TEACHERS'COMPETENCE IN TESTS CONSTRUCTION WITHIN BLOOMS TAXONOMY FOR EFFECTIVE LEARNING ASSESSMENT: A CASE STUDY OF KIKUYU DISTRICT, KIAMBU COUNTY.

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FULFILMENT OF REQUIREMENTS

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DECLARATION

This project study is my original work and has not been submitted to any other university for any academic award

SIGNED **DATE**

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SUPERVISORS DECLARATION

This project has been submitted for examination with my approval as university supervisor

SIGNED **DATE**

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DEDICATION

This research project is dedicated to God Almighty for His grace upon me. Claudius, my dear husband who has always encouraged me in my study and believed in me. Thanks dear for your emotional and material support.

To my lovely daughters Julie and Stella and son Chrispin, you gave me a reason to study and finish this project. Kids, thank you for your prayers which have brought me this far.

I cannot forget my friend Grace for her consistent push that I finish this project. That is what friends are for, thanks.

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I acknowledge the work of my supervisor, Dr. Levi who tirelessly assisted by giving advice and direction regarding this study.

To all the teachers who participated in this study by providing the data.

Thank you.

ABSTRACT

A test as an assessment technique is a tool or device that is used to obtain information about achievement, aptitude or intelligence level of learners. This study focused on the competence of secondary school teachers in assessing their students by finding out whether when constructing tests they are guided by the Bloom's levels of cognitive objectives. The purpose of the study was to find out how adequate the teachers spread their test items to cover the six levels of cognitive objectives that Bloom (1956) identified and were later revised by Anderson and Krathwohl (2001). The study aimed to determine how adequately the test items developed by the teachers cover the lower and higher levels of thinking in regard to the action verbs used in the test items. The study also intended to determine the extent to which school type (National, County, District schools) influence the teachers' consideration and use of the cognitive objectives in constructing their test items.

Four research questions were formulated for the study. The design for the study was a cross-sectional survey where a sample was selected from the target population of all the public secondary schools within kikuyu District, the area under study. The researcher conveniently selected one (1) National school out of the two (2) within the area of the study, three (3) County schools out of the five (5) and ten (10) District Schools out of the twenty one (21) within the area of study. A total of fourteen schools were included in the study. From each sampled school at least three (3) teachers were included in the study as respondents during data collection.

The main instrument used for data collection was the questionnaire. Teacher made tests containing test items constructed by each of the teachers involved in the study were also used to get the information from the teachers to establish their extent of competence in test construction.

Frequency tables, percentages, pie charts, graphs and means were used to help in answering the research questions.

The findings revealed that secondary school teachers do not adequately employ the Bloom's cognitive levels objectives in constructing their test items. It also revealed that teachers do not adequately make use of the action verbs in constructing test items. The findings were similar in all the types of schools. The findings therefore imply that training and retraining of teachers in test construction could help in improving teacher made tests for effective learning assessment; which was the recommendation the researcher made to the Ministry of Education.

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CHAPTER ONE
INTRODUCTION

1.1 Background to the study

Testing in education is a very crucial systematic device which is assumed to tell or measure what has been learnt and the extent of the learning. It aims at measuring a person's knowledge, intelligence or other characteristics in a systematic way. Testing therefore involves the use of test items that will enable the measurement be effective and accurate.

In education situation, it is what goes on in the classroom that determines how well the measurement will portray the accurate results. A teacher becomes a crucial and important part of the learning process, having been trusted with designing, administering and scoring tests which are supposed to play a big role in ensuring that the purpose of the test is fit.

Teacher made tests usually serve several purposes including communicating expectations like:

- What knowledge is important to learn?
- What skills are valued?
- What is expected in the summative assessment level (Kenya Certificate of Secondary Education Examination; K.C.S.E)? and so on.

The teacher-made tests also predict future performance; Districts, Schools, teachers and even the students uses the teacher made test results to predict the performance at the K.C.S.E examination.

It therefore became necessary to investigate how well the process of test construction is done in schools bearing in mind that the tests made by the teachers should guide the students on what they expect at the end of the four years in secondary school. The students' progress is also rated by the tests made by teachers to know how well they are prepared for the final examination (K.C.S.E). The Kenya Institute of curriculum Development (K.I.C.D) provides syllabus for different subjects, the expectation is that the objectives of each topic of a subject are well met and hence the areas become testable.

The Kenya National Examination Council (K.N.E.C) also produces a syllabus in order to make it clear the areas to be tested after the four years in secondary school. The syllabus provides objectives to be achieved as well as the expected timeline for the coverage of specific content in form of topics. The selection of topics is critically important together with the objectives of the teaching to identify skills, knowledge and understanding that are to be tested.

Since the key purpose of tests is to determine the learning done, a teacher should ensure that the tests does what it is meant to do, that is, measure what it is intended to measure and provide sound information supporting the purpose for which it is used. It therefore becomes necessary to find out whether teachers are guided by any principles, and in this study, the guidance of the Revised Bloom's Taxonomy cognitive objectives as they construct tests for their students.

Krathwohl (2002) identifies the structure of the Taxonomy's cognitive objectives as follows;

1. **Remember** - Retrieving relevant knowledge from long-term memory, which involves Recognizing and Recalling
2. **Understand** - Determining the meaning of instructional messages, including oral, written, and graphic communication, which involves Interpreting, Exemplifying, Classifying, Summarizing, Inferring, Comparing, Explaining
3. **Apply** - Carrying out or using a procedure in a given situation which involves Executing and Implementing
4. **Analyze** - Breaking material into its constituent parts and detecting how the parts relate to one another and to an overall structure or purpose. It involves; Differentiating organizing, and Attributing
5. **Evaluate** - Making judgments based on criteria and standards. To evaluate involves; checking and critiquing
6. **Create** - Putting elements together to form a novel, coherent whole or make an original product. It involves; Generating, Planning and Producing.

The concern of the study was the cognitive process dimension of the Revised Bloom's Taxonomy, Krathwohl (2001) and not the original taxonomy, Bloom (1956). The reason being, that the authors of the original taxonomy were interested in demonstrating how multiple-choice items could be used to assess different objectives. With the exception of the synthesis and evaluation objectives, all sample items were multiple-choice. On the other hand the Revised Taxonomy provides demonstrations for the non-multiple-choice test items; there is a discussion of the criteria to be used in evaluating student performance on essay questions. This made the Revised Taxonomy appropriate for this study because secondary school tests in Kenya are not multiple choice but essay and structured formats, so to say for the 8-4-4 system of education.

1.2 Statement of the Problem

Testing in secondary schools starts the very first term a form one joins the school. These tests come in form of Continuous Assessment Tests (CATs), Mid-Term Exams, Monthly Tests, End of Term Exams, and End of Year Exams and in some schools Random Assessment Tests, all of which are teacher made tests. Proposals have even been given that teacher-made tests become part of the final grade given to students in K.C.S.E examination. This shows the weight that people; parents, employers, public and students, give to these teacher made tests.

Testing is a necessary part of teaching and there can be serious consequences if the testing is inaccurate. The study sought to investigate the competence of secondary school teachers in assessing their students by finding out whether when constructing tests they are guided by the Bloom's taxonomy levels of cognitive objectives.

1.3 Objective of the Study

The objective of the study was to find out how adequate teachers spread their test items to cover the six levels of cognitive objectives that Bloom (1956) identified and were later revised by Anderson and Krathwohl (2001). The study aimed to determine how adequately the test items developed by the teachers cover the lower and higher levels of thinking in regard to the action verbs used in the test items. The study also intended to determine the extent to which school type (National, County, District schools) influence the teachers' consideration and use of the cognitive objectives in constructing their test items.

The study used the art subjects' (Christian Religious Education, History, and Geography) tests but generalized for all other subjects' tests.

The study sought to answer the following research questions:-

1. How adequate are teachers' test items in reflecting the six cognitive level objectives?
2. To what extent do the teacher's test items measure thinking at lower and higher levels?
3. How adequate do teachers employ the use of action verbs in their test items?
4. Is there any difference in the adequacy of the teachers test items based on their type of school?

1.4 Justification of the Study

The results of this study will help improve educational practices and programmes by all the stakeholders in the process of testing. Teachers will know what it takes to have a good test that measures all the levels of cognitive abilities. People whose main interest may be in assessment will have a check list on probably how to make a better test. Curriculum developers and examination designers will know the crucial nature of testing and come up with a solution to the poor performance in K.C.S.E by probably training teachers on how to construct classroom tests that will not compromise on the teaching learning process.

1.5 Scope and Limitation

The study only investigated teachers' competence in tests construction within the Revised Bloom's Taxonomy. The study did not concern itself with other teachers' competencies in education assessment but only the competence of constructing tests. It is only a sample of teachers from the area under study that was included in the study. The study did not include teacher-made tests in all subjects, only the three humanities: Christian Religious Education (CRE), History and Geography were used in the study. The assumption was that the results from the three subjects can be generalized for all the other subjects done in secondary schools.

1.6 Definition of Operational Terms

The following are the operational definitions of terms that were used in this study

Assessment: this will be used interchangeably with testing to mean the act of using test questions to measure the level of learning.

Test: this is a set of questions also here in referred to as test items on an area of study/subject.

Teacher competence: ability of teachers to use principles and guidelines say the Bloom's taxonomy in constructing standard tests.

Standard tests: this will be used interchangeably with effective learning assessment to mean tests that are constructed using a blue print as a guide in this case the Bloom's taxonomy.

CHAPTER TWO
LITERATURE REVIEW:

2.1 Introduction

In this chapter, the researcher looks at other related studies under three themes: The Role of Testing, Teacher Competency in Learning Assessment and The Bloom's Taxonomy.

2.2 Role of Testing

Bishop (1985) defines a test as a task or a set of tasks or questions intended to elicit particular type of behaviour when presented to learners under standard conditions. As a general rule, the primary reason why teachers do classroom assessment is to collect information about the performance of their students in School (Bennet & Gitomer, 2009; Nitko & Brookart, 2007; Harlen, 2007; Musial et al., 2009). However, teachers also realize that they are not the only end users of the information gathered from the process. Undeniably, students also want to know how they performed in an assessment process (Cohen et al., 2000) in the form of feedback or feed-forward (Mbelani, 2008; Murray, 2006). The results of the assessment process must allow students to know how else they can improve their performance (Bennet & Gitomer, 2009; Mory, 1992). Parents, too, may also be interested in knowing how their children are performing in school. (Popham, 2008; Raty, Kasanen, & Honkalampi, 2006; Stiggins, 2002).

School administrators and other teachers often use information gathered from tests. Cangelosi (1990) defines tests as planned measurement by which teachers attempt to create opportunities for students to display their achievement relative to specified goals.

Oguneye, (2002) posits that one of the functions of a school is to evaluate the performance of an individual learner. To effectively carry out this role, assessment is prerequisite. Assessment is a means whereby the teacher obtains information about knowledge gains, behavioral changes and other aspects of the development of learners. Collectively, the aim in assessing students is to improve the effectiveness of learning and teaching (Sparks 2005). Assessment is an integral and essential part of the teaching and learning cycle. In the assessment process there is a clear link between stated learning outcomes, the learning experiences the students are exposed to and the

assessment tasks. Through assessment the teacher is able to diagnose students' learning difficulties and plan further instruction for them.

It provides feedback to students about their learning, to teachers about how well they have taught, to parents about their child's performance and to communities to judge the quality of the educational system.

When teachers assess learning, they identify specific goals and objectives for each subject or lesson, systematically gauge the extent to which these anticipated outcomes actually occur and determine to what degree learning takes place (Raty et al., 2006). In addition, when they do assessment in the classrooms, teachers are also required to define the role of assessment in making instructional and educational decisions (Danielson, 2008; Stake, 2004). According to Rust (2002), it is easy for teachers to become immersed in the job and lose sight of the exact purpose of a particular element of assessment.

