ASSESSMENT OF FORMATIVE EVALUATION IN TEACHING AND LEARNING SECONDARY MATHEMATICS: A CASE OF THIKA WEST DISTRICT, KIAMBU COUNTY.

WAMBUGU DORCAS WANJIRU

E55/12860/09

A MASTER OF EDUCATION RESEARCH PROJECT SUBMITTED TO THE DEPARTMENT OF EDUCATIONAL MANAGEMENT, POLICY AND CURRICULUM STUDIES. IN PARTIAL FULFILLMENT OF THE REQUIREMENT OF MASTER OF EDUCATION DEGREE KENYATTA UNIVERSITY

KENYATTA UNIVERSITY LIBRARY
DECLARATION

This project is my original work and has not been presented for a degree in any other university.

Date 29.11.2011

DORCAS WANJIRU WAMBUGU
E55/12860/09

This research project has been approved for examination with our approval as university supervisors:

Date 30.11.2011

Dr WILFRIDA ITOLONDO
Lecturer
Department of Educational Management, policy and Curriculum Studies
Kenyatta University

Date 30.11.2011

Dr. G.A ONYANGO
Lecturer
Department of Educational Management, policy and Curriculum Studies
Kenyatta University.
DEDICATION

I dedicate this project to my son Morris to inspire him to work hard in his studies
ACKNOWLEDGEMENT

I give all my gratitude to the almighty God who has been the source of my strength while undertaking this project. I also acknowledge and thank my supervisors Dr. Itolondo and Dr. G.A. Onyango for their guidance throughout the entire project writing. Special thanks go to my husband Paul for his financial and moral support when I struggled to get through with this research project.
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Declaration</td>
<td>ii</td>
</tr>
<tr>
<td>Dedication</td>
<td>iii</td>
</tr>
<tr>
<td>Acknowledgement</td>
<td>iv</td>
</tr>
<tr>
<td>Table of Contents</td>
<td>v</td>
</tr>
<tr>
<td>List of Tables</td>
<td>ix</td>
</tr>
<tr>
<td>List of Figures</td>
<td>x</td>
</tr>
<tr>
<td>Abbreviations and Acronyms</td>
<td>xi</td>
</tr>
<tr>
<td>Abstract</td>
<td>xii</td>
</tr>
<tr>
<td>CHAPTER ONE: INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>1.1 Introduction</td>
<td>1</td>
</tr>
<tr>
<td>1.2 Background of the Study</td>
<td>1</td>
</tr>
<tr>
<td>1.3 Statement of the Problem</td>
<td>10</td>
</tr>
<tr>
<td>1.4 Purpose of the Study</td>
<td>11</td>
</tr>
<tr>
<td>1.5 Objectives of the Study</td>
<td>11</td>
</tr>
<tr>
<td>1.6 Research Questions</td>
<td>11</td>
</tr>
<tr>
<td>1.7 Significance of the Study</td>
<td>12</td>
</tr>
<tr>
<td>1.8 Limitations of the Study</td>
<td>13</td>
</tr>
<tr>
<td>1.9 Delimitations</td>
<td>13</td>
</tr>
<tr>
<td>1.10 Assumptions of the Study</td>
<td>13</td>
</tr>
<tr>
<td>1.11 Theoretical Framework</td>
<td>14</td>
</tr>
</tbody>
</table>
# LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>Mathematics Mean scores in Thika West</td>
<td>9</td>
</tr>
<tr>
<td>4.1</td>
<td>Frequency of Using Schemes</td>
<td>41</td>
</tr>
<tr>
<td>4.2</td>
<td>Preparation of Mathematics Assessment Tests</td>
<td>41</td>
</tr>
<tr>
<td>4.3</td>
<td>Types of Questions Given in the Tests</td>
<td>42</td>
</tr>
<tr>
<td>4.4</td>
<td>Use of Assessment Techniques</td>
<td>46</td>
</tr>
<tr>
<td>4.5</td>
<td>Rating of Classroom Assessment</td>
<td>48</td>
</tr>
<tr>
<td>4.6</td>
<td>Duration for Receiving Feedback of the C.A.Ts by Students</td>
<td>50</td>
</tr>
<tr>
<td>4.7</td>
<td>Communication of Feedback</td>
<td>51</td>
</tr>
</tbody>
</table>
LIST OF FIGURES

Figure 4.1 Planning of Mathematics Assessment ........................................... 39
Figure 4.2 Guide for Assessment Techniques.................................................. 40
Figure 4.3 Marking of Assessments .................................................................. 43
Figure 4.4 Frequency of Mathematics’ C.A.Ts.................................................... 44
Figure 4.5 Time allocated for C.A.Ts................................................................. 45
Figure 4.6 Other Assessment Techniques........................................................ 47
Figure 4.7 Duration for Releasing Assessment Feedback..................................... 49
Figure 4.8 Regularity of Remedial Teaching....................................................... 52
ABBREVIATIONS AND ACRONYMS

K.N.E.C: Kenya National Examination Council
K.C.S.E: Kenya Certificate of Secondary Education
K.C.P.E: Kenya Certificate of Primary Education
C.A.Ts: Continuous Assessment tests
Q.U.A.S.O: Quality Assurance Standards’ Officer
N.C.E.O.P: National Commission on Educational Objectives and Policies
SMASSE: Strengthening Mathematics and Sciences for Secondary Education
T/L: Teaching and learning
The purpose of this study was to assess formative evaluation in teaching and learning secondary Mathematics in Thika West District. The study was guided by the following objectives: to investigate how teachers plan and prepare assessments before administering them to the students, to determine the techniques being used to evaluate the students formatively in mathematics, to assess the use of feedback from assessments as practiced by the teachers and to investigate how the practice of formative evaluation can be improved. Survey design was used for the study. The target population was all the district category public schools in the district. All these schools were used in the study. Simple random sampling was used to select the specific teachers for the study from these schools while systematic sampling was used to sample students using class lists. Questionnaires, document analysis sheet and observation schedules were used as instruments for the study. Statistical package for Social Sciences was used to analyze the data where descriptive statistics were used. The analyzed data were presented in form of frequency table, bar graphs and pie charts. The study found that the formative techniques regularly used in evaluating students included oral questioning, observation and written assignment whereas group work, project work and administration of weekly assessments were rarely used. Regarding preparation for the assessment, the study found that teachers planned for assessment after teaching particular topics as indicated by 73% of the respondents, they did not use schemes of work to prepare for the assessment as indicated by 53% of the respondents and C.A.Ts were prepared and marked by individual teachers. The study also found that C.A.Ts were administered to the students once a term by most teachers. The study further found that the assessments were very important as indicated by 54% of the respondents. It took most teachers two weeks to give back feedback to the students and this feedback was used to schedule remedial classes which were conducted outside class hours after giving instructions as indicated by 73% of the respondents. The study generally concluded that even though formative evaluation was carried out in schools, it had a lot of weaknesses. The study recommended that teachers should plan for assessment using schemes of work to ensure all objectives have been tested, they should set and mark C.A.Ts in consultation with each other and assess students more frequently. The study further recommended the use different assessment techniques and giving of feedback from to be availed soonest possible to settle anomalies before they get out of hand. The study finally recommended that another study be carried out in other parts of Kenya on assessment of formative evaluation in teaching and learning secondary mathematics.
CHAPTER ONE

Introduction

1.1 Introduction

This chapter presents background to the study, statement of the problem, objectives, limitations and delimitations, theoretical and conceptual framework.

1.2 Background to the Study.

Mathematics is an essential discipline recognized worldwide. Its knowledge enhances a person's reasoning, problem-solving skills, and in general, the ability to think. It is important for understanding almost every subject whether science and technology, medicine, economics, or business and finance (Mutunga and Breakel, 1992). It plays a significant role in the lives of individuals and the world of society as a whole.

For this reason, mathematics has been given a lot of emphasis in Kenyan system of education by making it a compulsory subject for all learners in primary and secondary schools. The subject has the largest number of teacher-student contact hours according to the official school timetable and the Students are expected to have at least one lesson every day in mathematics.

It has also been emphasized in colleges and universities by being taken as a prerequisite subject of study in most colleges that offer scientific and business courses. Its fundamental role lies in its everyday application in many social sciences, government and business transactions, physical sciences and engineering, biological sciences and
medicine, military and aerodynamic advancements and household chores. This has given the reason for making the subject compulsory in Kenyan school curriculum (Mutunga and Breakel, 1992; Republic of Kenya, 1999).

Due to its vast application in everyday life, secondary school mathematics education has been designed with a number of objectives which if well achieved would enable the students to grow to useful citizens. According to Kenya institute of Education (2002), these objectives state that

*By the end of the course, the learner should be able to:*

1. Perform mathematical operations and manipulations with confidence, speed and Accuracy,
2. Think and reason precisely, logically and critically in any given situation,
3. Develop investigative skills in mathematics,
4. Identify, concretize, symbolize, and use mathematical relationships in everyday life,
5. Comprehend, analyze, synthesize, evaluate and make generalizations so as to solve mathematical problems,
6 Collect, organize, represent, analyze, interpret data and make conclusions and predictions from its results,
7. Apply mathematical knowledge and skills to familiar and unfamiliar situations,
8. Appreciate the role, value and use of mathematics in society,
9. Develop willingness to work collaboratively,
10. Acquire knowledge and skills for further education and training,
11. Communicate mathematical ideas,
12. Develop positive attitude towards learning mathematics.

