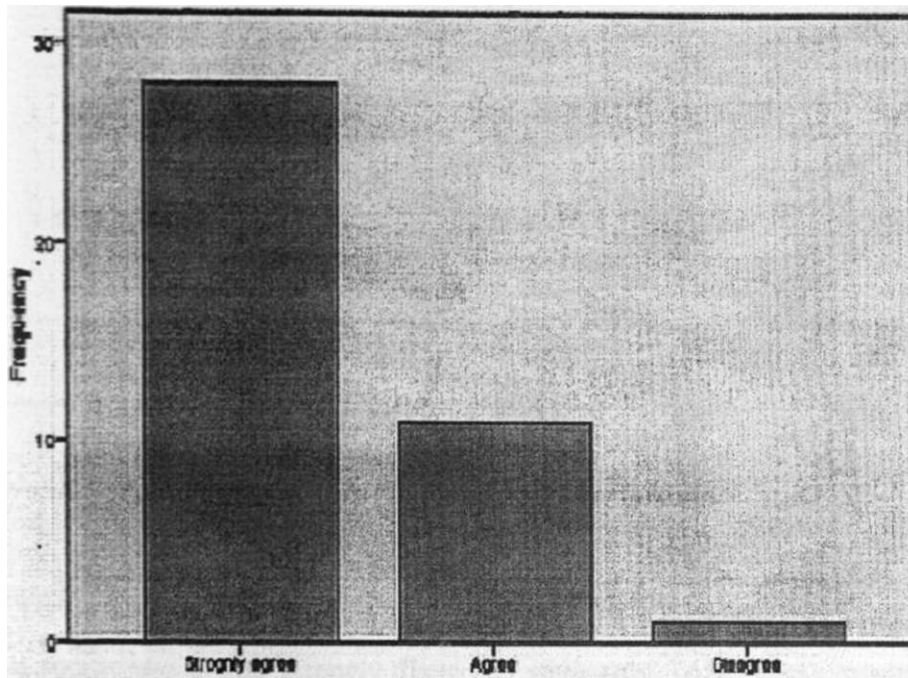
	Frequency	Percentage
Strongly agree	28	70
Agree	11	27.5
Disagree	1	2.5

Most of the students felt that the more the number of assessments then the better they will perform at KCSE. Since Mathematics is a practice subject then the more one does it the better they are likely to perform.

Also the teachers were asked whether they think that frequent assessment enhanced performance in mathematics. The $r = 0.45$, $P = 0.05$ The relationship is significant.

The table 12 above is a summary of the response from the teachers.

Graph 5 frequent assessment leads to good performance in KCSE



The results show that most respondents i.e. teachers and students strongly agree that frequent assessment improves performance at KCSE.

4.6. Frequent assessment and effect on anxiety of students in the exam

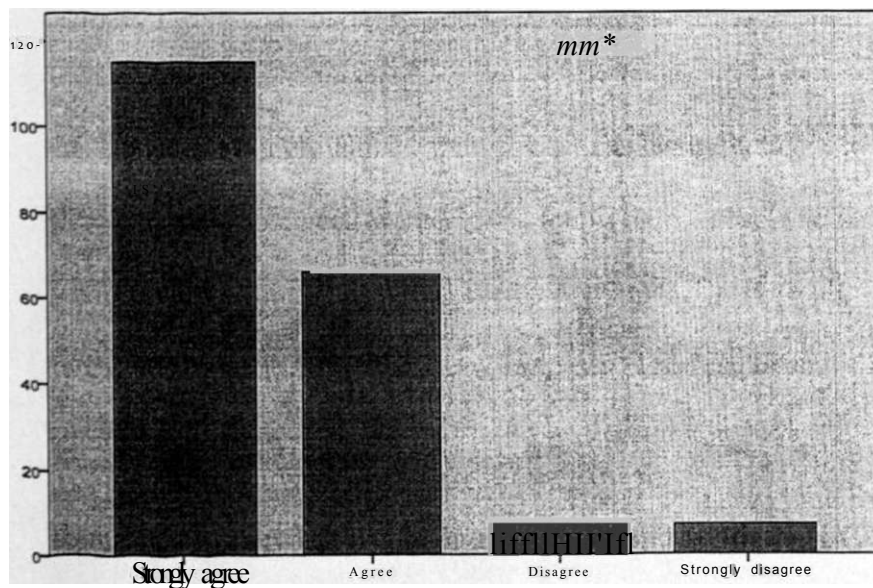
This study was interested in establishing the effect of frequent assessment on the anxiety of the students. The students were asked whether frequent assessment in mathematics reduces their anxiety as they sit for the exams. A summary of the response is shown in the table 13 below.