There is then the possibility that the purpose is not achieved, or that they overlook another form of assessment that might be more appropriate. Rust (2002) also adds that generally, teachers actually assess students for quite a range of reasons- motivation, creating learning opportunities, to give feedback, to grade, and as a quality assurance mechanism (both internal and external systems).

Sumner (1987) identified the role of testing by stating two categories of roles those that are external to the school and include; transfer information, monitoring standards, accountability, allocating resources, identification of students in specified categories, accreditation, selection and target setting. He identified the internal roles to include feedback to the student on their learning, feedback to the teacher on student learning-diagnostic assessment, identification of specific learning difficulties, grouping students, aid in education guidance and for curriculum improvement. The main purposes of the assessments, according to Bone (1999), are: (1) To grade or rank a student; (2) To pass or fail a student; (3) To provide feedbacks to students; (4) To provide feedbacks to lecturers; (5) To provide feedbacks to professional bodies; (6) To contribute to a student profile; (7) To motivate students; (8) To motivate lecturers; (9) To predict

success in research and/or professional courses; (10) To predict success in future employment organization; (11) To provide a SWOT (strengths, weaknesses, opportunities and threats) analysis for students; (12) To provide a SWOT analysis for teachers; and (13) To assist an institution in establishing quality in their provision of courses.

Kuhs et al. (2001, p. 2) add that "in addition to guiding classroom instruction," assessment helps teachers

- formulate plans and strategies to support the instructional needs of students
- share information with students about their progress
- collect information to assign student grades
- evaluate the effectiveness of their instructional strategies and curricula
- prepare summative information on student progress for decisions such as promotion, retention, assignment to special programs, and referrals to other needed assistance programs.

Tests and observations provide the information base for teachers' evaluations of student achievement. Thus, there are three general aims for classroom assessment: pedagogical, managerial and communicative.

Unfortunately, studies examining the quality of tests commonly used in schools suggest that testing malpractice and inaccurate evaluations are widespread.

Stiggins (1988) points out the consequences of a poorly designed test by stating that, 'teacher developed tests are dominated by questions that ask students to recall facts and information. Although instructional objectives and even instructional activities may seek to develop thinking skills, classroom tests often fail to match these aspirations. Students who use tests to try to understand the teachers' expectations can see the priority placed on memorizing, and they respond accordingly'. Thus poor quality assessment that fails to tap and reward higher order thinking skills will inhibit the development of those skills.

Hence, it is very important that when teachers conduct assessments they have a clear purpose in mind and believe that their assessments promote excellence in students. Murray (2006)

2.3 Teacher Competency in Learning Assessment

Stiggins, (1988) posits that teachers spend between twenty (20) percent and thirty (30) percent of their time directly involved in data or information gathering activities including designing, synthesizing, selecting, administering, scoring, interpreting and revising tests and other types of observations of students' performances and behaviors.

In the assessment of students the teacher takes the Centre stage. Airasian (1996) claimed that assessment is not just for students, it is for teachers as well. Therefore, teachers are expected to demonstrate some level of competence in assessing their students. The days are over when a teacher, in assessing his students merely copies the questions at the back of textbooks without taking into cognizance the purpose and use of the assessment results. There are different assessment techniques and these must be matched to purpose and must be conducted using established quality standards. It is these quality standards that teachers may not be conversant with and for this study the construction of quality tests guided by the Bloom's taxonomy.

The American Federation of Teachers, National Council on Measurement in Education and National Education Association (1990) enumerated seven standards for teacher competence in the educational assessment of their students. These include:

1. Teachers should be skilled in choosing assessment methods appropriate for instructional decisions.

   Skills in choosing appropriate, useful, administratively convenient, technically adequate, and fair assessment methods are prerequisite to good use of information to support instructional decisions. Teachers need to be well-acquainted with the kinds of information provided by a broad range of assessment alternatives and their strengths and weaknesses. In particular, they should be familiar with criteria for evaluating and selecting assessment methods in light of instructional plans.
2. Teachers should be skilled in developing assessment methods appropriate for instructional decisions.

   While teachers often use published or other external assessment tools, the bulk of the assessment information they use for decision-making comes from approaches they create and

implement. Indeed, the assessment demands of the classroom go well beyond readily available instruments.

3. The teacher should be skilled in administering, scoring and interpreting the results of both externally-produced and teacher-produced assessment methods. It is not enough that teachers are able to select and develop good assessment methods; they must also be able to apply them properly. Teachers should be skilled in administering, scoring, and interpreting results from diverse assessment methods.
4. Teachers should be skilled in using assessment results when making decisions about individual students, planning teaching, developing curriculum, and school improvement. Assessment results are used to make educational decisions at several levels: in the classroom about students, in the community about a school and a school district, and in society, generally, about the purposes and outcomes of the educational enterprise. Teachers play a vital role when participating in decision-making at each of these levels and must be able to use assessment results effectively.
5. Teachers should be skilled in developing valid pupil grading procedures which use pupil assessments. Grading students is an important part of professional practice for teachers. Grading is defined as indicating both a student's level of performance and a teacher's valuing of that performance. The principles for using assessments to obtain valid grades are known and teachers should employ them.
6. Teachers should be skilled in communicating assessment results to students, parents, other lay audiences, and other educators. Teachers must routinely report assessment results to students and to parents or guardians. In addition, they are frequently asked to report or to discuss assessment results with other educators and with diverse lay audiences. If the results are not communicated effectively, they may be misused or not used. To communicate effectively with others on matters of student assessment, teachers must be able to use assessment terminology appropriately and must be able to articulate the meaning, limitations, and implications of assessment results. Furthermore, teachers will sometimes be in a position that will require them to defend their own assessment procedures and their interpretations of them. At other times, teachers may need to help the public to interpret assessment results appropriately.

7. Teachers should be skilled in recognizing unethical, illegal, and otherwise inappropriate assessment methods and uses of assessment information. Fairness, the rights of all concerned, and professional ethical behavior must under gird all student assessment activities, from the initial planning for and gathering of information to the interpretation, use, and communication of the results. Teachers must be well-versed in their own ethical and legal responsibilities in assessment. In addition, they should also attempt to have the inappropriate assessment practices of others discontinued whenever they are encountered. Teachers should also participate with the wider educational community in defining the limits of appropriate professional behavior in assessment.

Lissitz and Schafer (2002, pp. 23-26) also provide standards for assessment quality:

1. Quality assessments arise from and accurately reflect clearly specified and appropriate achievement expectations for students.
2. Sound assessments are specifically designed to serve instructional purposes.
3. Quality assessments accurately reflect the intended target and serve the intended purpose.
4. Quality assessments provide a representative sample of student performance that is sufficient in its scope to permit confident conclusions about student achievement.
5. Sound assessments are designed, developed, and used in such a manner as to eliminate sources of bias or distortion that interfere with the accuracy of results.

Teachers require an ability to design test items. The skills and competencies needed are often lacking and time required to design an effective test is rarely enough. The researcher's concern was to find out; how many teachers are aware of the Bloom's Taxonomy and are guided by it in test construction? And how many approach testing by drafting a specification table of content to guide them on levels of knowledge to test?

Due to poor testing many sins are committed in reporting students' progress. What is reported students know does not commensurate what they can do using the knowledge they ought to have acquired. As far as this study is concerned the Bloom's levels of cognitive objectives should guide every teacher in assessing the learning outcomes to ensure that all levels are mastered by the students.

2.4 The Bloom's Taxonomy

The Blooms Taxonomy is a hierarchical structure representing six levels of thinking and learning skills that move from the lower level to higher order skills. The original Taxonomy was developed by Bloom (1956) and was later revised by Anderson and Krathwohl (2001). The revised taxonomy was a modification of the original Taxonomy where the most notable of the changes is the change of nouns to action verbs, for example the knowledge changed to remember. The original Taxonomy had the levels: Knowledge, Comprehension, Application, Analysis, Synthesis, and Evaluation.

The Revised Taxonomy has two dimensions; the knowledge dimension and the cognitive process dimension as explained below.

Structure of the knowledge Dimension of the revised Taxonomy

a) **Factual knowledge**- The basic elements that students must know.
b) **Conceptual knowledge** - The interrelationships among the basic elements within a larger structure that enable them to function together.
c) **Procedural knowledge**- How to do something, methods of inquiry, and criteria for using skills, algorithms, techniques and methods.
d) **Meta-cognitive knowledge-** Knowledge of cognition in general as well as awareness and knowledge of one's own cognition

Structure of the cognitive process Dimension of the Revised Taxonomy

a) **Remember** – Retrieving relevant knowledge from long term memory
b) **Understand -** Determining the meaning of instructional messages, including oral, written and graphic communication.
c) **Analyze -** Breaking material into its constituent parts and detecting how the parts relate to one another and to an overall structure or purpose.
d) **Evaluate -** This involves making judgments based on criteria and standards.
e) **Create -** This is putting elements together to form a coherent whole or make an original product.

According to Cangelosi (1990) the cognitive domain is either knowledge level or intellectual level. An objective requiring students to remember some specified content is a knowledge-level objective. An objective has an intellectual level behavioral construct if it requires students to use reasoning to make judgments relative to the specified content. He further makes a distinction of the knowledge-level objectives by stating that it can be tested as simple knowledge or knowledge of a process. Knowledge level objective is considered simple knowledge if the content for students to remember involves no more than a single response to a particular test item. The objective is considered knowledge of a process if the content for students to remember is a sequence of steps in a procedure.

In relation to the Revised Bloom's Taxonomy we would put remember in the simple knowledge category, understand in the knowledge of a process category and the other levels of apply, analyse, evaluate and create at the intellectual level.

Like the original Taxonomy, the revision is a hierarchy in the sense that the six major categories of the Cognitive Process dimension differ in their complexity, with remember being less complex than understand, which is less complex than apply, and so on. The revision gives much greater weight to teacher usage; the requirement of a strict hierarchy has been relaxed to allow the categories to overlap one another. Nworgu (2010).

This is most clearly illustrated in the case of the category Understand. Because its scope has been considerably broadened over Comprehend in the original framework, some cognitive processes associated with Understand (e.g., Explaining) are more cognitively complex than at least one of the cognitive processes associated with Apply (e.g., Executing) Krathwohl, (2002).

2.4.1 The Taxonomy Table

In the revised Taxonomy, any objective is represented in two dimensions in a two-dimensional table, which is termed as the Taxonomy Table. The Knowledge dimension forms the vertical axis of the table, whereas the Cognitive Process dimension forms the horizontal axis. The intersections of the knowledge and cognitive process categories form the cells. The horizontal dimension, known as the Cognitive Process Dimension, is a modification of Bloom's Taxonomy.

Application, Analysis, and Evaluation have been replaced by their verb forms. Knowledge has become Remember; Comprehension, Understand, Synthesis, and Create. The shift from Comprehend to understand was based on the desire of the authors to use terminology that was consistent with the way in which teachers talked about their work. The shift from Synthesize to Create was based on general agreement that synthesis was a part of the process of creating. The relative position of Evaluate and Create was changed, with Create assuming the highest (i.e., most complex, most abstract) position on the Cognitive Process Dimension. The vertical dimension, known as the Knowledge Dimension, consists of four general types of knowledge: Factual, Conceptual, Procedural, and Metacognitive.

Factual Knowledge consists of the terminology, details, and elements that students must know to be acquainted with a particular subject matter. Knowing what to call something is an example of Factual Knowledge. Conceptual Knowledge is knowledge of classifications and categories~ principles and generalizations, and theories, models, and structures. It is to know the interrelationships among the basic elements within a larger structure that enable them (the elements) to function together. Procedural Knowledge is to know how to make or do something. It includes methods, techniques, algorithms, and skills. It also includes the criteria one uses to determine when to use appropriate Procedural Knowledge. Finally, Metacognitive Knowledge is knowledge of cognition in general as well as awareness and knowledge of one's own cognition; it includes strategic knowledge, task knowledge, and sell-knowledge. Any objective can be classified in the Taxonomy Table (table 2.4.1.1 below) in one or more cells that correspond with the intersection of the column(s) appropriate for categorizing the verb(s) and the row(s) appropriate for categorizing the noun(s) or noun phrase(s).