However, these objectives are achieved at a very minimal extent as indicated by students' poor performance in mathematics in K.C.S.E (Rukangu2000). Some of the factors that have always featured to negatively influence the teaching and learning of secondary mathematics and hence the failure to achieve the set objectives include; lack of resources, poor attitudes by the students and teachers, inadequate time to complete the syllabus and lack of motivation for both teachers and students (Eshiwani, 1983). Others include lack of proficiency knowledge by teachers and lack of understanding by the students because of the language used.

A study carried out by Gitonga (2010) to determine the relationship between students' performance in word problem and related algebraic expression found out that students performed better in mathematical tasks that were in algebraic mode than in word problem mode. This means that some students fail in mathematics because they have a problem with the language used when learning it. Another study by Miheso (2009) that assessed teachers proficiency in mathematical content knowledge through their interpretations of students problem solving strategies, found that teachers proficiency was multidimensional and generally displayed a lack of deep and connected content knowledge.

Strengthening Mathematics and Science in Secondary Education (SMASSE) project in 1998 has also shown that consistent failure and negative attitude by students towards
Mathematics, continues to characterize the classroom (Miheso, 2009). Based on this same research, teachers have been found to present lessons that are too much teacher-centered with the teacher as the main actor and sometimes the only actor in the classroom as students remain passive recipients. Mathematics teachers commonly use Rote learning, exercises and problem solving methods to deliver mathematical concepts to the learners. Rote learning or drilling is used to teach mathematical results, definitions and concepts by repetition and memorization typically without being supported by mathematical reasoning whereas exercises are used to reinforce mathematical skills by completing large numbers of exercises of a similar type. Problem solving cultivates mathematical ingenuity, creativity and heuristic thinking by setting students open-ended questions. This method is however not commonly used by all teachers in the secondary schools as revealed by (Miheso, 2002) who found out in his study that, 98% of the respondents who were secondary school students, were able to confidently tackle computation problems, 30% could tackle application type problems and 2% could tackle deductive level problems. This study revealed that teachers focused more on computation mathematics and so students had no opportunity to engage in problem solving activities. Generally, Mathematics Lessons have been found to be difficult, boring and lacking in effective teaching/learning materials.

Many attempts have been made to minimize the above mentioned problems with a view of realizing the objectives and improving performance. An example is the introduction of SMASSE in 1998, which was an attempt to help teachers solve some of these problems
by introducing new teaching methodologies to help learners change their attitude towards mathematics and increase understanding of the subject, showing teachers how to improvise in case of scarce teaching and learning materials amongst others for effective teaching and learning of mathematics, but no much improvement has been realized. This means that the real problem has not been addressed and therefore necessitating more research. It is for this reason that the researcher felt that it is important to assess the effectiveness of formative evaluation in schools which could go a long way in helping to identify the problems facing the teaching and learning of mathematics at a particular time hence addressing the same for better performance.

It is worth noting that, for one to perform well in mathematics in summative evaluation such as the Kenya Certificate of Secondary Examination, one need to be performing well through the course work where evaluation on the progress is be done using formative evaluation. Formative evaluation has the primary purpose of helping to ensure that summative evaluation has a positive outcome (Shiundu and omulando, 1992). This is enhanced through the use of formative assessment given by the teachers which makes the student feel confident of what they know and also have their self efficacy raised (Bandura, 1997).

Formative Evaluation is viewed as a cyclical process including four phases: preparation, assessment, evaluation, and reflection (Wilson, 2000). In the preparation phase, decisions are made which help the teacher to identify what is to be evaluated, the type of evaluation (formative, summative, or diagnostic) to be used, the criteria against which student
learning outcomes will be judged, and the most appropriate assessment techniques with which to gather information on student progress. The teacher's decisions in this phase form the basis for the remaining phases.

During the assessment phase, the teacher constructs assessment instruments, administers them to the student to collect the information on student learning progress. The teacher continues to make decisions in this phase such as; determining where, when, and how assessments will be conducted.

In the evaluation phase, the teacher interprets the assessment information and makes judgments about student progress. Based on the judgments or evaluation, teachers make decisions about student learning programs and inform progress to students, parents, and appropriate school personnel. Finally in the reflection phase, the teacher considers the extent to which the previous phases in the evaluation process have been successful and the implication on what the learner has gained. Such reflection assists the teacher in making decisions concerning improvements or modifications to subsequent teaching and evaluation.

In our Kenya's system of education, assessing students continuously during the teaching and learning has been getting emphasis over the years. The Kenya Education Commission which was set after independence (1964) discussed the necessity of assessment in educational circles and reported this:-

"We believe that time has come to experiment with procedures which involve a more continuous assessment throughout the course. This might involve the"
organization of academic work in blocks, each assessed and each contributing towards the final evaluation. A steady improvement in performance during the course will be seen as a ground for favorable consideration at the end of it.

Another commission headed by Gachathi in 1976 known as National Commission on Educational Objectives and Policies (N.C.E.O.P) also reported that one of the ways of ensuring that examinations became an integral part of the learning process was by increasing the use of continuous and progressive assessments. This is because Continuous and progressive assessment enable the students to learn progressively in steps rather than wait for examinations at the end of the course.

Kamunge Report on Manpower Training for the Next Decade and Beyond (1988) also reported that while encouraging good performance in examination, the government would ensure the provision of balanced education and training programs that would develop the whole person. The government was also to ensure the implementation of continuous assessment of students work as part and parcel of national examinations and as an important feature of the 8.4.4 system of education. This continuous assessment as part of national exams has only been realized in a few vocational subjects and it has not been there in theoretical subjects like mathematics.

Kenya National Examination Council (KNEC) contracts some subject experts who set and moderate projects in vocational subjects. They show the abilities that need to be assessed and prepare the marking guides that are to be used while assessing (Wasanga and Ingolo, 2001). KNEC then provides timetable and instructions on how the projects
should be conducted, the materials and the marking guides that each of these teachers is to use for assessing (Wasanga and Ingolo, 2001).

It is thus worthwhile to note that continuous assessments have been in use for summative evaluation in some subjects (vocational) and not in others like mathematics where the researcher is concerned. However, continuous assessment given by teachers for formative evaluation has been there in all schools and in almost all subjects. What is not clear to the researcher is how this evaluation is done to improve teaching and learning in mathematics which in turn is supposed to improve performance and hence the concern in this study.

Evaluation is most effective when based on sound operational principles. These principles provide the direction to the process and serve as a criterion for appraising the effectiveness of specific procedures and practices (Tanner and Jones, 2003). These include the following:

i). Determining and clarifying what is to be assessed. No assessment device should be selected or developed until the purpose of assessment has been carefully defined. In terms of assessing pupils' progress, the identification and definition of educational objective is always the first order of business and assessment should therefore be consistent with the objectives set. Planning for assessment so as to put all these things in consideration is very important.

ii). Assessment techniques should be selected in terms of the purposes to be served. When the aspect of pupil behaviour to be assessed has been precisely defined the appropriate assessment technique should be selected for use.
iii). Comprehensive assessment requires a variety of assessment techniques. No single assessment technique is adequate for appraising pupil progress towards all of the important outcomes of instruction. In fact most assessment techniques are rather limited in scope.

iv). Proper use of assessment techniques requires an awareness of their limitations as well as their strengths.

v). Principles of validity and reliability should be followed while preparing to assess students. A valid evaluation instrument should measure what the evaluator intends to measure and should elicit the intended responses from the students. The learners should also perform consistently on a test under similar conditions at different times if the test is reliable. This can be enhanced if the teachers work in teams or department to ensure this validity and reliability (Tanner and Jones, 2003)

In Thika West District, Mathematics performance in District category schools has been lower as compared to National and Provincial category schools as indicated in the table below and hence the researchers’ concern on how formative evaluation in mathematics is done in these schools to identify learners’ weaknesses to enhance the learners’ performance.

<table>
<thead>
<tr>
<th>SCHOOL</th>
<th>MANGU(N)</th>
<th>MARY HILL(N)</th>
<th>THIKA HIGH(P)</th>
<th>CHANIA BOYS(P)</th>
<th>JUJA SEC(D)</th>
<th>BROAD WAY(D)</th>
<th>KENYATTA SEC(D)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>10.53</td>
<td>7.73</td>
<td>8.47</td>
<td>5.44</td>
<td>1.58</td>
<td>2.18</td>
<td>1.64</td>
</tr>
<tr>
<td>2008</td>
<td>10.64</td>
<td>8.02</td>
<td>8.72</td>
<td>5.62</td>
<td>1.32</td>
<td>1.98</td>
<td>1.58</td>
</tr>
</tbody>
</table>

SOURCE: District Education Office Thika

KEY: N-National school, P-provincial school, D-district school
1.3 Statement of the Problem

Formative evaluation conducted during the process of learning is meant to check on the progress of learning and address any problems that may arise from this learning to enhance teaching and learning and ensure a positive outcome in summative evaluation. Use of evaluation plan, feedback and use of different assessment techniques are some of the important variables that influence the effectiveness of formative evaluation. In Thika West district, formative evaluation has been in practice especially through continuous assessment tests, but the problem of poor performance in K.C.S.E mathematics has persisted over the years. It is for this reason that the researcher felt that the practice of formative evaluation could be deficient and as such necessitated this research.

1.4 Purpose of the Study

This study sought to assess the practice of formative evaluation in teaching and learning secondary mathematics in Thika West District with a purpose of uncovering the weaknesses in the formative evaluation as practiced in the schools and suggest strategies for improvement to enhance performance in mathematics.