Table 13 Summary of students' response on frequent assessment and anxiety

	Frequency	Percentage
Strongly agree	115	58.7
Agree	66	33.7
Disagree	8	4.1
Strongly disagree	7	3.6
Total	196	100

Most of the students strongly agreed that frequent assessment reduced anxiety in the exams (58.7%), those who agreed were 33.7%, followed by those who disagreed at 4.1% and finally those who strongly disagreed were only 3.6%. These results clearly indicate that the more students are assessed anxiety decreases. The results above are represented by the graph 5 shown below.

Graph 6 Relationship between frequent assessment and reduction of anxiety



The mean of reduction of anxiety was 4.40 and this lies between strongly agree and agree. The standard deviation is 0.990 which indicates there is high variation in the response of the students. The students' fear of mathematics reduces when they are engaged in many tests therefore. High anxiety is associated with failure in examinations. The $\chi^2 = 169.224$, $df 3$ and $p = 0.01$. the relationship is significant.

4.7 Conclusion

This study hypothesized that frequent assessment leads to high achievement in mathematics. The findings support the hypothesis. If frequent assessment reduces anxiety then this leads to better performance at KCSE. According to responses from the respondents frequent assessment leads to better performance.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents a summary of the finding, conclusion and recommendations. They are presented under the following thematic areas objective of the study, methodology, reliability and validity of the study, findings of the research, contributions to the body of knowledge and suggestions for further research. The objective of the study was to establish whether frequent assessment leads to higher achievement in KCSE Mathematics Form four. Also the study undertook to find out the attitude of teachers and students towards frequent assessment in mathematics.

5.2 Methodology

The method selected for data collection was for case study. Data was collected using subjects who were carefully selected to ensure that the results can be generalized to the whole population. The purpose was to establish relationship between frequent assessment and performance at KCSE.

The descriptive research design was used in order to evaluate the effect of frequent testing in Mathematics on the general performance of the students in their final exam (KCSE). The design was chosen to since it helps in collection of reliable and valid primary data. The questionnaires were distributed to the respondents by the researcher.

Respondents were more than willing to take part in the research and therefore readily gave the information required. This provided a basis for analysis of the provided information.

5.3 Justification of the methodology

The method used was good in establishing whether really it is true that there exists a relationship between frequency of testing and the performance in the final examination in form four.

5.4 Validity of the results

The instruments used were questionnaires which had simple language with no ambiguous words. This ensured that the information given by the respondents was correct and therefore valid. The findings can therefore be true to the fact that there is a positive correlation between frequent assessment and performance at KCSE. Since the sample size was representative of the population then the results can be generalized to the whole population confidently.

5.5 Reliability of the results

Townsend and Wheatley (1975) found that frequent testing in Calculus which is a topic in Mathematics increased performance in the final examinations. The findings in this study are in line with these findings and others like Ma (1995). Therefore the findings are reliable and can be replicated in other areas and subjects.

5.5 Findings of the study

5.5.1 Does frequent assessment in mathematics lead to high achievement in KCSE

The study established that frequent assessment leads to improved performance at KCSE level. Most of the respondent strongly agreed that frequent assessment leads to higher achievement. Roediger and Karpicke (2006) have stated hat frequent testing has a positive effect on retention and thus leads to high achievement.

5.5.2 Does frequent assessment reduce anxiety in exams

This study established that frequent assessment reduces anxiety when sitting for exams and .this leads to high achievement in mathematics. Dustin (1971) showed that students anxiety decreased in where frequent assessment was used. Also Dempster (1992) stated that frequent short testing tends to significantly reduce students anxiety. The studies completely agree with the findings if this study that frequent assessment reduces anxiety in exams leading to high achievement.

5.6 Contributions to the body of knowledge

The findings have made clear that frequent assessment improves performance at KCSE in Kenya. This has contributed in that many schools and teachers of Mathematics will be able to apply this tactic with the caution that one can avoid learners from being test wise. This study has made a stride in establishing that frequent assessment really reduces anxiety and thus improves performance at KCSE. Teachers can be able to know what students like or dislike in frequent testing.

5.7 Significance of the study

Since mathematics is a compulsory subject in Form Four and its performance in many schools is wanting then schools can use the policy of frequent assessment in order to improve their performance in mathematics. Also anxiety is sometimes blamed for poor performance and thus frequent testing should be encouraged in order to reduce this tension when students sit for their examinations of mathematics.