The taxonomy table provides teachers with a conceptual framework that promotes shared understanding and meaningful communication. It provides a means by which teachers can develop more complete understanding of specific objectives and use this understanding to improve assessment and instruction and the essential link between them. Anderson (2005)

Table 2.4.1.1: The Taxonomy Table

The cognitive process dimension

Knowledge dimension	**1** Remember	**2** Understand	**3** Apply	**4** Analyze	**5** Evaluate	**6** Create
Factual,						
Conceptual						
Procedural,						
Metacognitive						

Source: Anderson, L.W. and Krathwohl D. R. (2001).

2.4.2 Structure of the Cognitive Process Dimension of the Revised Taxonomy

The table below illustrates the levels of the cognitive process dimension giving their definitions and sample action verbs that teachers are expected to use in testing different levels of mastery of content.

Table 2.4.2.1: The Revised Blooms Taxonomy

LEVEL	**DEFINATION**	**ACTION VERBS**
REMEMBERING	Recall of information	List, memorize define, recognize Arrange, relate, label, recall, name, repeat, order ,
UNDERSTANDING	Interpret information in one's own words	classify describe, discuss, explain express, identify, indicate, locate recognize report, restate, review select, sort, tell, translate
APPLYING	Use knowledge or generalization in a new situation	Demonstrate, dramatize, apply, choose, employ illustrate interpret operate, prepare practice, schedule, sketch, solve, use

ANALYSING	Break down knowledge into parts and show relationships among parts	Discriminate, differentiate, analyze appraise, calculate categorize, compare, contrast ,criticize diagram Distinguish, examine, inventory question, experiment, test
EVALUATING	Making judgments based on criteria and standards	Appraise, argue assess, attack, choose, compare, defend, estimate, evaluate, judge, predict, rate, score, select, support, value
CREATING	Bring together parts of knowledge to form a whole and build relationships for new situations	Arrange, assemble, collect, compose, construct, create, design formulate, manage organize, plan, prepare, propose, set up, synthesize, write

Adapted from;

Krathwohl, D. R. (2002). A Revision of Bloom's taxonomy: An overview. *Theory into Practice, 41(4),* 212-218.

2.4.3 Assessment within Bloom's Revised Taxonomy

In the discussion that follow, each of the six categories, as well as the cognitive processes that fit within them, are defined and explained in relation to assessment practices expected for each category. The literature is guided by Mayer (2002), Krathwohl (2002), Mandernach (2003), and Huit (2009).

Remember

When the objective of instruction is to promote retention of the presented material in much the same form in which it was taught, the relevant process category is Remember. Remembering involves retrieving relevant knowledge from long-term memory.

Remembering knowledge is essential for meaningful learning and problem solving when that knowledge is used in more complex tasks. When teachers focus on effective learning assessment, remembering knowledge should be integrated within the larger task of constructing new knowledge or solving new problems.

In other words, when meaningful learning assessment is the goal, then remembering should become a means to an end, rather than the end itself. The two associated Cognitive processes are recognizing and recalling. Recognizing (also called identifying) involves locating knowledge in long-term memory that is consistent with presented material. Recalling (also called retrieving*)* involves retrieving relevant knowledge from long-term memory.

Understand

When the goal of instruction is to promote transfer, the focus shifts to the other five cognitive process categories, Understand through Create. Of these, the largest category of transfer-based educational objectives emphasized in schools and colleges is Understand. Mayer (2002)

Students are said to understand when they are able to construct meaning from instructional messages including oral, written, and graphic communications, and material presented during teaching or in books,

Students understand when they build connections between the new knowledge to be gained and their prior knowledge. The incoming knowledge is integrated with existing schemas and cognitive frameworks. Cognitive processes in the category of Understand include interpreting, exemplifying, classifying, summarizing, inferring, comparing, and explaining.

This occurs when a student is able to convert information from one form of representation to another. , find a specific example or instance of a general concept or principle, produce a short statement that represents presented information or abstracts a general theme and/ or draws a logical conclusion from presented information. And /or detect similarities and differences between two or more objects, events, ideas, problems, or when a student mentally constructs and uses a cause-and-effect model of a system or series. Mayer (2002).

Apply

Apply involves using procedures to perform exercises or solve problems The Apply category consists of two cognitive processes: executing when the task is an exercise (i.e., familiar to the learner), and implementing-when the task is a problem (i.e., unfamiliar to the learner).

Executing (also called carrying out) occurs when a student applies a procedure to a familiar task Implementing (also called using) occurs when a student applies one or more procedures to an unfamiliar task. Unlike executing, which relies almost exclusively on cognitive processes associated with Apply, implementing involves cognitive processes associated with both Understand and Apply.

Analyze

Analyze involves breaking material into its constituent parts and determining how the parts are related to each other and to an overall structure.

This category includes the cognitive processes of differentiating, organizing, and attributing. Objectives classified as Analyze include learning to determine the relevant or important pieces of a message (differentiating), the ways in which the pieces of a message are configured (organizing), and the underlying purpose of the message (attributing). Although learning to Analyze may be viewed as an end in itself, it is probably more defensible educationally to consider analysis as an extension of Understanding or as a prelude to Evaluating or Creating. Mayer (2002).

Differentiating (also called discriminating, selecting, distinguishing, or focusing) occurs when a student discriminates relevant from irrelevant parts or important from unimportant parts of presented material

Organizing (also called finding coherence, integrating, outlining, parsing, or structuring) involves determining how elements fit or function within a structure.

Attributing (also called deconstructing) occurs when a student is able to determine the point of view, biases, values, or intent underlying presented material.

Evaluate

Evaluate is defined as making judgments based on criteria and standards. The criteria most often used are quality, effectiveness, efficiency, and consistency. They may be determined by the student or given to the student by others. The standards may be either quantitative (i.e., is this sufficient amount?) or qualitative (i.e., is this good enough?). This category includes the cognitive processes of checking (which refers to judgments about internal consistency) and critiquing (which refers to judgments based on external criteria).

Checking (also called coordinating, detecting, monitoring, or testing) occurs when a student detects inconsistencies or fallacies within a process or product, determines whether a process or product has internal consistency, or detects the effectiveness of a procedure as it is being implemented. When combined with planning (a cognitive process in the category, Create) and implementing (a cognitive process in the category, Apply), checking involves determining how well the plan is working.

Critiquing (also called judging) occurs when a student detects inconsistencies between a product or operation and some external criteria, determines whether a product has external consistency, or judges the appropriateness of a procedure for a given problem. Critiquing lies at the core of what has been called critical thinking. In critiquing, students judge the merits of a product or operation based on specified or student-determined criteria and standards.

Create

Create involves putting elements together to form a coherent or functional whole; that is, reorganizing elements into a new pattern or structure. Objectives classified as Create involve having students produce an original product. Composition (including writing), for example, often, but not always, involves cognitive processes associated with Create.

It can simply be the application of procedural knowledge (e.g., "Write this essay in this way"). The creative process can be broken into three phases: (a) problem representation, in which a student attempts to understand the task and generate possible solutions; (b) solution planning, in which a student examines the possibilities and devises a workable plan; and (c) solution

execution, in which a student successfully carries out the plan. Thus, the creative process can be thought of as starting with a divergent phase in which a variety of possible solutions are considered as the student attempts to understand the task (generating). This is followed by a convergent phase, in which a solution method is devised and turned into a plan of action (planning). Finally, the plan is executed as the solution is constructed (producing). So then, Create can be broken down into three cognitive processes: generating, planning, and producing.
Generating (also called hypothesizing) involves inventing alternative hypotheses based on criteria. When generating transcends the boundaries or constraints of prior knowledge and existing theories, it involves divergent thinking and forms the core of what can be called creative thinking.

In generating, a student is given a description of a problem and must produce alternative solutions. Planning (also called designing) involves devising a method for accomplishing some task. However, planning stops short of carrying out the steps to create the actual solution for a break a task into subtasks to be performed when solving the problem). Teachers often skip stating planning objectives, instead stating their objectives in terms of producing, the final stage of the creative process. When this happens, planning is either assumed or is implicit in the producing objective. In this case, planning is likely to be carried out by the student covertly, in the course of constructing a product (i.e., producing). In planning, a student develops a solution method when given a problem statement.
Producing (also called constructing) involves inventing a product. In producing, a student is given a functional description of a goal and must create a product that satisfies the description.

Conclusion

The focus of education lies in seeking how to improve human thinking and cannot be attained by chance but must be diligently sought for (Forehand, 2005).According to Forehand, for teachers to accurately measure their students' ability, it requires them to adopt and adequately use classification of levels of intellectual behavior as identified by Bloom (1956). Huit (2009) posits that the major idea of the Taxonomy is to arrange mastery in a hierarchy from less to more

complex. A student must have attained the mastery at a lower level to be able to perform at the next higher level.

The teacher must decide which type of question to use to assess each objective at the correct level. When making this decision a teacher should consider the best way to get the desired information from the student. Fives et. al (2013). According to Bloom (1956), the task of classifying test items is somewhat more complicated than that of classifying educational objectives, before the teacher can classify a particular test's items he/she must know, or at least make some assumptions about, the learning situations which have preceded the test. He must also attempt to solve the test problem and note the mental processes to be utilized.

The study sought to investigate the competence of secondary school teachers in assessing their students by finding out whether when constructing tests they are guided by these Bloom's levels of cognitive objectives. The revised Bloom's Taxonomy of Anderson and Krathwohl (2001) will be used, focusing on the following levels: remember, understand, apply, analyze, evaluate and create where the first two levels measure the lower thinking level while the other four assess the higher level thinking.

CHAPTER THREE
METHODOLOGY, RESEARCH DESIGN AND SAMPLING

3.0 Introduction

This chapter describes the research methodology in different sections; the research design, sampling and the sample population, the data collection method and the instruments and finally the data analysis methods that were used in this study.

3.1 Research Design

The design for this study was a cross-sectional survey where a sample was randomly selected from the target population of all the public secondary schools within Kikuyu District of Kiambu County which was the area under study.

3.2 Sampling and Sample Population

Kikuyu District has two (2) National schools, five (5) County schools and twenty one (21) District schools. The researcher conveniently selected one (1) National school out of the two (2), three (3) County schools out of the five (5) and ten (10) District Schools out of the twenty one (21) within the area of study. A total of fourteen schools were included in the study. This was a 50% representation of the National schools, 60% representation of the County schools and a 47.6% representation of the District schools. The total population representation sample was targeted at 50%.This is as illustrated in the table below.

Table 3.1 Population representation sample

Type of school	Total population	Target sample	% Representation
National schools	2	1	50%
County schools	5	3	60%
District schools	21	10	47.6%
Totals	**28**	**14**	**50%**

The researcher purposively used the three art subjects namely Christian Religious Education (CRE), history, and geography for the study.

From each sampled school at least one teacher for each subject: CRE, History, and Geography, was targeted in the study as respondent during data collection. This implies that a total of forty two (42) teachers were the target sample, which meant three (3) teachers from each of the fourteen (14) schools sampled.

3.3 Data Collection and Research Instruments

The main instrument used for data collection was the questionnaires. Questionnaires were used to get the information from the teachers to establish their extent of competence in test construction. The questionnaires were designed in simple and clear language with precision to ensure validity of the responses. Questions to help answer the research questions were contained in the questionnaires.

The questionnaire was divided into three sections; section A contained questions on teachers' personal information that helped in the demographic analysis of the sampled population.

Section B contained questions that helped to establish the levels of teachers' competences in test construction. The respondents were required to tick the chosen response representing their viewpoint from several answer categories. This means the structure of the questions was closed questions. The advantage of closed questions is that they are manageable since the respondent is restricted to a finite set of responses. They are also easy to answer and code for analysis.
A few questions had a dichotomous response format where only two mutually exclusive responses were provided.