1.5 Objectives of the Study

The objectives of the study were to:

i) Investigate how teachers plan and prepare assessments before administering them to the students
ii) Determine the formative assessment techniques being used in evaluating students in mathematics in secondary schools

iii) Assess the use of feedback from assessments as practiced by the teachers

iv) Make suggestions on how the practice of formative evaluation can be improved

1.6 Research Questions

The study addressed the following research questions:

i) How do mathematics teachers plan and prepare assessment tools to use in their classes?

ii) How often are formative assessments administered to the students?

iii) What formative techniques are frequently being used by the mathematics’ teachers to assess learning in the secondary schools?

iv) How is feedback given to the students and used to improve learning in mathematics?

v) How can the practice of formative evaluation be improved in the schools?

1.7 Significance of the Study

The study focused on Formative assessment in mathematics in secondary schools. The knowledge of this and its enhancement in performance has a great significance in educational development of the country. The findings of the study are therefore significant to;
a) Policy makers

Educational policies have been changing over the years probably due to findings that emanate from research. The findings of this study will assist the policy makers to reconsider the existing policies on assessment and examine the weaknesses in them. At the same time they will emphasize some of the strategies of assessment that have been ignored by teachers hence enhancing learning and performance.

b) Educational administrators

Educational Administrators are charged with the responsibility of monitoring learning programmes in schools. The Findings brought out by this study may help to ensure appropriate and meaningful assessments in mathematics are used in secondary schools. This can be done in collaboration with heads of department and other teachers in mathematics department.

c) Teachers

As the implementers of all research inputs related to academic excellence in schools, the teachers will find much assistance in the findings of this study. They will be provided with the appropriate information that can guide them on planning, preparation and administration of assessment. It will also assist them in assessing how well they can use assessment feedback to enhance learning.
Students

Students will be the major beneficiaries of this study. When the teachers assess what they have learnt appropriately, shortcomings in their learning will be uncovered and dealt with at the right time thus ensuring better performance.

1.8 Limitations

i) Due to unreliable means of transport in some areas, the researcher used uncomfortable and slow mode of transport such as bicycles or motorbikes which took more transport time. The study thus took more time than planned because of this inconvenience.

ii) Teachers’ attitudes towards the researcher while assessing the practice of formative evaluation in the schools was quite a challenge. This influenced some teachers to give sketchy responses.

iii) Due to scarcity of resources the researcher strained in order to carry out the study successfully.

1.9 Delimitations

The study was confined in Thika West District and was carried out in Eight schools out of sixteen schools in the District where two mathematics’ teachers per school were considered for the study.
1.10 Assumptions of the Study

The study was guided by the following assumptions:

i). That the respondents would provide faithful and truthful responses to the items in the questionnaire

ii). All schools used formative assessment in the course of teaching and learning of Mathematics

iii). That there was proper assessment record keeping in the schools

iv) That all the schools used a similar syllabus in teaching and learning of mathematics

1.11 Theoretical Framework

Tyler's Theory (1942) of evaluation in education was used in the study. It was represented diagrammatically using a triangle, with curriculum objectives at the apex of the triangle which lead to instruction and the provision of learning experiences and finally to evaluation (Lewy, 1977). The relationships in this triangle are reciprocal in nature in that, evaluation feeds back to instruction and to curriculum objectives as shown Figure 1.1 below.

Figure 1.1
National goals of education are used as guidelines while designing school objectives. These objectives are intended to benefit individual students and the society as well. To realize these objectives, the school puts learning experiences in place which are well planned through preparation of schemes of work and lesson plans. To determine whether objectives of education have been achieved, evaluation is done through assessments such as tests, internal exams and even external exams.

This in turn leads to evaluation of the learning experiences that have been in practice to enable the achievement of the objectives. If the objectives are not satisfactorily achieved, then modification of the learning experiences is done and evaluation is conducted again to check on the achievement of the objectives. This type of evaluation is referred to as formative evaluation because the data elicited from the evaluation process is used for modification purposes.

Tylerian theory is objective oriented. It was adopted in the study because from the foregoing discussion it was clear that objectives are very important in the teaching and learning of mathematics. If there are no objectives set for learning then it is very hard to determine whether there is any learning that is taking place. Objectives are used to determine the appropriate learning experiences and the evaluation techniques thus key in the whole process of teaching and learning. The researcher also agrees with Tylerian theory of evaluation in that Evaluation should be a continuous process, well planned to identify the objectives to be achieved, determine the appropriate learning strategies and the evaluation techniques to be used. However the researcher observes that Tylerian model is rigid and ignores many factors that could influence the way learners perform when they are evaluated such as home based factors and social factors.
1.2 Conceptual Framework

Figure 1.2 below shows how formative evaluation if well incorporated in the teaching/learning process may have a significant bearing in the achievement of course objectives and hence improvement in performance. Planning and preparation, giving of feedback on assessment as well as use of different assessment techniques are some of the independent variables which were used in this study. These in turn were perceived to affect teaching and learning mathematics and hence an effect on performance.

*Figure 1.2 Formative Evaluation in Teaching and Learning Secondary Mathematics*
Formative evaluation is an integral part of the teaching and learning. It helps to determine the extent to which educational objectives have been achieved. Learning cannot be said to have taken place in any situation unless one gets some feedback from the students to determine the attainment of his/her instructional objectives using different assessment techniques. These objectives can be achieved through the use of appropriate teaching/learning methods, proper selection of learning resources and even content which are confirmed only when evaluation is done. If formative evaluation is well done through proper planning and preparation, use of appropriate techniques of assessment as well as feedback; determination of the appropriate teaching learning strategies, resources and content to enable the achievement of the objectives becomes easy. This improves teaching and learning and thus contributes to better performance.

1.13 Definitions of Operational Terms

Assessment: A preliminary phase in the evaluation process where various techniques are used to gather information about student learning progress.

Evaluation: Making judgment of the value or worth of a learning activity event or meaning of an activity, event or body.

Evaluation techniques: Evaluation tools such as continuous assessment tests, weekly quizzes, homework, etc.
Formative evaluation: Evaluation conducted during the process of learning with an aim of making learning better

Instruments: Tools used in data collection such as questionnaires, tests, exams (internal and external exams)

Objectivity: This is fairness to the testees. Tests are objective if they do not portray biasness

Performance: A presentation of students scores in an examination such as K.C.S.E mean scores in mathematics

Reliability: The extent to which a particular measure is consistent and reproductive. The consistency of a test is its ability to measure accurately what it is supposed to measure

Summative evaluation: Examination conducted at the end of a course of study

Test: A test is an instrument for gathering information or learning activities performed by a learner as assigned by the teacher in order to elicit responses for various reasons which set the objective of the test

Validity: This is the ability of an instrument to measure what it is supposed to measure. A test is varied when it measures what it intends to measure and to the desired extent
CHAPTER TWO

Literature Review

2.1 Introduction

This chapter focuses on literature review related to the practice of formative evaluation in secondary schools. It is organized in line with the following themes: planning and preparation for formative assessment, frequency of assessment, formative assessment techniques, feedback from assessment and its use.

2.2 Planning and preparation for Assessment

Assessment is central to the process of teaching and learning in mathematics and forms an important element in the lives of students and teachers. During the school year, a significant amount of time and effort is spent on assessing: testing, examining, marking, and reporting. This has a big impact on students, who react emotionally to the assessments regimes in which they find themselves. The way assessment in a school, department or classroom is organized plays a major role in creating a culture, attitudes and norms of behaviour which shape the learning process. It thus requires careful planning to ensure that the regime in the classroom fosters motivation, self-esteem and a desire for lifelong learning in the students (Tanner and Jones, 2003).

In recent years, increased emphasis has been placed on summative assessment and although this is occasionally useful to the teacher, it is mostly used for managerial purposes. It is the formative aspects of assessment that support the professional aims of a
teacher directly and can make the biggest contribution to improving attainment. Undoubtedly, the school and department will have an assessment policy which should detail some of the basic conditions which the assessment practices must fulfill. However, planning for effective assessment is probably the hardest part of the job for novices and even experienced teachers learn to do well (Gipps et al. 1995; Ofsted, 1998).

The process of evaluation involves selection of suitable tools and techniques for collecting evidences to know the progress of performance among learners and the quality of evaluation depends on the suitability of evaluation tools selected. Hence, in order to make a right choice of tools and techniques, a teacher should be clear about what is, exactly to be evaluated. A teacher is also required to know the strengths and weaknesses of evaluation tools and techniques, in order to use them purposefully, meaningfully and effectively. As a variety of instructional objectives are to be evaluated, different evaluation techniques need to be utilized simultaneously. This help the teacher to collect more evidences on various aspects of learner achievement on different objectives (Tanner and Jones, 2003).

Commonly, teachers use tests to assess students learning progress. Test items are better prepared as soon as the material has been taught. This is to avoid missing out on any point or any content that has been taught. They should be within the limits of the schemes of work and should be clearly worded and objectives strictly adhered to (Black and Wiliam, 1998). Marking schemes should also be provided, where a marking scheme
according to Okpala (1999) is a sketchy compilation of all points /marks that are essential in earning the possible maximum score from a question. A test planner should therefore in collaboration with others in the same department, produce a marking scheme which is a list of exhaustive possible answers to the items provided in the test and marks or penalties to the right or the wrong answers respectively. A table of specifications should also be used when preparing tests to ensure that all the levels of knowledge have been tested.