5.8 Suggestions for further research

The following areas are suggested for further research:

- i. A similar study should be carried out in other Districts and subjects to establish whether the same result would be found.
- ii. . Challenges facing frequent assessment in mathematics thus hindering its implementation in schools.

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APPENDIX I: QUESTIONNAIRE FOR MATHEMATICS TEACHER

Dear mathematics teacher,

• I am a post graduate student at the University of Nairobi. I am conducting a research study entitled; Effects of Frequent assessment on achievement and attitude in Mathematics in Kenya.

You have been selected to assist in providing the required information as your views are considered important in this study. I am therefore requesting you to fill this questionnaire. The information given will be treated with utmost confidentiality and will only be used for the purpose of this study.

PART A

1. My gender is.

1. Female

2. Male

2. My age lie between;

1. 20—30

2. 31—40

3. 41—50

4. 51--60

3. My marital status is;

1. Married

2. Single

4. My educational level is

1. Diploma level holder

2. Degree holder

3. Masters holder

4. Doctorate degree holder

5. I have been in this school for

1. Two years

2. Three years

3. Four years

4. Five years

5. six years

6. >six years

6.1 have chosen to be in this school

1. Yes I I

2. No

7.1 ended in this school through

	Strongly agree	agree	disagree	Strongly disagree
Choice				
Transfer				
Disciplinary				
Posting				
BOG				

8.1 am happy in this school

Strongly agree	
Agree	
Neutral	
Disagree	
strongly disagree	

PART B

9. My School has done form four exam for the last three years

1. Yes

2. No 1

10. In the last three years the performance has been rising

Strongly agree	
Agree	
Neutral	
Disagree	
strongly disagree	

11. My school performs well due to hard work of teachers

Strongly agree	
Agree	
Neutral	
Disagree	
strongly disagree	

12. We administer

	Yes	No
one exams per term		
Two exams per term		
Three exams per term		
Four exams per term		
More than four		

13. The scores of the exams are averaged at the end of the term.

Yes	No

14. We frequently assess students in mathematics

Yes	No

15.1 am happy with the policy of frequent assessment in mathematics

1. Yes

2. No

16. Frequent assessments keep the learner alert.

Strongly agree	
Agree	
Neutral	
Disagree	
strongly disagree	

17. Frequent assessment should be encouraged

Strongly agree	
Agree	
Neutral	
Disagree	
strongly disagree	

18. Frequent assessment leads to good performance in KCSE

Strongly agree	
Agree	
Neutral	
Disagree	
strongly disagree	

APPENDIX II: QUESTIONNAIRE FOR FORM FOUR STUDENTS

Dear student

Before filling this questionnaire, let us get to know what is happening. This is a research that aims at improving learning in our schools. What you contribute is what will be recommended to take place in our schools.

What is required of you is only stating whether you are a male or a female. I don't require your name therefore you should not think that we are looking for faults on your side. Read the question well and go through the responses then choose the one you feel answers the question well according to you.

Thank you, now you can go through the questions and answer them carefully.

PART A DEMOGRAPHIC DETAILS

6. My gender is.

1. Female

2. Male

7. My age lies between :

13-16

17-20

Above 24

8. I am in form:

1. One

2. Two

3. Three

4. Four

9. I am married

PART B

5. My School has done KCSE for the last three years.

1. Yes 1 I

6 .We are assessed many times in a term

Yes	No

7 .The exams we do in a term are:

	Yes	No
One		
Two		
Three		
Four		
Above four		

8. The scores of the exams are averaged at the end of the term.

Strongly agree	
Agree	
Neutral	
Disagree	
strongly disagree	

9. Frequent assessment is good because it keeps the student focused (alert) always

Strongly agree	
Agree	
Neutral	
Disagree	
strongly disagree	

10 .Frequent assessments should be encouraged in schools.

strongly agree	
Agree	
Neutral	
Disagree	
Strongly disagree	

11. Frequent assessment has improved the performance of our school at KCSE level.

Strongly agree	
Agree	
Neutral	
Disagree	
strongly disagree	

12. Frequent assessment is expensive to parents

Yes	No

13.1 have been scoring high marks in the frequent mathematic test

Yes	No

14. Because of frequent mathematics assessment I am sure of passing mathematics at K.C.S.E level

Strongly agree	
Agree	
Neutral	
Disagree	
strongly disagree	

15.1 don't fear mathematics because I have done many mathematics tests

Strongly agree	
Agree	
Neutral	
Disagree	
strongly disagree	

16.1 like this policy of frequent mathematics testing

Yes	No

MVfcRSiry op Nam