Section C contained items on a five point likert scale where the respondents were required to indicate their levels of agreement or disagreement on statements that were used to guide the researcher in establishing how adequately test items constructed by teachers reflected the six cognitive levels objectives of the Bloom's Taxonomy. The statements were simple descriptions of the six levels of cognitive objectives of the Bloom's Taxonomy.

Section C also helped to find out how adequately teachers employed the use of action verbs in their test items. Respondents were required to indicate how often they used a list of verbs in the tests. Each category of verbs was chosen to cover the six levels of cognitive objectives in a proportional manner. The verbs used helped to establish the mostly tested or untested levels of the cognitive objectives.

The researcher avoided open ended questions because this would have required more effort and more time for the respondents. Again responses would have come in different forms and this would have led to answers that cannot be systematically coded for analysis.

Teacher made tests containing test items constructed by each of the teachers involved in the study were also used. The teachers were requested to provide at least one test they had constructed in their teaching subject. For uniformity purposes the researcher requested from the teachers for an end of term test on each subject for the form three classes preferably the recently done test. The tests helped the researcher to identify the levels of knowledge tested by identifying the action verbs used in each test item which helped to answer the study questions.

3.4 Data Analysis Method

Data was analyzed both quantitatively and qualitatively. Data description, frequency tables, percentages, graphs, pie charts, line graphs and means were used to help in answering the research questions. Each research question was answered separately by analyzing data pertaining to it.

Data from the teacher made tests was analyzed by description and statistical methods, interest being on identifying the levels of knowledge the teachers often tested their students on. Data from the tests and the questionnaires supplemented each other in providing information to answer the research questions.

CHAPTER FOUR
DATA ANALYSIS AND INTERPRETATION

4.1 Introduction

This chapter presents the findings of the study, the analysis and the interpretation. The first section shows the demographic and personal information and the response rate of the sampled population.

The second section analyses data related to factors influencing test construction. The third section has the findings of the study concerning the use of Blooms Taxonomy by the teachers which is the main purpose of this study. The fourth section presents the analysis from the teacher made tests that the sampled population availed to the researcher for further analysis.

4.2 Population, Demographic and Personal Information

4.2.1 Population and response rate

The target population was one (1) national school, three (3) county schools and ten (10) District schools. The target was 100% achieved because the researcher was able to give questionnaires to all the targeted schools. A total of 14 schools were involved in the study.

From the one national school, three (3) teachers were respondents with one teacher in CRE, one in History and one in Geography, which was 100% response. From the three (3) County schools, nine questionnaires were administered but eight (8) got back to the researcher which was well above 90% response. Three (3) teachers were in CRE, three (3) in History and two (2) in Geography.

All the District Schools targeted were used in the study and twenty seven (27) teachers from the target ten (10) schools responded to the questionnaires. Ten (10) teachers were of CRE, eight (8)

of History and nine (9) of Geography. A 90% target response was realized in reference to the target population of 30 teachers from the district schools.

This implies that a total of 38 teachers were respondents in this study. With an initial target of 42 teachers, a response of 90.5% is enough to make deductions in the study in reference to the purpose of the study.

4.2.2 Demographic and Personal Information

4.2.2.1 Gender

The study had sixteen (16) male respondents; one (1) from the national school, three (3) from the county schools and twelve (12) from the district schools.

Twenty two (22) female teachers participated in the study with two (2) from the national school, five (5) from the county schools and fifteen (15) from the district schools. A total of thirty eight (38) teachers were used in the study.

As required from section A of the questionnaire, all the respondents indicated their response as summarized in the table and figure 4.2.2.1 below.

Table 4.2.2.1: Gender and Type of Schools

Type of school	Male	female	totals
National	1	2	3
County	3	5	8
District	12	15	27
Total	**16**	**22**	**38**

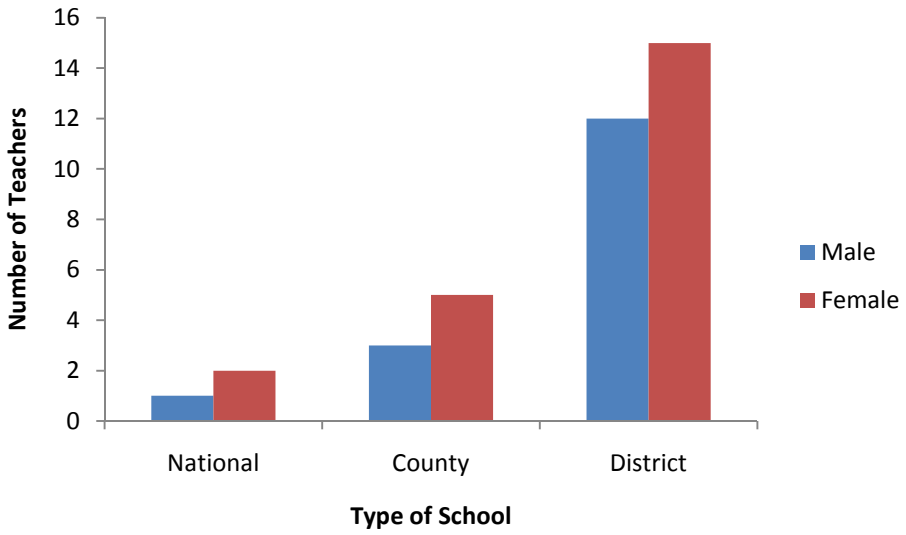

Figure 4.2.2.1 Gender and Type of Schools

4.2.2.2 Professional training

On professional training a total of twenty eight (28) teachers out of the thirty eight (38) indicated that they had a degree while ten (10) had a master's degree. This is 73.7% and 26.3 %respectively. None of the teachers indicated to have a diploma or a PhD.

For the degree level two (2) teachers came from the national school, five (5) from the county schools and twenty one (21) from the district schools .this contributes to 66.7%, 62.5% and 77.8% respectively in reference to the sampled population.

The masters level had one (1) teacher from the national school which is 33.3%, three (3) from the county schools a 37.5% and six (6) from the district schools a 22.2% of the sample. The analysis in reference to gender and type of school is shown in table and figure 4.2.2.2 and 4.2.2.2 respectively.

Table 4.2.2.2: Gender and Level of Professional Training

Level of Profession	M	F	Total
Diploma	0	0	0
Degree	12	16	28
Masters	4	6	10
PhD	0	0	0
Total	**16**	**22**	**38**

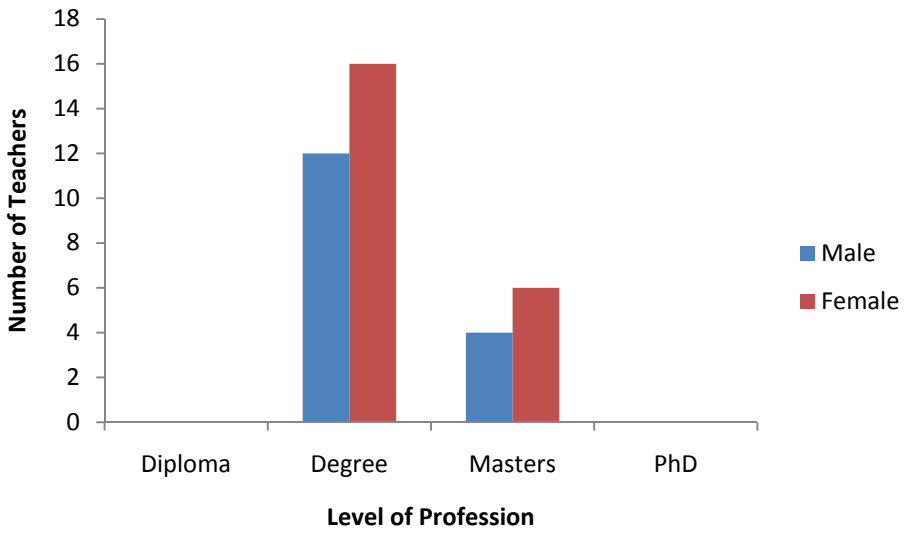

Figure 4.2.2.2: Gender and Level of Professional Training

Table 4.2.2.3: Level of professional training and the type of schools

Type of School	Diploma	Degree	Masters	PhD	Total
National	0	2	1	0	3
County	0	5	3	0	8
District	0	21	6	0	27
Total	**0**	**28**	**10**	**0**	**38**

These statistics reveal that most of the teachers in the secondary schools had degrees a 73.7% and 26.3% had masters degrees.

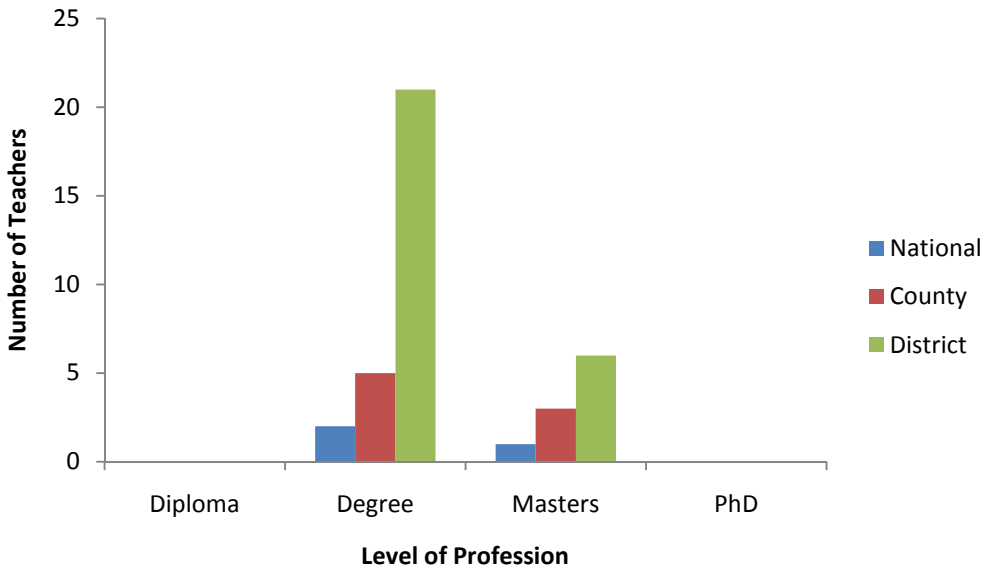

Figure 4.2.2.3: Level of professional training and the type of schools

4.2.2.3 Teaching Load and Type of School

The biggest percentage of teachers 73.7% had a work load of sixteen (16) to twenty five (25) lessons which is an average of three (3) to five (5) lessons per day. This implies that the biggest percentage is not overloaded with school work and therefore we can conclude that the teachers have ample time to prepare tests for their students. The issue of shortage of time is not therefore a factor influencing the competence of teachers in test construction. The data on teachers work load is summarized in table and figure 4.2.2.4 below.

Table 4.2.2.4 Teaching Load and Type of School

Type of School	Total	Less than 15	%	16-25	%	More than 25	%
National	3	0	0%	2	66.7	1	33.3%
County	8	0	0%	6	75%	2	25%
District	27	0	0%	20	74.1%	7	25.9%
Total	**38**	**0**	0%	**28**	**73.7%**	**10**	**26.3%**

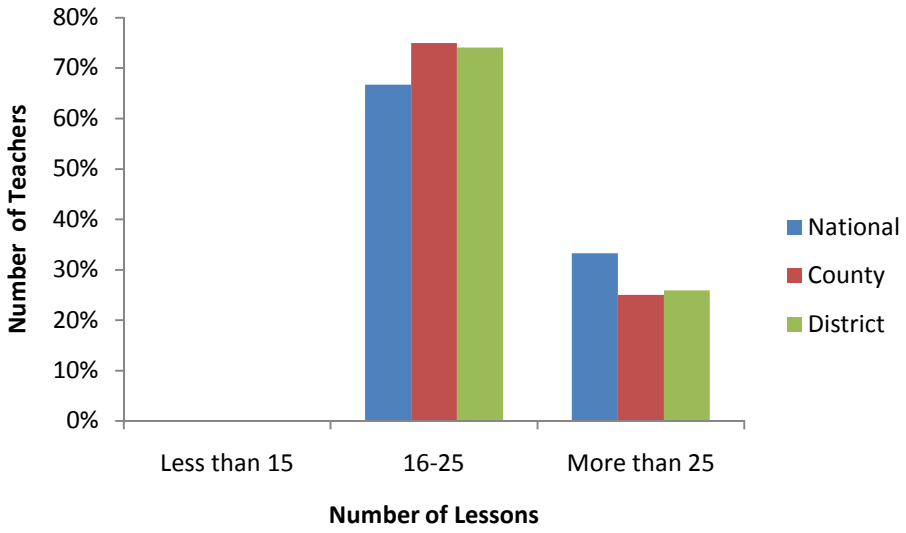

Figure 4.2.2.4: Teaching Load and Type of School

4.3 Teacher Competence on Test Construction

The responses from the questionnaire helped in determining how skilled the teachers were in preparing tests for their students. Each response is analyzed in this section.