In order to assess effectively one also needs to be very clear about aims of teaching. All teaching episodes should have clear learning outcomes, what one wants to teach and what one needs to assess are inseparable. It is also not possible to assess everything that a pupil does. Therefore just as one has to prepare and plan for lessons, assessment also has to be planned for maximum effectiveness. At a very practical level, one has to decide what to assess, when and how (Tanner and Jones, 2003). Remember, students judge what the teacher values in their work by what he/she assesses. Assessment which tests only memorization, undervalue creativity and imagination and if one values the ability to apply knowledge and skills to problems, one should assess problem – solving. One should also assess what is important rather than what is convenient.

2.3 Testing Frequency

The time that the students have in school is finite and time spent in testing and the duration of tests must be balanced against the other demands on student/teacher time.
Most teacher made tests are used to monitor instruction and assign grades. Although the frequency of testing varies in practice, research evidence is clear that more frequent assessments (weekly or fortnightly) are associated with better learning or retaining of content and teachers should therefore measure learner’s progress more frequently (Tanner and Jones, 2003). Frequent assessment provides immediate feedback about how the students are doing and pinpoints the skills missing among students. Thus the more frequent the measurement, the quicker the teacher adapts instruction to ensure that the students are making optimal progress (Good and Grouws 1975; Brophy, 1981). However frequent measurement is only helpful when it immediately direct teachers as to what to teach next or how to teach it. Students’ deficits should dictate how frequent measurement should occur and thus students with substantial deficit should be monitored more frequently to ensure that the instructional methods are effective.

2.4 Formative Assessment Techniques
Learning of mathematics is a cumulative process that occurs as experiences contribute to understanding. This learning can only be ascertained through the use of assessment. The major goal of assessment is to obtain a valid and reliable picture of a student’s understanding and achievement. This evidence must come from a variety of sources. These sources may include oral presentations, written work, observations, or various combinations of these (Rukangu, 1987). Examples of written work include projects, homework assignments, quizzes, and exams. Observation checklists are also helpful devices to record evidence of a student’s continued growth in understanding.
The advantage of using several kinds of assessment is that a student's understanding can be continuously monitored. In addition, because students differ in their perceptions and thinking styles, it is crucial that they are given the opportunity to demonstrate their individual capabilities. A single type of assessment can also frustrate students, diminish their self-confidence, and make them feel anxious about mathematics (Tanner and Jones, 2003).

According to Rukangu (1987) assessment of a student's mathematical knowledge can also be done by checking on the ability to solve problems, to use the language of mathematics, to reason and analyze, to comprehend the key concepts and procedures, and to think and act in positive ways. Methods for assessing a student's ability to solve problems include observing the student solving problems individually, in small groups, or in class discussions. Other methods include listening to a student discuss problem-solving processes and analyzing tests, homework, and essays. The use of a variety of these strategies facilitates in finding the solution to problems and consistency in verifying solutions.

Assessment should also examine the extent to which students have integrated and made sense of mathematical concepts and procedures and whether they can apply these concepts and procedures to situations that require creative and critical thinking (Mutunga and Braekel, 1992). In understanding concepts and their interrelationships it is also essential to interpret a situation and derive an appropriate plan of action. Knowing what
procedures are appropriate and how to execute them is essential to carrying out the plan successfully.

Assessment of a student's ability to communicate mathematically is also important. It gives the meaning he/she attaches to the concepts and procedures of mathematics. It also involves his/her ability in talking about, writing about, understanding, and evaluating mathematical ideas. Attention should be given to the clarity, precision, and appropriateness of mathematical terms and symbols. Discussion is also a splendid means of judging a student's ability to function as a critical participant in small groups or within the class.

Learning mathematics also includes developing a positive attitude towards mathematics. The assessment of a student's attitude requires information about her/his thinking and actions in a wide variety of situations. A student's attitudes are reflected in how he/she asks and answers questions, works on problems, and approaches new mathematics. Observations, homework assignments and oral presentations are all excellent ways to assess a student's mathematical attitude.

All the above are reliable means of determining the progress of the learners at the instructional level. Clough (1984) says that the essence of any evaluation procedure must be to help the student, and thus it is occasionally necessary to utilize different procedures to suit the personality of the students. No one method can suit the desired results.
During classroom interactions, mathematics teachers also use questioning as one of the most important methods in determining achievements of high standards in students, where questions are used to assess students' knowledge and challenge their thinking (Ofsted, 1996:23). However, the dominant purpose for which questioning serves in many classrooms is to direct attention and keep students alert and on task. This is done by scattering large numbers of short questions around the class as a means of social control.

The majority of questions asked require simple recall and fail to provide the kind of rich data required in formative evaluation (Gipps et al 1995; Ofsted, 1998). This is very effective but it makes only a limited contribution to formative evaluation and effective learning (William, 1999; 17). Black and William (1998) encourage teachers to use questioning as an opportunity to increase their students' knowledge and improve understanding. They caution, however, that teachers need to make sure to ask thoughtful, reflective questions rather than simple, factual ones and then give students adequate time to respond. In order to involve everyone, they suggest strategies such as the following: Inviting students to discuss their thinking about a question or topic in pairs or small groups and then ask a representative to share the thinking with the larger group (sometimes called think-pair-share), presenting several possible answers to a question then ask students to vote on them or asking all students to write down an answer and then read a selected few out loud.

Other assessment procedures commonly used during classroom interaction include testing which may be done using objective or essay questions. As an instrument it should be valid, reliable, objective and comprehensive.
Black and William (1998) also suggest that frequent short tests are better than infrequent long ones, new learning should be tested within about a week of first exposure and to be mindful of the quality of test items, teachers should work with each other to collect good assessment items.

When all the above formative assessment are prepared and used properly, they may help to tell whether the course objectives are being achieved or not and teachers plan for the remedial action to take in order to correct any problems. It can thus be concluded that, good formative assessment techniques can contribute to improvement in both teaching and learning of mathematics and if used appropriately this can lead to better performance.

2.5 Feedback on Formative assessment

Feedback is a key aspect of formative assessment. Teachers gain feedback in a variety of ways and in return, provide feedback for the students. For practical reasons, some feedback is delayed and this occurs through marking of work, which has been completed in class, at home or in tests and examinations. However, much feedback occurs in real time, in the cut and thrust of classroom interaction.

Research suggests that immediate oral feedback is more effective than written feedback. This is because; feedback works best when it is given regularly and early enough to be still relevant (James 1988). However not all oral feedback is good. The quality of dialogue is important (William, 1999). Students must be challenged to think and act for themselves. Similarly, praise which is often regarded as an obviously good thing and a
motivator can be addictive and insincere when over used (Good and Grouws 1975; Brophy, 1981) Oral interactions should therefore be constructive and honest.

Feedback is a key factor in formative assessment, for only by indicating to the students what is needed for their next steps in learning can the teacher bring about the intended engagement in learning. He or she cannot do the learning for their students however, the teacher makes use of feedback to adjust teaching, make materials and opportunities for the learning available and, most importantly, making clear the purposes and goals of the work. Delayed feedback lowers the effectiveness of formative assessment.

2.6 Purpose of Assessment in Mathematics

Assessment is always bound to achieve the purpose for which it is set for and assessment data may be used by a number of different audiences. These include pupils themselves, teachers, parents, potential employers, other schools and colleges, governors and national government.

According to Tanner and Jones (2003) the distinctive purposes which these audiences have can be grouped together under three broad headings:-

   i) Managerial
   ii) Communicative
   iii) Pedagogical
Managerial purpose for assessment include:- Demonstrating or testing the effectiveness of government policies, holding schools accountable for pupil’s progress, motivating teachers through payment by result schemes, selecting pupils to benefit from a limited resource (e.g.) university education and Controlling the curriculum by emphasizing particular forms of knowledge.

Communicative purposes of assessment on the other hand include:- providing information to parent about their children’s progress against agreed standards and providing information to other teachers or employers about individual pupils’ knowledge and skills.

Finally pedagogical purposes for assessment include:- Evaluating the success of ones own teaching, analyzing pupils learning and identifying misconceptions, supporting the teaching process by providing feedback to inform future planning, giving pupils an appreciation of their achievement and encouraging success, motivating pupils and holding them accountable and finally supporting the learning process by identifying precisely what individual pupils need to do to improve.

When teachers know how students are progressing and where they have problems, they can use this information to make necessary instructional adjustments, such as reteaching, trying alternative instructional approaches, or offering more opportunities for practice. These activities can lead to improved students’ performance.
For many years more than a decade, educational policies in Kenya have emphasized managerial and communicative purposes at the expense of pedagogical purposes. These purposes are based on summative assessments more than formative assessments which are more concerned with the pedagogical purposes (Tanner and Jones, 2003). This is the reason as to why low performance in mathematics is only noted at the end of the year when the minister announces the results. These assessments usually occur at the end of coherent units of work and at the end of year. They are about making judgments about pupils' performance up to that point against national standards and level descriptions.

High-stakes summative assessment has been at the heart of our government policies for more than a decade and the use of summative assessment over and above that required by the national curriculum has grown rapidly (Harlen and Crick, 2003). However, research evidence indicates that it is formative assessment that is more likely to raise student’s achievement (Black and William, 1998). From this reason the researcher felt that there is need to look at formative assessment and the way they are being used to improve performance in mathematics in secondary schools.