4.3.1 Teachers Training on Test Construction

In response to the question: Have you attended any course / training or seminar on test construction?

The responses were as shown in table and Figure 4.3.1

Table 4.3.1: Teachers Training on Test Construction

Response	No of teachers	%
Yes	5	13.2%
No	33	86.8%
Total	**38**	**100%**

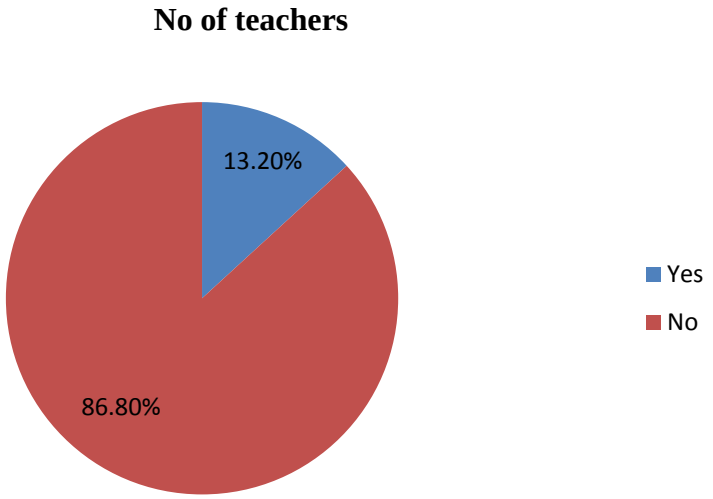

Figure 4.3.1: Teachers Training on Test Construction

Out of the thirty eight (38) teachers involved in the study only 13.2% indicated to have a attended a course ,training or seminar on test construction , with 86.8% admitting to have had no training on the same.

4.3.2 Test Preparation and Frequency

4.3.2.1 Test preparation methods

All the teachers said they prepare tests in their subjects so 100% responded for yes to the question; Do you prepare tests in your teaching subjects?

In response to how end of term examination are prepared in the schools. The following choices were provided in the questionnaire and the teachers were expected to tick their responses.

a) Individual subject teachers prepare examinations for their class_____

b) A group of teachers prepare the examination together_____

c) The heads of departments prepares the examination_____

d) Examinations are usually bought _____

e) Any other (specify_____

The results for the responses (a) to (e) were as shown in table 4.3.2.1 below.-

Table 4.3.2.1: Test preparation methods

	National	**%**	**County**	**%**	**District**	**%**	**TOTAL**	**%**
a)	1	33.3%	3	37.5%	19	70.4%	23	60.5%
b)	1	33.3%	2	25%	4	14.8%	7	18.4%
c)	1	33.3%	2	25%	2	7.4%	5	13.2%
d)	0	0	1	12.5%	2	7.4%	3	7.9%
Totals	**3**	**100%**	**8**	**100%**	**27**	**100%**	**38**	**100%**

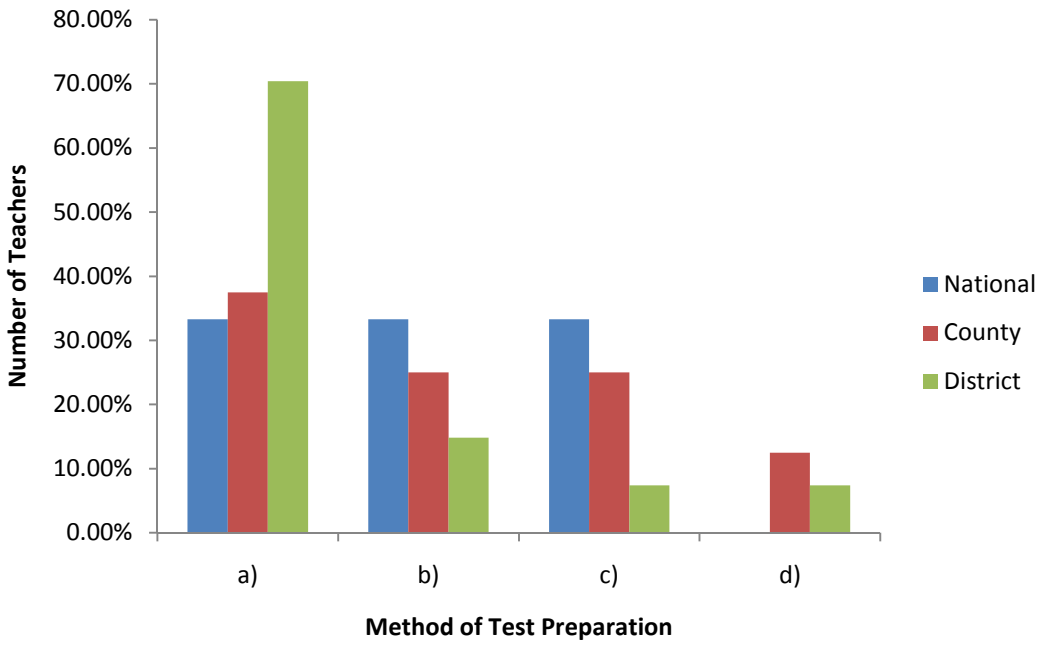

Figure 4.3.2.1: Test Preparation Methods

In response to any other method other than the ones identified in (a) to (d), one teacher specified that preparation of tests in her school was Cyclic, one teacher each time, this is therefore similar to individual subject teachers preparing the examinations. Another teacher said that they lift examinations questions from past papers and revision books and still another teacher said tests are copied from past Kenya National Examinations Councils' examinations papers.

4.3.2.2 Testing frequency

In a question that required the teachers to indicate the number of tests written per term in their schools, the results were as analyzed in table and Figure 4.3.2.2 below.

Table 4.3.2.2: Testing frequency

SCH.	1 test	%	2 tests	%	3 tests	%	MORE THAN 3 tests	%	TOTAL	%
National	0	0	0	0%	0	0%	3	100%	3	100
County	0	0	4	50%	2	25%	2	25%	8	100
District	0	0	10	37.0%	12	44.4%	5	18.6%	27	100
TOTAL	**0**	**0**	**14**	**36.8%**	**14**	**36.8**	**10**	**26.4%**	**38**	**100**

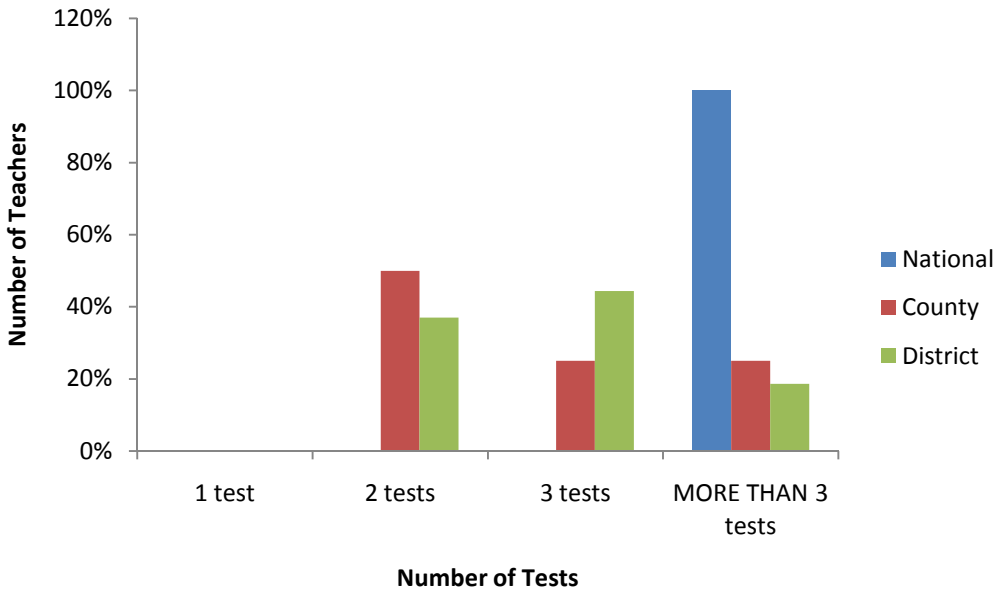

Figure 4.3.2.2: Testing Frequency

Most teachers indicated that their students write more than two tests per term. Testing then requires more attention with the revelation that some schools have more than three (3) tests per term, 26.4% of the sample schools. All these tests are prepared by the teachers. So improvement of teachers test construction skills is key to ensuring tests quality. 73.6 % indicated that they have two (2) to three (3) tests each term; 36.8% for two tests and an equal percentage for three tests per term.

4.3.3 Skills and Competences for Test Construction

In response to the question**;** Do you have the skills and competencies for designing tests in your subject? , The results were as follows in relation to type of school (table 4.3.3).

Table 4.3.3: Skills and Competences for Test Construction

Type of School	**Yes**	**%**	**No**	**%**	**Not sure**	**%**	**Totals**	**%**
National	1	33.3%	0	0%	2	67.7%	3	100%
County	2	25%	0	0%	6	75%	8	100%
District	5	18.5%	0	0%	22	81.5%	27	100%
Total	**8**	**21.1%**	**0**	**0%**	**30**	**78.9%**	**38**	100%

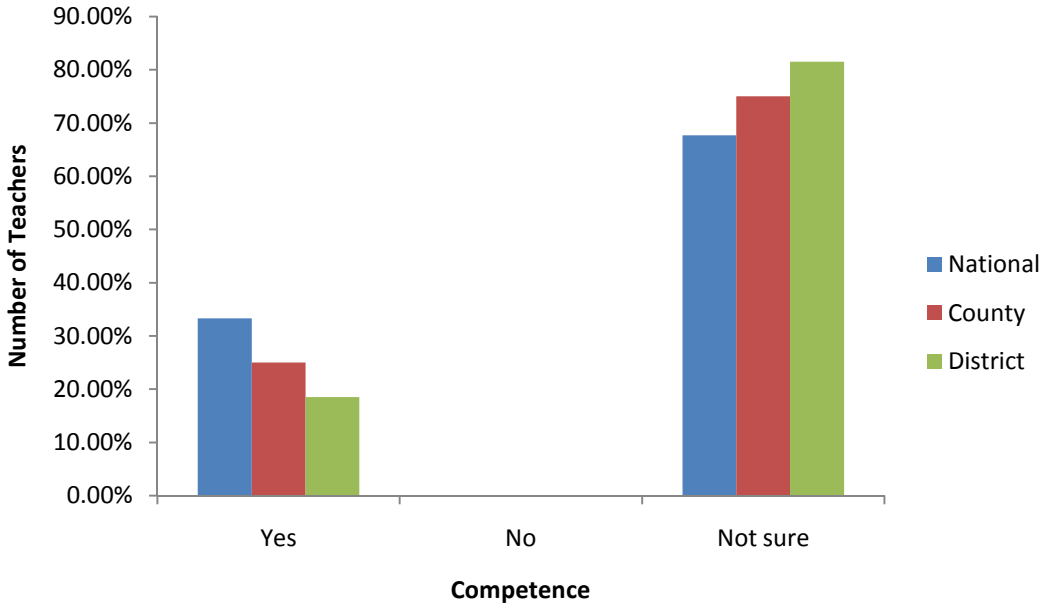

Figure 4.3.3: Skills and Competences for Test Construction

A total of thirty (30) teachers, out of the thirty eight (38), that is 78.9%, were not sure whether they had the skills and competences for designing tests in their subjects. Only eight (8) teachers indicated that they had the skills and competences of test construction.

Although none of the teachers admitted that they had no skills, the data reveals that most teachers feel that they do not have the skills, portrayed by the percentage of those that were not sure about their competence.

4.3.4 Duration of Test Construction

For the question; How long does it take to construct one end of term test? Results were as in table and Figure 4.3.4 below, in relation to type of school:

Table 4.3.4: Duration of Test Construction

	Response	**National**	**%**	**County**	**%**	**District**	**%**	**Total**	**Total %**
a	A few minutes	0	0%	0	0%	2	7.4%	**2**	**5.2%**
b	A few hours	1	33%	3	37.5 %	10	37.0 %	**14**	**36.8%**
c	A day	2	67%	3	37.5 %	13	48.2 %	**18**	**47.4%**
d	A number of days	0	0%	2	25%	2	7.4%	**4**	**10.5%**
e	A week	0	0%	0	0%	0	0%	**0**	**0%**
f	A number of weeks	0	0%	0	0%	0	0%	**0**	**0%**
	Total	**3**	**100%**	**8**	**100 %**	**27**	**100 %**	**38**	**100%**

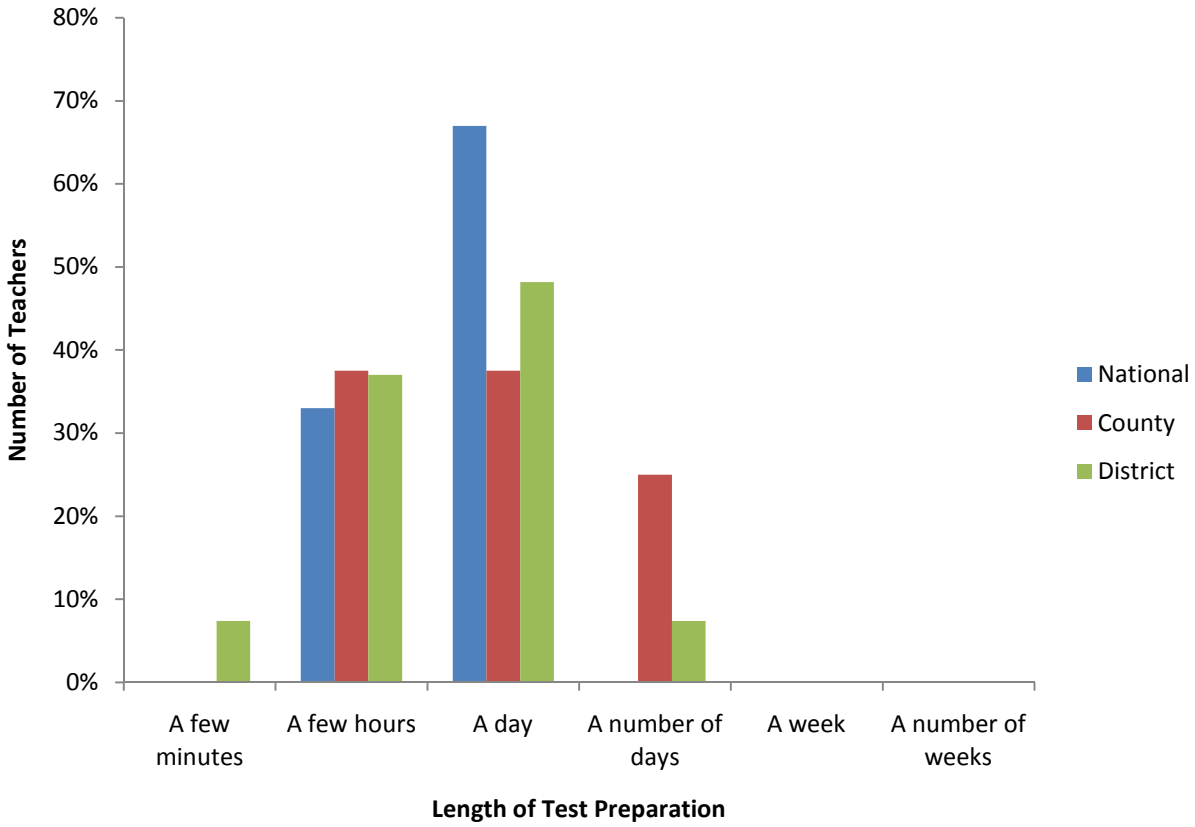

Figure 4.3.4: Duration of Test Construction

The construction of tests, to many teachers is a few hours task, with 36.8% indicating that they prepare their tests in a few hours and 47.4% in a day. None of the teachers indicated to take a week or more and only 10.5% said they take a number of days. This implies that 89.5% of the teachers take a day or less to prepare a test. The national and county schools no teacher indicted to spend a few minutes in constructing a test.

The concern here is that the construction of a quality test requires ample time and competence to ensure that the learning objectives are accurately tested and at all levels of knowledge.

4.4 The Use of the Blooms Taxonomy

The results for the question, Have you ever heard of the Blooms Taxonomy? were as follows (table and figure 4.4.1)

Table 4.4.1: Blooms Taxonomy Awareness

Type of School	Yes	%	No	%	Total	Total %
National	3	100%	0	0%	3	100%
County	6	75%	2	25%	8	100%
District	21	77.8%	6	22.2%	27	100%
Total	**30**	**78.9%**	**8**	**21.1%**	**38**	**100%**

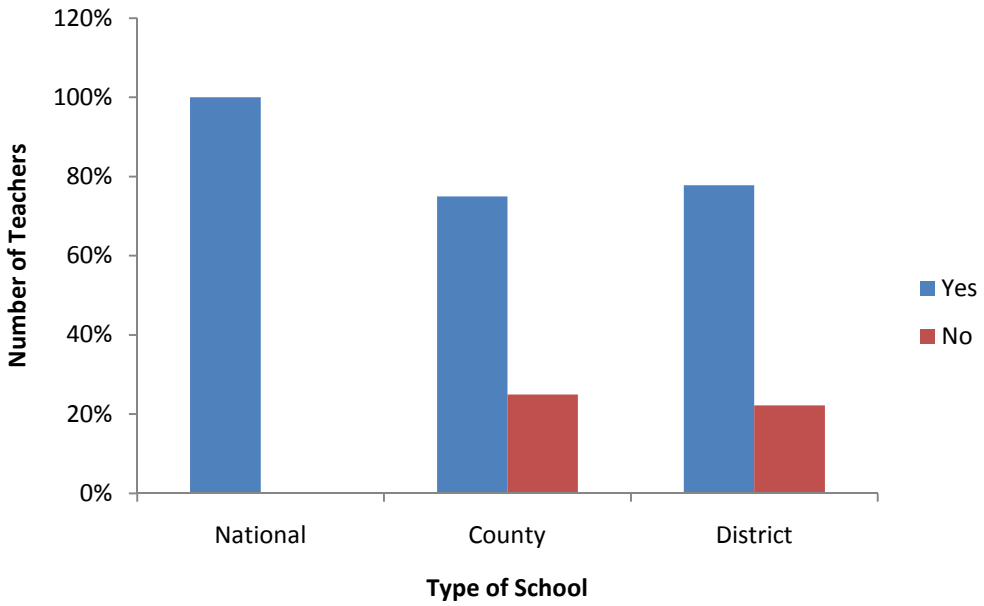

Figure 4.4.1: Blooms Taxonomy Awareness

To most teachers, 78.9%, the term Blooms Taxonomy was not new; they had heard about it, but 21.1% admitted to have not heard about it.

On the question of whether the teachers use the Blooms Taxonomy, the responses were as shown in table and figure 4.4.2 below.

Table 4.4.2: The Use of the Blooms Taxonomy

Type of School.	Yes	%	No	%	Total	Total %
National	1	33.3%	2	66.7%	3	100%
County	1	12.5%	7	87.5%	8	100%
District	2	7.4%	25	92.6%	27	100%
Total	**4**	**10.5%**	**34**	**89.5%**	**38**	**100%**

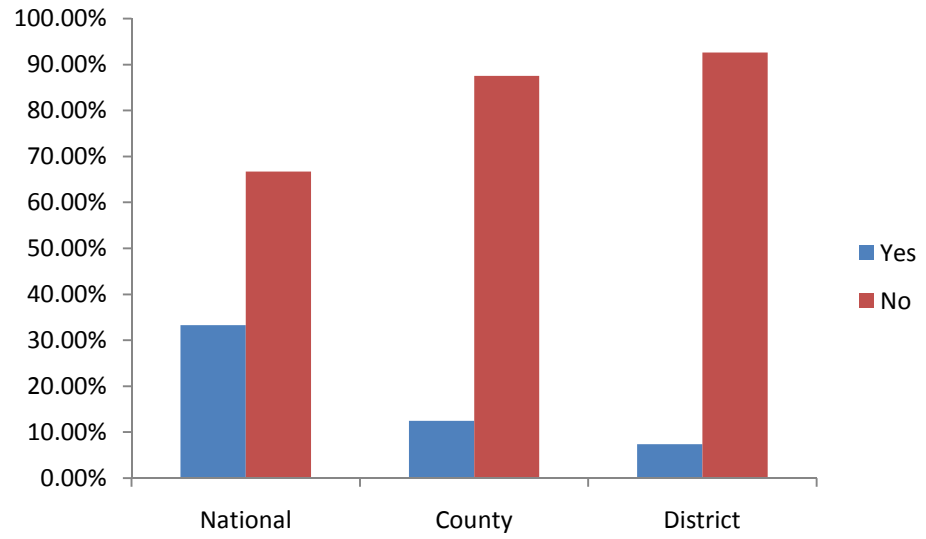

Figure 4.4.2: The Use of the Blooms Taxonomy

This reveals that even if most teachers had heard about the Blooms Taxonomy only 10.5% of the total used it in their testing techniques.

4.5 Blooms Taxonomy Levels of Knowledge

The statements (a) to (f) briefly explain the levels of knowledge of the Blooms Taxonomy; remembering, understanding, applying, analyzing, evaluating and creating. The likert scale of

strongly agree, agree, uncertain, disagree and strongly disagree on the construction of tests was used to establish the levels on which teachers test their students on. The question was as below.

		SA	**A**	**U**	**D**	**SD**
a)	I require students to recall what I have taught them.					
b)	I expect students to interpret information in their own words.					
c)	I require the students to use the knowledge taught to generalize in new situations.					
d)	I require students to break down knowledge taught into parts and show relationships among parts.					
e)	I expect students to make own judgments based on a given criteria or standard.					
f)	I expect student to bring together parts of knowledge and create new relationships for new situations.					

Results of the likert scale for agreement and disagreement to the statements (a) to (f) above were as follows

Where; **SA** is Strongly Agree

A Is Agree

U is Uncertain

D IS Disagree

SD is Strongly Disagree

On the 'type of school' column, in the analysis table below, N stands for National, **C** for County and **D** for District.

The table 4.5.1 below shows the responses on every level per each type of school and their percentages.