2.7 Summary

From literature given above, it is clear that formative evaluation should be a well planned process. It should involve selection of suitable tools and techniques for collecting evidences to know the progress of performance among learners. Teachers have to make the right choice of tools and techniques because the quality of evaluation depends on the
suitability of evaluation tools selected. They should ensure that different assessment techniques are used when assessing students because this helps the teacher to collect more evidences on various aspects of learners’ achievement based on different objectives and different personality of students.

Assessment tools should also be valid, reliable, comprehensive and objective. To ensure this, the teacher has to be clear about what is exactly to be evaluated. He/she should also know the strengths and weaknesses of evaluation techniques in order to use them, meaningfully and effectively to meet the purpose for which the assessment is planned.

Frequency of assessment should also be given adequate consideration. Frequent assessment provide immediate feedback on how students are progressing and pinpoints the skills missing among students. This feedback is very necessary because it helps the teachers to decide the way forward in helping the students learn. This can be done through making arrangements for remedial teaching, changing instructional methods to make teaching more effective, changing of teaching/learning resources amongst others. Thus evaluation process should be well planned for it to effectively inform teaching and learning process hence improving students’ performance.
CHAPTER THREE
Research Methodology

3.1 Introduction

This chapter discusses the processes that were undertaken to achieve the set objectives of the study. This was done by considering the research design, sample and sampling procedure, research instruments as well as data collection procedure and analysis.

3.2 Research Design

The study used a survey design. This design was chosen by the researcher because it allows the collection of information concerning the practice of formative evaluation in secondary schools as at present. It was used to assess the current status as it is without influencing it in any way. As Sproul (1988) suggests, descriptive survey is able to explore the relationship between variables in their natural setting as they occur. These variables in the study included the different formative assessment techniques used in the schools, frequency in administering assessment, planning and giving of feedback on assessment to the students and how all these lead to improved learning and teaching of mathematics. The design was also appropriate because it allowed the use of questionnaires as research instruments.

3.3 Location of the Study

The study was carried out in Thika West District. The District was chosen by the researcher due to its poor performance in mathematics in the district category schools and
at the same time it was accessible to the researcher and this helped in saving time and funds spent during data collection.

3.4 Target Population

The researcher targeted all the nine district category schools in Thika West. 504 subjects (480 form three students and 24 mathematics teachers) from these schools formed the target population.

3.5 Sample and Sampling Technique

All the nine District schools were used for the study because their performance was poorer when compared to the performance in the National and the Provincial schools in the district. One of them was however used for piloting purposes. Simple random sampling was used to select two mathematics’ teachers from each district category school and twenty form three students from each school were sampled using systematic sampling technique. This sampling technique was based on the selection of subjects at equal intervals starting with a randomly selected subject on the population list (Orodho, 2009). A sample size was chosen and a sampling constant ‘k’ determined using the formulae

\[ K = \frac{\text{Population}}{\text{Sample size}} \]

Then every \( K^{th} \) student was selected using class lists and they moved to common room where they responded to the questionnaires. Form three classes were chosen for the study.
as it is the stage where on average the teachers start preparing the students rigorously for the K.C.S.E examinations.

3.6 Research Instruments

The tools used for the study included: questionnaire for the teachers and students, document analysis sheet and an observation guide. Questionnaires were used because they offer considerable advantage in administration. Gay(1976) notes that a questionnaire is more efficient as it requires less time, it is less expensive and allows for the collection of data from a larger sample. The instruments used were the researchers own design and they were included in the appendices.

3.6.1 Questionnaire for Teachers

The questionnaires for the teachers had both closed and open ended questions that sought to get information on classroom assessment techniques, planning, preparation and giving of feedback on assessments. These items were based on the various research questions. The closed ended questions required the respondents to provide facts on matters pertaining to the formative evaluation practice in the school while the open ended ones allowed them to express their views about the formative evaluation practice.

3.6.2 Questionnaire for Students

The questionnaire for the students helped to elicit general information on how formative evaluation is practiced in the schools. It contained questions on when and how continuous assessments were done in the schools.
3.6.3 Document Analysis Sheet

A document analysis sheet was used to provide more information about formative evaluation as practiced in the schools. This included information on the assessment techniques being used, frequency of assessment, levels of cognitive development tested, planning and giving of feedback on assessment. This information was obtained from the analysis of records kept such as schemes of work, mark books, test papers as well as student exercise books.

3.6.4 Lesson Observation Schedule

A lesson observation schedule was used to provide information on assessment practice in the classrooms. It involved observing lesson introductory questions, students' involvement in learning as well as assignments given. Lesson observation was done in the sampled schools to enable the researcher obtain reasonable data regarding classroom assessment.

3.7 Piloting

Piloting of the teachers' and students' questionnaires was done in one of the schools in Thika West District in order to measure the validity and reliability of the research instruments. This piloting was done to facilitate changes and modification of the questions in readiness for the actual data collection. The pilot school was not included in the actual study.
3.7.1 Validity

The researcher ensured that the research instruments had content validity. This validity is concerned with establishment on whether the questionnaire content is measuring what it’s supposed to measure. It measures the accuracy of the instruments in obtaining the anticipated data that can meet the objectives of the study (Kothari, 2004). The researcher went through the items in the instruments to ensure that they were clear and would elicit the intended information from the respondents. The instruments were scrutinized to determine if they would address all the possible areas that they should with assistance from experts in the researcher’s department.

3.7.2 Reliability

A measure is reliable if one gets the same or similar value for each unit measured every time he/she measures. Kombo and Tromp (2006) define reliability as a measure of how consistent the results from a test are while Mulusa (1990) says that a reliable instrument is one that consistently produces the expected results. To determine reliability of the instruments, test-retest method was used where reliability coefficient was established using the Spearman Rank Order Correlation.

The formula used:

\[ r = 1 - \frac{6 \sum (d)^2}{N (N^2 - 1)} \]
Test retest method as a technique of assessing the reliability of a research instrument involved administering the questionnaire to a group of teachers and students in the piloting school and then the instruments were withdrawn and the results analyzed. The same questionnaires were administered again to the same group after two weeks and the results analyzed to check for consistency. Through piloting, inconsistencies were corrected to enhance reliability. According to Gay (2003) a coefficient of 0.70 is considered adequate but a coefficient of 0.80 is good. The researcher got a coefficient of 0.75 for the students’ questionnaires and 0.77 from the teachers’ questionnaires. The researcher therefore considered the instruments to be reliable.

3.8 Data Collection Procedure

The researcher sought permission from the office of the president and the Ministry of education to conduct the study in Thika West District. Once the permission was given, the researcher made a first visit to the schools to introduce herself to the head teachers and teachers from the sampled schools and create rapport with them as well as getting their consent to participate in the study. She explained the purpose of the study and gave assurance that the information was to be kept confidential and anonymous. In the second visit, the researcher administered the questionnaires to the teachers and the students and requested them to provide the information needed after which she carried them away for analysis. The researcher also requested form three mathematics’ teachers to schedule a
day when she would observe how the students were evaluated in class. On the scheduled
days, the researcher visited the schools for classroom observation and at the same time
requested to use some school documents such as schemes of work, mark books, student
books amongst others to collect more data.

3.9 Data Analysis Plan

After field work, the data collected were analyzed to find out how formative evaluation
was practiced in schools. Just before the actual analysis was done, the gathered data were
scrutinized to check for any mistakes in the information provided in the instruments.
Coding was then done to summarize the data. The coded data was then analyzed using
the Statistical Package for Social Sciences (SPSS). Descriptive statistics such as
frequencies, percentages, means and standard deviations were used to analyze the data.
The analyzed data were presented in the form of frequency table, bar graphs and pie
charts.
CHAPTER FOUR
Findings and Discussion

4.1 Introduction
The purpose of this study was to assess how the teachers are using formative evaluation to enhance teaching and learning of secondary mathematics in Thika West District. The study targeted 160 students and 16 teachers and out of these 140 students and 15 teachers responded, this gave a response rate of 88%. Descriptive statistics such as frequencies, percentages, means and standard deviations were used to show the relationship between the variables of the study. Bar graphs, pie charts and frequency tables were used to present the findings. These findings are presented in this chapter based on the data collected from the respondents as per the research objectives which were:

(a) To investigate how teachers plan and prepare for assessments before administering them to the students

(b) To determine the formative assessment techniques being used in evaluating students in mathematics in secondary schools

c) To assess the use of feedback from assessments as practiced by teachers to enhance learning.

d) To investigate how the practice of formative evaluation can be improved in secondary schools in Thika West District.
4.2. Planning and Preparation for Continuous Assessments Tests by Teachers before their Administration to Students

4.2.1 Planning for Mathematics Assessment

Teachers were asked to indicate when they planned for mathematics assessment and the findings were as presented in Figure 4.1.

The study found that 11 (73%) of the teachers planned for assessment after teaching particular topics, three (20%) of the teachers indicated that they planned for the assessments just before they assessed while one (7%) of the respondents indicated that they planned when preparing schemes of work.
4.2.2 Guide for Planning Assessment techniques

The respondents were asked to indicate what they used to guide them in determining assessment techniques to use while assessing learning and the following findings were obtained.

![Pie chart showing the guide for planning assessment techniques](image)

**Figure 4.2 Guide for planning assessment Techniques**

The study found that nine (61%) of the respondents had indicated that they were guided by the content learnt when planning for the assessment techniques to use when assessing learning, five (33%) of the respondents were guided by objectives they had set while one (6%) were guided by the time available.