Table 4.5.1: Blooms Taxonomy Levels of Knowledge

Statement	**Type of Sch**	**SA**	**%**	**A**	**%**	**U**	**%**	**D**	**%**	**SD**	**%**	**TOT**	**%**
A	N	2	66.7	1	33.3	0	0	0	0	0	0	3	100
	C	2	25	4	50	0	0	2	25	0	0	8	100
	D	10	37.0	14	51.7	3	11.1	0	0	0	0	27	100
B	N	0	0	1	33.3	1	33.3	1	33.3	0	0	3	100
	C	0	0	2	25	2	25	4	50	10	0	8	100
	D	0	0	2	7.4	2	7.4	9	33.3	14	51.9	27	100
C	N	1	33.3	1	33.3	1	33.3	0	0	0	0	3	100
	C	1	12.5	3	37.5	2	25	2	25	0	0	8	100
	D	2	7.4	2	7.4	3	11.2	11	40.7	9	33.3	27	100
D	N	0	0	1	33.3	1	33.3	1	33.3	0	0	3	100
	C	0	0	2	25	1	12.5	4	50	1	12.5	8	100
	D	1	3.7	3	11.1	2	7.4	1.4	51.9	7	25.9	27	100
E	N	0	0	1	33.3	0	0	2	66.9	0	0	3	100
	C	0	0	1	12.5	0	0	4	50	3	37.5	8	100
	D	0	0	2	7.4	3	11.1	17	63	5	18.5	27	100
F	N	0	0	0	0	1	33.3	2	66.7	0	0	3	100
	C	0	0	0	0	0	0	6	75	2	25	8	100
	D	0	0	1	3.7	2	7.4	15	55.6	9	33.3	27	100

From the statistics it is revealed that the biggest percentage of teachers agreed to have been testing at the lower levels of knowledge. There is no difference in how teachers responded to the questions in relation to their types of school.

Table 4.5.2: summary of levels of knowledge

Statement	SA	%	A	%	U	%	D	%	SD	%	TOT	%
A	14	36.8	19	50	3	7.9	2	5.3	0	0	38	100
B	0	0	5	13.2	5	13.2	14	36.8	14	36.8	38	100
C	4	10.5	6	15.8	6	15.8	13	34.2	9	23.7	38	100
D	1	2.6	6	15.8	4	10.5	19	50	8	21.1	38	100
E	0	0	4	10.5	3	7.9	23	60.5	8	21.1	38	100
F	0	0	1	2.6	3	7.9	20	52.6	14	36.8	38	100

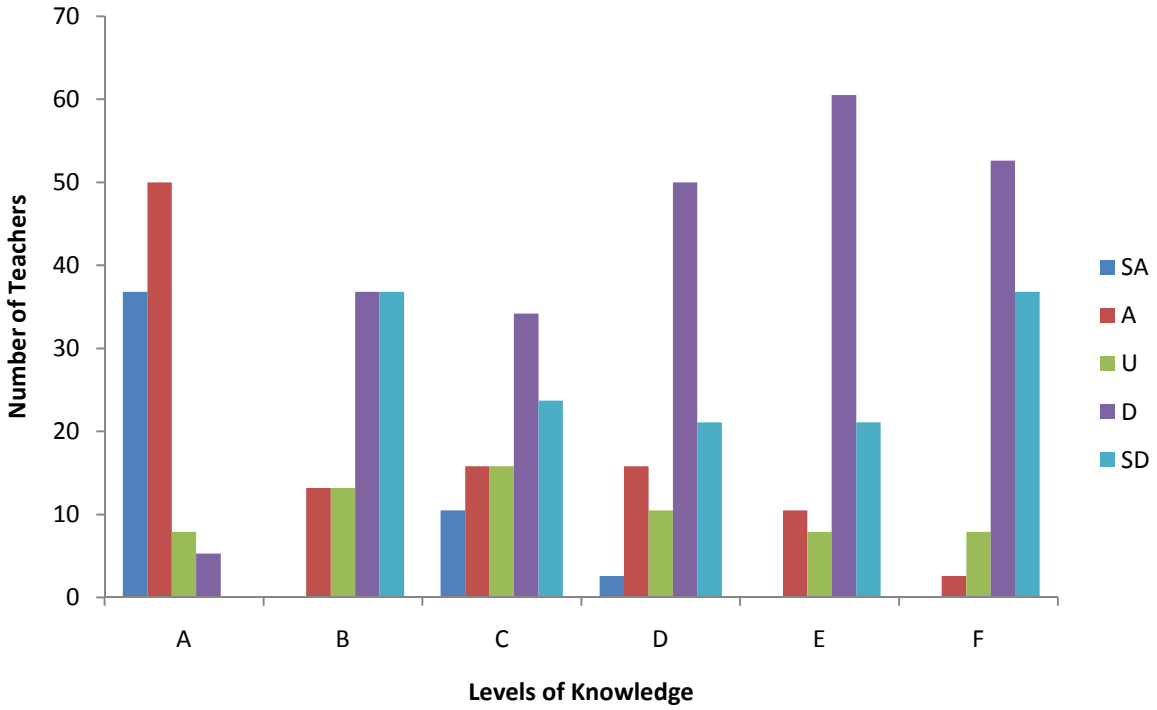

Figure 4.5.2: Summary of Levels of Knowledge

4.6 Verbs Usage in Test Items Construction

The researcher had identified verbs for every level of the Blooms Taxonomy and wanted to find out how often each level is tested.

The question was as follows.

How often do you use the following verbs in your test questions?

		Very often	**Often**	**Rarely**	**Very Rarely**	**Never**
a)	List, define, name, arrange, outline					
b)	Describe, explain, discuss, identify, classify					
c)	Interpret, sketch, illustrate, prepare, demonstrate					
d)	Differentiate, examine, compare, criticize					
e)	Argue, evaluate, predict, defend, appraise					
f)	Compose, prepare, organize, create, design					

A likert scale used for this question got the following results (Table 4.6.1) from the respondents.

On the 'type of school' column, **N** stands for National, **C** for County and **D** for District.

Table 4.6.1: Verbs Usage in Test Items Construction

Verbs	Type of School	Very often	%	Often	%	Rarely	%	Very Rarely	%	Never	%
A	N	2	66.7	1	33.3	0	0	0	0	0	0
	C	6	75	2	25	0	0	0	0	0	0
	D	21	77.8	6	22.2	0	0	0	0	0	0
B	N	1	33.3	2	66.7	0	12.5	0	0	0	0
	C	4	50	3	37.5	1	11.1	0	0	0	0
	D	1.7	63	7	25.9	3	66.7	0	0	0	0
C	N	0	0	1	33.3	2	37.5	0	0	0	0
	C	1	12.5	4	50	3	37	0	0	0	0
	D	2	7.4	9	33.3	10	33.3	6	22.3	0	0
D	N	0	0	2	66.7	1	62.5	0	10	0	0
	C	0	0	2	25	5	44.4	1	12.5	0	0
	D	3	11.1	10	37.0	12	66.7	2	7.5	0	0
E	N	0	0	1	33.3	2	75	0	0	0	0
	C	0	0	1	12.5	6	66.7	1	12.5	0	0
	D	0	0	2	7.4	1.8	66.7	7	25.9	0	0
F	N	0	0	0	0	2	66.7	1	33.3	0	0
	C	0	0	0	0	6	75	2	25	0	0
	D	0	0	0	0	20	74.1	7	25.9	0	0

The data analyzed in Table 4.6.1 above reveals that for National, county and District Schools, the teachers' test items concentrated more on the lower levels of thinking with high percentages on very often and often scales for verbs on the lower levels of cognitive abilities. On the other hand, Rarely and Very rarely scale got higher percentages for higher order cognitive abilities verbs.

4.7 Teacher Made Tests' Analysis

Out of the forty two (42) teachers involved in the study 36 teachers were teaching form three (3) class. From the thirty six, 15 copies of CRE test for the form 3 class were provided for this study.16 Copies of Geography and 12 copies of History. Some teachers doubled as teachers of two subjects in the category of CRE, Geography and History. Some teachers admitted to teach CRE and Geography, History and Geography and CRE and History.

So, some teachers were able to provide more than one copy of a test for the analysis in this study. So a total of forty three copies of tests for the form three class per provided and were analyzed. Tests were for term one, term two and some for term 3 for years 2012 and 2013 only.

There was no term 3 2013 test provided because the researcher went for the data collection in term three, before the tests for the term were administered. The researcher requested the teachers to provide tests for the two years only (2012 and 2013) for the purpose of having a study relevant for the time. The test papers provided were as follows (table 4.7.1)

Table 4.7.1: Test Papers Provided

	Term 1 2012	**Term 2 2012**	**Term 3 2012**	**Term 1 2013**	**Term 2 2013**	**Term 3 2013**	**TOTAL**
Geography	0	1	2	6	7	0	16
History	1	0	1	4	6	0	12
CRE	0	1	3	2	9	0	15
TOTAL	**1**	**2**	**6**	**12**	**22**	**0**	**43**

Action verbs used in the test items in the three subjects were distributed as in the table 4.7.2 below.

Table 4.7.2: Action Verbs Usage

	Number of Action Verb	**Total No. of items**	**%**
CRE	94	226	41.6
GEO	114	330	34.5
HIST.	88	246	35.8
TOTAL	**296**	**802**	**36.9**

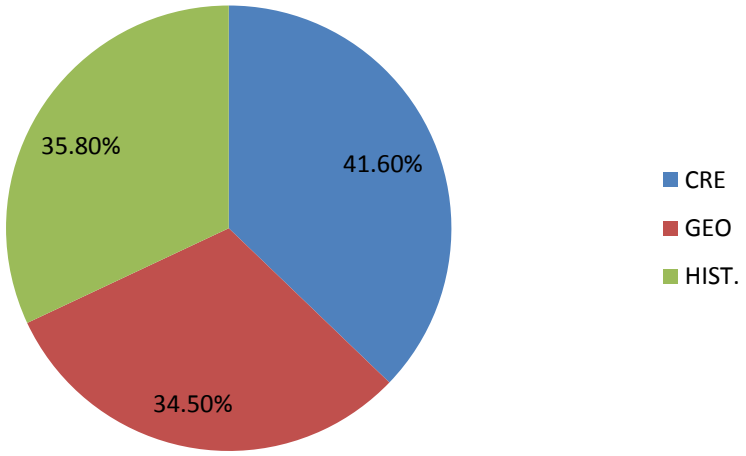

Figure 4.7.2: Action Verbs Usage

The table and figure reveals that most of the items constructed by the teachers do not employ the use of action verbs. None of the subject teachers employed the use of action verbs on even half of the test items constructed. It is only in 296 items that action verbs were used out of the total 802 test items in the three subjects, which is only 36.9%. The syllabus states objectives in action verbs but the framing of the questions does not reflect the achievement of the instructional objectives.

The analysis also revealed that for the National, County and District Schools, the teachers' test items concentrated on the lower levels of thinking. This implies that there is no significant differences in the way tests are constructed in all the types of schools.

This is seen in the analysis shown in the table 4.7.3 below; the action verbs listed are the ones the teachers had used in their test items.

Table 4.7.3: Action Verbs Frequency of Use

Action Verb used	**No. of items**	**%**
Outline	44	14.9
State	48	16.2
Name	34	11.5
Identity	35	11.8
List	37	12.5
Explain	34	11.5
Describe	28	9.4
Distinguish/differentiate/compare	14	4.7
Draw	2	0.7
Calculate	2	0.7
Define	18	6.1
Total	**296**	**100%**

Classifying the action verbs into their levels of cognition as identified by Krathwohl (2002), the following analysis; table 4.7.4 presents the outcome.