4.2.3 Use of Schemes of work in Preparation for the Assessments

To find out the frequency of use of schemes of work during the preparation of the assessments, the teachers were asked to indicate how often they used the schemes of work and the findings were as presented in Table 4.1
Table 4.1 Frequency of Using Schemes of work

<table>
<thead>
<tr>
<th>Use of Schemes</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>All the times</td>
<td>4</td>
<td>36</td>
</tr>
<tr>
<td>Some times</td>
<td>8</td>
<td>53</td>
</tr>
<tr>
<td>Not at all</td>
<td>3</td>
<td>11</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>15</td>
<td>100</td>
</tr>
</tbody>
</table>

The study found that eight (53%) of the respondents used the schemes of work sometimes while four (36%) indicated that they used the schemes of work all the times. The study further found that three (11%) of the respondents never used the schemes of work.

4.2.4 Preparation of Mathematics Assessment Tests

The teachers were asked to indicate the people who were responsible for the preparation of Continuous Assessment Tests in Mathematics in their schools and the following were the findings of the study.

Table 4.2 Preparation of Mathematics Assessment Tests

<table>
<thead>
<tr>
<th>Preparation of the Assessments</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>By individual teachers</td>
<td>15</td>
<td>100</td>
</tr>
<tr>
<td>By a panel of teachers in the department</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>By the subject heads</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>15</td>
<td>100</td>
</tr>
</tbody>
</table>

41
The study found that all the respondents 15 (100%) indicated that the assessments were prepared by individual teachers.

4.2.5 Coverage of the C.A.Ts

In establishing the areas covered by the C.A.Ts, students were asked to indicate whether the C.A.Ts were set from areas they had covered and 121 (86%) of the respondents indicated that the C.A.Ts covered what had been taught while 19 (14%) indicated that they did not cover what they had been taught.

4.2.6 Types of Questions Given in the Tests

The researcher analyzed the types of questions the teachers usually set in the tests from the available past papers on C.A.Ts and Table 4.6 presents the findings from the analyzed data.

Table 4.3 Types of Questions Given in the Tests

<table>
<thead>
<tr>
<th>Types of Questions</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recall</td>
<td>8</td>
<td>100</td>
</tr>
<tr>
<td>Comprehension</td>
<td>8</td>
<td>100</td>
</tr>
<tr>
<td>Application</td>
<td>6</td>
<td>75</td>
</tr>
<tr>
<td>Synthesis</td>
<td>2</td>
<td>25</td>
</tr>
<tr>
<td>Evaluation</td>
<td>1</td>
<td>12.5</td>
</tr>
</tbody>
</table>
Table 4.3 shows that recall and comprehension skills were tested in all the eight (100%) schools studied. It was also found that application skills were tested in six (75%) of the schools studied. Questions which tested on synthesis and evaluations skills were least tested as found in two (25%) and one (12.5%) of the schools studied respectively. Regarding the use of table of specifications in the preparation of tests, the study found that teachers rarely used the table of specifications in ensuring that all the skills were tested.

4.2.7 Marking of Assessments

The teachers were asked to indicate the people responsible for marking the tests done by students and the findings were as follows.

![Pie chart showing marking of assessments](image)

Figure 4.3 Marking of Assessments

Figure 4.3 shows that 12 (80%) of the respondents indicated that tests were marked by subject teachers while three (20%) indicated that they were marked by subject panels.
They were also asked to indicate whether there was moderation of marking schemes in their schools and the study found that 10 (67%) of the respondents had indicated that moderation was not done while five (33%) indicated that it was done in their schools.

4.2.8 Frequency of Administering Formative Assessments to the Students

Students were asked to indicate the frequency with which the assessment tests were administered to them and the following were the findings.

![Figure 4.4 Frequency of C.A.Ts](image)

Figure 4.4 shows that 83 (59%) of the respondents interviewed indicated that they were assessed once in a term, 44 (31%) were assessed once a month while 13 (10%) of the students interviewed indicated that they were assessed once a week. From the findings of the study, most of the teachers assessed their students once per term.
4.2.9 Time allocated for the C.A.Ts

In establishing the time which was allocated for taking the C.A.Ts the students gave their responses as presented in Figure 4.5

![Figure 4.5 Time allocated for C.A.Ts.](image)

The study found that 108 (77%) of the respondents indicated that they did the C.A.Ts during class hours while 32 (23%) did their C.A.Ts after class hours.

4.3. Formative Assessment Techniques Used in Evaluating Students in Mathematics

4.3.1 Types of Assessment Techniques Used

The study sought to find out the extent of use of different assessment techniques by teachers while assessing teaching and learning in mathematics and the teachers gave their responses. These responses were tested on a four point likert scale of 1-4; where 1 represented ‘Very regularly’, 2 represented ‘Regularly’, 3 represented ‘Less regularly’ and 4 represented ‘Not used at all’.
The score 'Very regularly' was taken to be equivalent to mean score ranging from 0.0 to 1.0, 'Regularly' with mean score ranging from 1.1 to 2.0, 'Less regularly' with a mean score ranging from 2.1 to 3.0 and 'Not used at all' with a means score ranging from 3.1 to 4.0. The results were as presented in the Table 4.4

Table 4.4 Use of different Assessment Techniques

<table>
<thead>
<tr>
<th>Technique</th>
<th>n</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral questioning</td>
<td>15</td>
<td>1.40</td>
<td>.632</td>
</tr>
<tr>
<td>Observation</td>
<td>15</td>
<td>1.67</td>
<td>.617</td>
</tr>
<tr>
<td>Written Assignment(hw)</td>
<td>15</td>
<td>1.80</td>
<td>.676</td>
</tr>
<tr>
<td>Project</td>
<td>15</td>
<td>3.73</td>
<td>.594</td>
</tr>
<tr>
<td>Monthly Tests</td>
<td>15</td>
<td>2.13</td>
<td>.516</td>
</tr>
<tr>
<td>Weekly Quizzes</td>
<td>15</td>
<td>2.20</td>
<td>.862</td>
</tr>
</tbody>
</table>

Table 4.4 shows that oral questioning, observation and written assignment were the most regularly used techniques of assessment (mean score ranging between 1.1 to 2.0). It was also found out that monthly tests and weekly quizzes were used less regularly (mean score between 2.1 to 3.0). The study finally found that projects were not used at all (mean score of 3.73).
4.3.2 Other Assessment Techniques

The study sought to establish how often the students were subjected to other assessment techniques in mathematics and the findings were as presented in Figure 4.6.

![Other Assessment Techniques](image)

**Figure 4.6 Other Assessment Techniques**

Figure 4.6 shows that 101 (72%) of the respondents indicated that they were given homework everyday, 76 (54%) of the respondents indicated that they were given group work on weekly basis and 101 (72%) indicated that they were never subjected to project work.

In document analysis, it was found that other ways of assessing students included: administration of weekly assessments and giving homework to students during holidays.
4.4 Use of Feedback from Assessments by the Teachers

4.4.1 Rating of Classroom Assessment

Teachers were asked to rate the classroom assessments in terms of importance.

Table 4.5 Rating of Classroom Assessment

<table>
<thead>
<tr>
<th>Rating of classroom Assessment</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Important</td>
<td>2</td>
<td>13</td>
</tr>
<tr>
<td>Moderately important</td>
<td>5</td>
<td>33</td>
</tr>
<tr>
<td>Very important</td>
<td>8</td>
<td>54</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>100</td>
</tr>
</tbody>
</table>

The study found that eight (54%) of the respondents rated classroom assessments as very important, five (33%) rated them as moderately important while two (13%) rated assessment as important.

When asked to mention the reasons why they considered classroom assessments to be very important, the following were the reasons mentioned: that they helped in testing students understanding of particular topics, that the assessments were used to evaluate teachers’ teaching methods, for revision purposes, gauging the achievement of objectives, identifying weak students and monitoring teaching and learning processes. Students respondents were also asked to indicate whether the C.A.Ts were important in their daily learning and the study found that 109 (78%) of the students rated C.A.Ts as important while 31 (22%) indicated that the C.A.Ts were not important.
The student respondents were further asked to mention the ways through which the C.A.Ts assisted them in learning. The following were their responses: They help students to improve on their areas of weaknesses, they help students to do revision, C.A.Ts help students to upgrade what they learn, they improve students understanding in different topics, improve student's confidence, sharpen up students' minds and also enable students to gain more knowledge.

4.4.2 Duration for Releasing Assessment Feedback by Teachers

In establishing the duration which the teachers took to give feedback on assessments to students, the findings were as presented in Figure 4.7.

The study found that eight (54%) of the respondents took two weeks to give feedback on assessments, three (20%) of the respondents indicated that they gave feedback after one
week, two (13%) after one month and another two (13%) indicated that they gave feedback before the next assessment. At the same time Student respondents were asked to indicate the duration which elapsed before they received feedback on C.A.T.s. and the findings were as presented in Table 4.6.

Table 4.6 Duration for Receiving Feedback of the C.A.T.s by Students

<table>
<thead>
<tr>
<th>Feedback on CATs</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>One week</td>
<td>28</td>
<td>20</td>
</tr>
<tr>
<td>Two weeks</td>
<td>52</td>
<td>37</td>
</tr>
<tr>
<td>One month</td>
<td>26</td>
<td>19</td>
</tr>
<tr>
<td>Before next Assessment</td>
<td>34</td>
<td>24</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>140</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

The study found that 52 (37%) got the feedback after two weeks, 34 (24%) got feedback before the next assessment, 28 (20%) after one week and 26 (19%) got feedback after one month.

4.4.3 Meeting Deadlines for Releasing Assessment Feedback

Regarding deadlines, teachers were asked to indicate whether they were able to meet deadlines for releasing assessment feedback. The study found that 12 (80%) of the respondents were able to meet the deadlines while only three (20%) were not able to meet the deadlines. Those who indicated that they were not meeting the deadlines were asked to give reasons for their failure to do so. They mentioned that they had too many lessons
to teach leaving them with little time to mark the assessments and give the feedback to the students.

4.4.4 Communication of Assessment Feedback to the Students.

In establishing how teachers communicated assessment feedback to the students, teachers gave the following response

Table 4.7 Communication of Feedback

<table>
<thead>
<tr>
<th>Communication of feedback to students</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individually</td>
<td>4</td>
<td>27</td>
</tr>
<tr>
<td>In groups</td>
<td>3</td>
<td>20</td>
</tr>
<tr>
<td>Whole class</td>
<td>8</td>
<td>53</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

The study found that eight (53%) of the teachers gave feedback generally to the whole class, four (27%) of the teachers gave the feedback to individual students while three (20%) gave feedback in groups depending on performance.

4.4.5 Conducting of Remedial Teaching

Teachers were asked to indicate whether they conducted remedial teaching after giving feedback to students in their schools. The study found that all the 15 (100%) teachers interviewed indicated that they conducted remedial teaching in their schools.

The study further sought to establish the frequency with which remedial teaching was conducted in schools by teachers and obtained the following findings
Figure 4.8 Regularity of remedial Teaching

Figure 4.8 shows that 10 (67%) of the respondents conducted remedial teaching once a week, four (27%) conducted remedial teaching once a day while one (6%) of the respondents conducted remedial teaching over the weekends and during the school holidays.

4.5 Improvement of the Practice of Formative Evaluation

On the ways of improving formative evaluation, the following were the suggestions given by teachers and students: That the number of staff teaching mathematics should be increased to reduce the workload of marking and teaching, that evaluation time should be created in the school timetable, that the students should be tested after every topic to ensure that they have understood the topics, that time should be created for revising
C.A.Ts results to ensure understanding among those who did not understand the particular topics tested and that tests should be given to the students regularly.

4.6 Discussion

4.6.1 Planning and preparation for the Assessments by Teachers before their Administration to Students

Regarding planning for assessment, the study found that most teachers planned for assessment after teaching particular topics. This was also supported by student respondents who indicated that C.A.Ts covered what they had been taught. It was also found out that assessments were prepared by individual teachers who rarely used schemes of work to prepare for the same. This was confirmed by the fact that the objectives that are stipulated in the schemes of work do not guide most of the teachers when they are preparing for assessment; instead they are guided by the content learned. This is contrary to the views of researchers such as Black and William (1998) who found that assessment should be within the limits of the schemes of work, clearly worded and objectives strictly adhered to. Then once assessments are done, marking should be done in order to give feedback to the learners and to inform the next stages of instruction. The study found out that teachers set and mark C.A.TS individually as indicated by most teachers. This is not in line with other researchers' findings like Okpalla (1999) who says that a test planner should in collaboration with others in the same department set and produce a marking scheme. This means that setting and marking of assessments should be done by a panel of teachers in a department. This is also supported by other researchers who found that
teachers should work with other teachers to collect good assessment items (Black and William, 1998)

This needs to be improved in the schools studied if the teachers are to get the most appropriate feedback from their students using tests where there is no bias in setting assessment and marking.

The study also found that C.A.Ts were prepared and administered to the students in almost all schools but the frequency of administration varied in the different schools. Most of the students interviewed indicated that they were assessed once in a term while others were tested once a month. Although the frequency of testing varies in practice, research evidence is clear that more frequent assessments (weekly or fortnightly) are associated with better learning or retaining of content and teachers should therefore measure learner’s progress more frequently (Tanner and Jones, 2003). According to Black and William (1998) new learning should also be tested within about a week of first exposure. Frequent assessment provides immediate feedback about how the students are doing and pinpoints the skills missing among students. Thus the more frequent the assessment, the quicker the teacher adapts instruction to ensure that the students are making optimal progress (Good and Grouws, 1975; Brophy, 1981). Thus although C.A.Ts are being done in all schools, the frequency in most schools need to be improved for better teaching and learning of mathematics.
4.6.2 Formative Assessment Techniques Used in Evaluating Students in Mathematics

In establishing the formative assessment techniques used in evaluating students, the study found that teachers use a variety of assessment techniques where oral questioning, observation and giving of homework were the most regularly used techniques of assessment (mean score ranging between 1.1 to 2.0). This is in line with views of Rukangu (1987), who says that formative assessment techniques may include oral presentations, written work, observations, or various combinations of these. This study also agrees with the findings of William (1999) that questioning is one of the most commonly used techniques by teachers to assess learning. However, the dominant purpose for which questioning served in many classrooms as observed by the researcher during the class observations was to direct attention and keep students alert and on task. This was done by scattering large numbers of short questions around the class as a means of social control and although this was very effective in keeping the students active, it made only a limited contribution to formative evaluation and effective learning. Black and William (1998) encourage teachers to use questioning as an opportunity to increase their students' knowledge and improve understanding but they caution that teachers need to make sure to ask thoughtful, reflective questions rather than simple, factual ones and then give students adequate time to respond.

The study further found that other formative assessment techniques used include: giving group work, project work, administration of weekly assessments and giving students’
homework during the holidays. However projects were rarely used as an assessment technique. Teachers' assessment in mathematics should examine creative thinking though this is not the case in the sampled schools. Mutunga and Braekel (1992) in their research found that students should be tested to find out whether they have integrated and made sense of mathematical concepts and procedures. They should also be tested on the application of these concepts to situations that require creative and critical thinking. The students should be encouraged to think critically and creatively throughout a unit and the assessment for the unit should also require students to think critically and creatively (Saskatchewan Education, Training and Employment, 1996). This should be enhanced through use of projects and practicals. Most teachers ignored projects which help the students in promoting higher order thinking skills such as application, synthesis and evaluation. Variety of assessment techniques should therefore be used frequently in order to assess various objectives set, failure to which the teacher gets incorrect feedback on the progress made by students from their teaching.

4.6.3 Use of Feedback from Assessments by the Teachers

The study found that assessments were important to both teachers and the students. This was backed up with reasons that: assessment help in testing students understanding of particular topics, they help in revision, that they help teachers to identify weak students and to monitor teaching and learning processes. From the study, it was also established that teachers took duration of two weeks to give feedback on the assessment. This can be improved so as to help the teachers identify and act on the areas of weaknesses
immediately. James (1988) in his research findings suggests that feedback works best when it is given regularly and early enough to be relevant and therefore teachers need to be availing assessment feedback soon after the tests have been done. The study also found that teachers use the feedback from the assessment to schedule for remedial classes. Though the frequency of the remedial classes may need adjustment as most teachers indicated that they conducted remedial lessons once a week which may not be enough time to handle students who have problems in different areas.
CHAPTER FIVE

Summary, Conclusions and Recommendations

5.1 Introduction
The main objective of the study was to assess formative evaluation in teaching and learning secondary mathematics. The study was guided by the following objectives: to investigate how teachers plan and prepare assessments before administering them to the students, to determine the formative assessment techniques being used in evaluating students in mathematics in secondary schools, to assess the use of feedback from assessments as practiced by the teachers and to investigate how the practice of formative evaluation can be improved in secondary schools in Thika West District.

5.2 Summary of the Findings of the Study
This section presents the summary of the findings of the study according to the objectives:

5.2.1 Planning and Preparation for Assessments by Teachers before their Administration to Students
Regarding preparation for the assessment, the study found that most teachers planned for the assessment after teaching particular topics and thus used content learnt to guide them on what to test instead of the objectives set. They prepared assessments and marked them individually where moderation of the marking schemes was not done in most of the schools. The study also found that teachers rarely used schemes of work and table of
specifications to prepare for the assessments as indicated by most of the respondents. It was also found out that C.A.Ts were administered to the students in almost all schools but the frequency of administration varied in the different schools and the study further found that most of the students were assessed once in a term.

5.2.2 Formative Assessment Techniques Used in Evaluating Students in Mathematics

In establishing the formative assessment techniques used in evaluating students, the study found that oral questioning, observation and homework were the regularly used techniques of assessment (mean score ranging between 1.1 to 2.0). Other techniques included giving group work and monthly quizzes while project work and administration of weekly assessments were rarely used. A variety of techniques are therefore used to assess students in the sampled schools although some of them are not commonly used.

5.2.3 Use of Feedback from Assessments by the Teachers

The study found that the assessments were very important as indicated by most of the teacher respondents. This was backed up with reasons that: assessment help in testing students understanding of particular topics, they help in revision, that assessment help teachers to identify weak students and to monitor teaching and learning processes. The study also found that teachers took duration of two weeks on average to give feedback on C.A.Ts where the teachers used the feedback from assessment to schedule remedial
classes. The remedial classes were conducted outside class hours and mostly conducted once a week as indicated by the majority of the respondents.