Table 4.7.4 Levels of Knowledge Usage

Level of Cognitive thinking	**Verbs**	**Totals**	**%**
Remembering	List, state, name, identify, define	216	73%
Understanding	Describe, distinguish, explain	62	20.9%
Applying	Calculate, draw	4	1.4%
Analyze	Compare, differentiate	14	4.7%
Evaluate	None	0	0
Create	None	0	0
Totals		**296**	**100%**

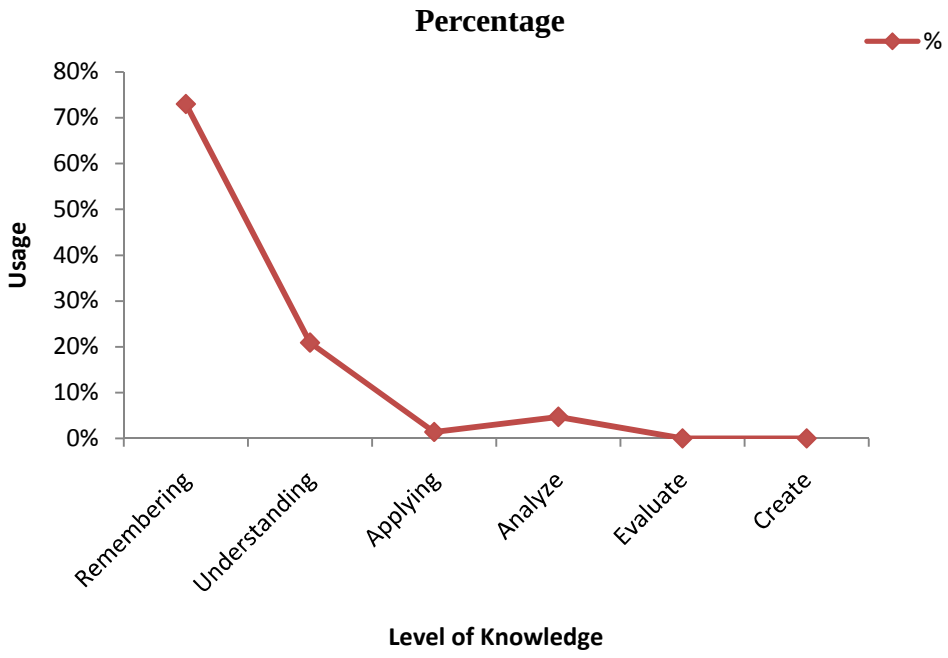

Figure 4.7.4: Levels of Knowledge Usage

This indicates that teachers had most of their test items functioning at the lower level of cognitive objectives going by classification of action verbs used in the tests analyzed. 278 items out of the 296, where action verbs were used, measured the students' ability at the lower level which is 93.9%. 18 items were at the higher level of thinking which only 6.1% is.

This shows that the teachers' use of the Bloom's cognitive level objectives is highly on memory recall than application and creativity.

This means non exposure to creating, problem solving, designing, judging and other higher order skills which may be a problem for professional and career growth which require the students own innovation rather than reproduction of content taught.

CHAPTER FIVE

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter summarizes the findings of the study based on the research questions, makes a conclusion and gives recommendations based on the results. Further research is also suggested going by the findings of this study.

5.2: Findings of the Study

The study sought to answer the following research questions and the findings were as described after each question:-

Research Question 1: How adequate are teachers' test items in reflecting the six cognitive level objectives?

As revealed from this study the teachers' test items are not adequate in reflecting the six cognitive level objectives. Most of the test items functioned at the lower thinking levels at the expense of the higher thinking level. It is evident from the teachers' responses that most of teachers had their test items concentrating on areas where the students just need to recall what their teachers have taught them.

Verbs that were identified to very often be used by the teachers were those that test the lower levels of cognitive abilities, like define, list, name, and outline. For the verbs testing on remembering 66.7% of teachers in the National school indicated to very often use them, this is according to the likert scale responses. 33.3 % indicated that they often use those verbs. From the county schools 75% admitted to using the verbs very often on the remembering level of the Blooms Taxonomy while 25% indicated that they often use them. The situation was similar in the District schools with 33.3% on very often and 66.7% on often scale for the use of the lowest level of the cognitive ability. The second level of ability, understand, with verbs like classify, describe identify explain had also high percentages of use. 33.3% on very often and 67.7% on

often scale for the National school, 50% very often and 37.5% on often in the County schools while 63% very often and 25.9% on often scale for the District schools.

These percentages of use for the first lowest levels of cognitive ability are prove enough that most of the test items prepared by teachers concentrate in the level that require students to recall or recognize ideas, principles and theories in the form they are taught. This is at the expense of testing the higher level thinking which involve creative, innovative and problem solving skills. The percentages of use reduce drastically as we move to the higher levels of cognitive abilities with rarely and very rarely scales of the likert responses getting high percentages for verbs that test the levels of analyze, evaluate and create.

It is the opinion of the researcher that students should get more challenging experiences to enable them explore and discover rather than to just recall and understand facts and ideas.

Research Question 2: To what extent do the teacher's test items measure thinking at lower and higher levels?

The items mostly measure thinking at lower levels. Most of the items required students to simply recall or explain ideas, or concepts based on what has been given by the teachers. The students are rarely exposed to items that require them to create, construct, evaluate and make innovations or judge on their own. 278 items, out of the 296, where action verbs were used, measured the students' ability at the lower level which is 93.9%. 18 items were at the higher level of thinking which is only 6.1%.A similar scenario is observed with the teachers responses as indicated in the 'research question one' explained above.

If a teachers are interested mainly in teaching and assessing the degree to which students have learned some subject matter content and retained it over some period of time, they would focus primarily on the lower levels of cognitive processes, those associated with Remembering and understanding but if they wish to expand their focus by finding ways to foster and assess meaningful learning, they need to emphasize those cognitive processes that go beyond mere recall of facts.

Research Question 3: How adequate do teachers employ the use of action verbs in their test items?

The use of action verbs in the test items is not adequate from the analyses already done. It was revealed that only in 296 items were action verbs used out of the total 802 test items that were analyzed the three subjects, which is only 36.9%. With the syllabus stating objectives in measurable terms using verbs, it would be expected that tests, which are meant to find out whether the objectives are met, should also be in measurable form by use of action verbs. This would help the students to know what objectives are being assessed. Teachers should help student move up the levels of Bloom's Taxonomy in order to ensure that they become critical thinkers by letting them apply, analyze, synthesize and evaluate facts, ideas and theories. This would help them do well in school and beyond.

Research Question 4: Is there any difference in the adequacy of the teachers test items based on their type of school?

There is no difference in the adequacy of teachers test items base on their type of school. This implies that the application of the Blooms cognitive level objectives does not depend on their type of school. All the teachers from the three type of schools; National, County and District portrayed a similar trend of testing. Teachers should therefore broaden the way they assess learning. When the goal of instruction is to promote transfer, assessment tasks should involve cognitive processes that go beyond recognizing and recalling. Items on recalling of facts and content taught should be supplemented with items that utilize the full range of cognitive processes required for transfer of learning, which is high order processes.

5.3 Conclusion

As revealed from this study, test construction is an area that requires more emphasis more so because most teachers are not trained in test construction skills. It is evident therefore that teachers need to be trained in test construction so as to adequately construct test items that would be sufficient in establishing the learning done at all levels of the Blooms Taxonomy.

The teachers' test items are not adequate in reflecting the six cognitive level objectives. The items mostly measure thinking at lower levels. The use of action verbs in the test items is not adequate from the analyses already done. There is no difference in the adequacy of teachers test items base on their type of school. Based on the findings of the study it can be concluded that training can improve the quality of assessment by improving the quality of the teacher made tests.

5.4 Recommendations and Further Research

Based on the findings the following recommendations are made:

(i) Regular training and retraining workshops, seminars and courses should be organized to help the teachers gain competence in construction of tests in order to ensure quality assessment in schools.

(ii) There is need to have assessment experts to monitor the testing being done in schools by the teachers to ensure quality and uniformity in testing.

(iii) Teachers should be encouraged to upgrade themselves with the knowledge in test construction.

(iv) Courses in test construction and educational measurement and evaluation should be improved at the college level to ensure that teachers receive proper training in test construction.

(v) The researcher also proposes further research on the teaching competences of teachers in reference to the Bloom's Taxonomy. This is because it is what teachers expect the students to have learned that they assess with the tests. This implies that the teaching may as well be affected by the type of delivery methods used to get the students learn or understand facts. This would help educators generate more complete range of educational objectives that are likely to result in both retention and transfer other than just retention or mere memory, this is because the instructional and learning activities used determines the achievement of the objectives set.

(vi) This study concentrated on the Cognitive Process dimension, further research can be conducted investigating the employment of the Knowledge dimension in test construction where the full Taxonomy Table would be applied in contrast to one dimension use.

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APPENDICES

APPENDIX A: THE TEACHERS' QUESTIONAIRRE

TEACHERS' QUESTIONNAIRE

I am a Masters Student from the University of Nairobi completing a research study. The purpose of the study is to collect data on teacher competence in test construction. Your responses will be confidential.

Thank you for your cooperation and time.

Please respond to each item in this questionnaire by putting a tick (√) in the box corresponding to your response.

SECTION A: PERSONAL INFORMATION

1. Please indicate your gender

   a) Male ☐ b) Female ☐

2. What is your highest level of professional training?

   a) Diploma ☐

   b) Degree (Bachelor or Postgraduate) ☐

   c) Masters degree ☐

   d) PhD ☐

3. For how long have you been in the teaching profession?

   a) 1-5 Years ☐

   b) 6-10 Years ☐

   c) 11-15 Years ☐

   d) Over 15 Years ☐

4. Which is your teaching subject (s)?

a) CRE ☐

b) History ☐

c) Geography ☐

5. What is your current teaching workload per week?

a) Less than 15 lessons ☐

b) 16-25 Lessons ☐

c) More than 25 Lessons ☐

6. Please indicate your type of school

a) District School ☐

b) County School ☐

c) National School ☐

SECTION B:

Put a tick (√) next to the response that is applicable.

1. Have you attended any course/training/workshop/seminar on test construction during your teaching life?

a) Yes ☐

b) No ☐

2. Do you prepare tests in your teaching subject in your school?

a) Yes ☐

b) No ☐

3. How are end of term examinations prepared in your school?
   f) Individual subject teachers prepare examinations for their class.
   g) A group of teachers prepare the examination together.
   h) The heads of departments prepares the examination
   i) Examinations are usually bought
   j) Any other (specify)……
   ……
4. In your opinion do you have the skills and competencies for designing a test in your subject?
   a) Yes ☐
   b) No ☐

5. How many tests on average do your students write per term?
   a) 1 test ☐
   b) 2 tests ☐
   c) 3 tests ☐
   d) More than 3 tests ☐

6. How long does it take you to construct one test in your subject area for an end of term?
   a) A few minutes ☐
   b) A few hours ☐
   c) A day ☐
   d) A number of days ☐
   e) A week ☐
   f) A number of weeks ☐

SECTION C

1. Have you ever heard of the Bloom's Taxonomy?

   a) Yes ☐

   b) No ☐

   If yes, Do you in anyway use it when constructing tests for your students?

   a) Yes ☐

   b) No ☐

2. Please indicate your level of agreement or disagreement with the following statements concerning the tests you construct for your students,

   where:

   SA is: Strongly Agree

   A is: Agree

   U is: Uncertain

   D is: Disagree

   SD is: Strongly disagree

In most of the test questions I construct:

		SA	**A**	**U**	**D**	**SD**
a)	I require students to recall what I have taught them.					
b)	I expect students to interpret information in their own words.					
c)	I require the students to use the knowledge taught to generalize in new situations.					
d)	I require students to break down knowledge taught into parts and show relationships among parts.					
e)	I expect students to make own judgments based on a given criteria or standard.					
f)	I expect student to bring together parts of knowledge and create new relationships for new situations.					

3. How often do you use the following verbs in your test questions?

		Very often	**Often**	**Rarely**	**Very Rarely**	**Never**
a)	List, define, name, arrange, outline					
b)	Describe, explain, discuss, identify, classify					
c)	Interpret, sketch, illustrate, prepare, demonstrate					
d)	Differentiate, examine, compare, criticize					
e)	Argue, evaluate, predict, defend, appraise					
f)	Compose, prepare, organize, create, design					

SECTION D

Are you teaching a form 3 class currently?

Yes ☐ No ☐

If yes, the researcher requests that you avail a copy of the test you prepared for your form three students for end of term one, two or three in the previous or current year for use in this study.

Please indicate the subject for which you will provide the copy of test for.

CRE ☐

GEOGRAPHY ☐

HISTORY ☐

Please indicate the term for which the test was prepared.

Term one ☐ Term two ☐ Term three ☐

END

We thank you for your contribution to this important research.