5.3 Conclusions

From the findings it can be concluded that:

i) Teachers planned for C.A.Ts after teaching particular topics and hence used the content learnt to determine assessment techniques to use. They rarely used the schemes of work and table of specifications to prepare C.A.Ts and hence the failure to test high order thinking skills. Teachers also prepared and marked C.A.Ts individually without consulting each other. The study also concluded that although C.A.Ts were done in all schools, they were not frequent as they were mostly administered once in a term in most schools.

ii) The study also concluded that oral questioning, observation and homework were the regularly used techniques of assessment in schools whereas project work and administration of weekly assessments were rarely used as assessment techniques. The study thus concluded that although different assessment techniques were being used in schools, some were being given more emphasis than others especially those that test recall and comprehension.

iii) The study finally concluded that the feedback was availed to the students after two weeks by most teachers and this feedback helped teachers in testing students' understanding of particular topics, revision and monitoring teaching and learning progress. It also helped teachers to schedule remedial lessons to
assist students with problems in various topics though this was not frequently done.

5.4 Recommendations

i) The study recommended that teachers should use the schemes of work to plan and prepare for assessments. This is to allow them to plan the assessment with regard to the set objectives which are aimed at improving student’s performance in Mathematics.

ii) The study further recommended that teachers should set assessments in collaboration with others in the department to get the best assessment items. At the same time marking should be done in consultation with each other to avoid getting biased while marking assessments so that the real position of students’ understanding is revealed hence informing the instruction process.

iii) Frequency of assessment should also be given adequate consideration as frequent assessment provides immediate feedback on the understanding of the students with regard to particular topics and pinpoints the skills missing hence informing the teacher on what is needed.

iv) The study also recommended that teachers should not limit themselves to a few assessment techniques because this would not allow them to exhaustively identify the areas which students have not understood. Varied assessment techniques would also allow teachers to assess different objectives adequately.

v) The study finally recommended that the feedback should be provided to the students on individual basis and should be provided within a week after testing. This will allow
teachers to identify the areas of weaknesses among students and act on them immediately making it easy for them to help students improve in their performance in Mathematics.

5.5 **Recommendations for Further Research**

This study was carried out in Thika West District. The study therefore recommends that another study be carried out in other parts of Kenya on the assessment of formative evaluation in teaching and learning secondary mathematics.
REFERENCES


Okech, J. and Asiachi (1986). *Curriculum Development for Primary Schools*. Kenyatta University; Faculty of Education and university of London Institute of Education.


APPENDICES

Appendix A: Questionnaire for Teachers

This questionnaire seeks information about mathematical assessment practice in your school. The items are asking for information about planning, frequency of testing, use of different assessment techniques and giving of feedback on assessments. The information you give is confidential and you need not write your name. Please respond to all questions.

Teachers' Classroom Assessment Techniques, Planning, Feedback and Frequency of assessments

1. At what interval do you assess students in mathematics using tests?
   a) After every lesson ( )
   b) Weekly ( )
   c) Monthly ( )
   d) Per term ( )

2. How do you rate the use of classroom assessment for learning (formative assessments)?
   a) Very important ( )
   b) Slightly important ( )
   c) Moderately important ( )
   d) Very important ( )

3. For what reasons do you give continuous assessment tests?

4. What is the time limit as to when the teachers should have provided feedback to the students after assessment?
5. Are you able to meet this deadline?
   (a) Yes ( )  (b) No ( )

6. If no why?

7. How do you communicate the feedback to your students?
   □ Individually
   □ In groups
   □ Whole class

8. Do you conduct remedial teaching in your class?
   Yes ( )  No ( )

9. When is the remedial teaching done in your school?
   (a) Not done at all ( )
   (b) By the teacher during the class hours ( )
   (c) By the teachers after instructions. ( )

10. How often is it done?
    (a) Not at all ( )
    (b) Once a day ( )
    (c) Once a week ( )
    (d) Any other specify.................................................................

11. How often do you use some of the following assessment techniques given below?
    Tick where appropriate

    | Assessment procedure | Very regularly | Regularly | Less regularly | Not used |
    |----------------------|---------------|-----------|---------------|----------|

12. When do mathematics teachers plan for assessment?
   a) When preparing schemes of work ( )
   b) After teaching particular topics ( )
   c) Just before assessment ( )
   d) Not done at all ( )

13. How are continuous assessments in mathematics prepared in your school?
   a) By individual teachers ( )
   b) By a panel of teachers in the department ( )
   c) By the subject heads ( )
   d) Any other ( )

14. Who marks mathematics tests for the students?
   a) Subject teacher ( )
   b) Subject panel ( )
   c) Subject head ( )

15. Is moderation on the marking schemes usually done?
   (a) Yes ( )   (b) No

16. What guides you when planning for assessment techniques to use during assessment?
   (a) Objectives set ( )
   (b) Content learnt ( )
   (c) Resources available ( )
   (d) Time available ( )

17. At what frequency do you use your schemes of work while preparing for assessment?
(b) All the times (   )
(c) Some times (   )
(d) Not at all (   )

18. Give suggestions on how the practice of formative evaluation (continuous assessment) can be improved in your school

..............................................................................................................
Appendix B: Student Questionnaire

This is not a test. You need not write your name. The information you provide will be treated confidentially. Please be honest and answer all questions.

1. What is the name of your school?

2. Do you do mathematical C.A.Ts in your school?

   Yes ( )  No ( )

3. How often do you do them?

   a) Once a week ( )
   b) Once a month ( )
   c) Once a term ( )
   d) Not at all ( )

4. At what time do you do C.A.Ts?

   a) During class hours ( )
   b) After classes ( )
   c) At night ( )
   d) During weekends ( )

5. Do C.A.Ts cover what has been taught?

   Yes ( )  No ( )

6. After how long do the teachers give feedback on the C.A.Ts? After:

   (a) One week ( )  (b) Two weeks ( )  (c) One month ( )
   (d) Before next ( )
   Assessment ( )

7. Are the C.A.Ts important in the daily learning in our schools?

   Yes ( )  No ( )

8. If yes how do they help you in your learning?

   ..........................................................
9. Apart from CATs, how often are you subjected to the following assessment techniques

<table>
<thead>
<tr>
<th></th>
<th>Daily</th>
<th>Weekly</th>
<th>Monthly</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homework</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group work questions</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project work</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

10. In your own views how can assessment be made more helpful in order to improve performance in mathematics

..........................................................................................................................
..........................................................................................................................
..........................................................................................................................
..........................................................................................................................
..........................................................................................................................
Appendix C: Document Analysis Sheet

The purpose of this instrument will be to extract more information on mathematics assessment. The researcher will look into the necessary documents available from the teachers of mathematics. This will include schemes of work, mark books, test papers, marking schemes and student exercise books.

Assessment information

1. Are continuous assessments tests planned for in the schemes of work?

2. How often are the C.A.Ts done in the school?

3. At what time are C.A.Ts done in the school?

4. Are records for these assessments properly kept?

5. What are the common types of questions given to students in the tests?

   Questions testing:
   a) Recall
   b) Comprehension
   c) Application
   d) Synthesis
   e) Evaluation

6. Apart from tests, identify other assignments given, marked and feedback given to the students?
a) Home work (individual)

b) Projects

c) Group assignments

7. Who marks the student assignments?

   a) Teacher

   b) Students

   c) Never marked

8. Do the teachers use the table of specifications to prepare tests they give to the students? Yes ( )

   No ( )
Appendix D: Lesson observation schedule
(To be filled by the researcher while observing the lesson proceedings)

The purpose of this instrument is to find out how mathematics’ teachers are assessing their students during the lessons.

Date..................................................

School.............................................

1. Does the teacher ask questions at the beginning of the lesson to assess the learning difficulties arising from the previous lesson and check on learners preparedness for the lesson.

2. Does the teacher revise previous homework with the learners to investigate whether the previous concepts taught were understood?

3. Does the teacher mark the students work during the lesson to get feedback on how the students are progressing during the lesson?

4. Are the students given home work?

5. What are the sources of homework given
   a) Text books
   b) Past exams
   c) Teacher made
   d) Others

6. Any other observation?
   Specify........................................................................................................
   ..............................................................................................................
   ..............................................................................................................
   ..............................................................................................................
   ..............................................................................................................
Appendix E: Participants

Thika West District

List of Public Secondary Schools

1. Broadways High Sch
2. Chania Boys High Sch
3. Chania Girls High Sch
4. Gachororo Sec
5. Holy Rosary Sec
6. Joytown Sec
7. Juja Farm Sec Sch
8. Juja Sec
9. Karibaribi Sec
10. Kenyatta Girls Sec Sch
11. Kimuchu Mixed Day Sec
12. Mang’u High Sch
13. Maryhill Girls High
14. Thika Barracks Sec
15. Thika High Sch For The Blind
16. Thika High Sch
RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on “Assessment on the practice of formative evaluation in teaching and learning secondary Mathematics” I am pleased to inform you that you have been authorized to undertake research in Thika West District for a period ending 31st August, 2011.

You are advised to report to the District Commissioner & the District Education Officer, Thika West District before embarking on the research project.

On completion of the research, you are expected to submit one hard copy and one soft copy of the research report/thesis to our office.
THIS IS TO CERTIFY THAT:
Prof./Dr./Mr./Mrs/Miss/Institution
Dorcas Wanjiru Wambugu
of (Address) Kenyatta University
P.O BOX 43844, Nairobi
has been permitted to conduct research in
Location
Thika West
District
Central
Province
on the topic: Assessment on the practices of formative evaluation in teaching and learning secondary Mathematics.
for a period ending 31st Augst 2011

Research Permit No. NCST/RRI/12/1/SS011/887
Date of issue 11th July 2011
Fee received kshs 1000

Applicant's Signature

Secretary
National Council for Science and Technology