ASSESSMENT OF TEACHERS' KNOWLEDGE ON TEST CONSTRUCTION OF SENIOR SECONDARY SCHOOL TEACHERS IN UNGOGO LOCAL GOVERNMENT AREA OF KANO STATE

BY

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DEDICATION

This work is dedicated to my late friend Lt. Mohammed Ahmed Kyari

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ABSTRACT

The purpose of this study is to investigate the knowledge of teachers in test construction in Ungogo local government area of kano state. Descriptive survey design was used for the study. The study assessed the knowledge of teachers on test construction based on gender, level of experience, qualification, and subject of teaching. Five research questions were answered and four hypotheses were raised and tested at .05 level of significance. The population of the study consisted of two hundred and sixty (260) senior secondary school teachers in public schools in the area. The instrument was administered to two hundred and thirty seven (237) teachers with a mortality rate of twenty three (23) teachers. The data collection instrument consisted of thirty (30) items of true/false format. The instrument was validated and has a reliability of internal consistency of 0.67. The data obtained were analyzed using t-test for independent sample with the aid of SPSS. The result of the study indicated that teachers do not differ significantly in their knowledge of test construction based on gender, working experience and subject of teaching but differ in educational qualification. This study recommends training for unqualified teachers employed in the teaching profession, teachers with low teaching qualification should be encouraged to further their studies, seminars and workshop on an interval basis to teachers on test construction and also similar study in other local government of the state and private schools is highly recommended.

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LIST OF ABBREVIATIONS

SAT: Standardized Achievement Tests

TMT: Teacher-Made Tests

TOS: Table of Specifications

OPERATIONAL DEFINITION OF TERMS

Test Construction Knowledge: - This refers to the skills and competencies acquired through education or training needed for constructing qualitative test items based on test construction procedure.

Experienced Teachers: - These are teachers that have been facilitating teaching and learning process for a period of not less than five years in Ungoggo local government.

Inexperienced Teachers: - These are teachers in the teaching profession for less than five years in Ungoggo local government.

Qualified Teachers: - These are teachers with required teaching qualifications.

Unqualified Teachers: - These are teachers without the required teaching qualifications.

Humanities Based Teachers:- These are teachers teaching Social Science subjects like Economics, Civic Education, History, Government, Commerce, etc.

Science based Teachers: - These are Teachers that teach Science Subjects like Mathematics, Physics, Chemistry, Biology, etc.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Tests have significant contribution in educational system. Both standardized tests and teacher made tests have an impact on the teaching-learning process. Teacher made tests are helpful for learners to acquire adequate knowledge and skills. Thus, they are the cornerstone in enabling learners to follow up the teaching-learning process. According to Airasian (2005), it is difficult to envisage a description of teaching that does not accord assessment an essential role. Teachers need to continuously collect, synthesize and interpret information about their students' learning. They need to know the state of knowledge and skills of their students before they can begin to plan instruction. Also, they need evidence as instruction proceeds that students are, or are not learning.

One of the primary purposes of assessment is to improve student's learning. Assessment entails methods or tools used by educators to measure students understanding. According to Allen (2004), assessment involves the use of empirical data on students learning to refine programs and improve learning. It is a process of gathering and discussing information from multiple and diverse sources in order to develop a deep understanding of what students know, understand, and can do with their knowledge as a result of their educational experience (Huba & Freed, 2000). This means that assessment deals with various ways of understanding the achievement of learners. There is the need for classroom teachers to prepare and administer tests so as to obtain certain vital information about what the students

achieve during the teaching and learning process, hence the use of tests as instrument for assessment.

A test is said to be an instrument used in determining the attainment or otherwise of instructional objectives. According to Anastasi and Urbina (2009), a test is an objective and standardized measure of a sample of behavior. From the above, standardization deals with uniformity in the testing procedure where as objectivity means the test scores are free from subjective judgment of the examiners. The Encarta Dictionary (2009), equates tests to examinations consisting of a series of questions, problems or practical tasks to gauge somebody's knowledge, ability or experience.

Testing not only provide both the teachers and students with information on how much have been learnt but also provide room for further learning to take place when learning objectives have been achieved. It is very significant for teachers to improve the quality of their tests so that they will be able to monitor properly the progress of their students. Tests made by teachers in our secondary schools have impact on the lives of the students, for such tests are used in taking decisions that affect their lives, they are also used in preparing the students for standardized achievement tests and hence they should be given adequate consideration. Testing provides feedback on whether learning has taken place in a classroom, it facilitate teaching , detect problems with teaching method and reveal strengths and weaknesses of students, testing therefore provide useful information for decision making about students, teachers and the program.

Achievement tests are designed to measure what an individual already know. It is designed to measure a person's level of skill, accomplishment, or knowledge in a

specific area. Anikweze (2014), provides that an achievement test is an ability test designed to measure what the individual has learned to do as a result of planned instruction. Achievement test could be teacher-made or standardized tests. A Standardized Achievement Test (SAT) is one which is carefully constructed with uniformity in the procedure for scoring, administering and interpretation of the result, these tests are constructed by experts and the test items are pretested before assembling of the tests. Teacher-Made Tests (TMTs) are achievement tests prepared by classroom teachers. Teacher-made tests can be written or oral assessment that are not commercially produced or standardized. Teacher-made tests use a variety of formats, embracing multiple-choice items, matching items; true/false items, fill in the blanks items or essay items specifically constructed by the teacher for his/her classroom. These two types of achievement tests differ in distinctive features, usage, validity and application. TMTs are very important in our educational system in Nigeria, they are largely used as continuous assessment, for placement and end of the term examinations in our secondary schools, hence there is need to improve the validity of such achievement test. Teachers therefore need test construction knowledge in order to be able to develop valid and reliable tests that will yield accurate feedback of students' achievement. In order to improve the suitability of TMTs so that they can measure the qualities they are supposed to measure, teachers need to follow valid rules so as create test items that will measure what it is designed to measure.

Teacher-Made Tests (TMTs) is an integral part of teaching, teachers place much weight on their tests in determining grades and student progress in schools, decisions taking by schools on the basis of test scores obtained from TMTs will be misleading if the test items constructed by teachers are not valid and reliable, poor tests

constructed by teachers means poor preparation of the students for SATs, the quality of TMTs need to be improved so much so that misleading decision will not be taken against the students which will affect the educational development of the student negatively.

Test construction is an important part of assessing student understanding of course content. It is said to be the way in which items in a test are constructed. The National Centre for Assessment in Higher Education (2015) sees test construction as practical and scientific roles that are applied before, during and after each item until it finally becomes a part of the test. The knowledge of test construction entails skills acquired through experience or education on the procedure or processes of constructing valid and reliable test items.

Constructing qualitative test items give teachers confidence that scores reflect students' mastery of essential skills or knowledge, quality test items are not constructed overnight, there is the need for test construction knowledge. The knowledge of test construction enable teachers to construct tests that have content validity with the aid of table of specification. The table of specifications (TOS) helps teachers map out the amount of class time spent on each objective with the cognitive level at which each objective was taught there by helping teachers to identify the type of items they need to include in their test. The TOS sometimes called a test blueprint is a table that helps teachers aligns objective, instruction and assessment. It provides teachers with evidence that the test have content validity and also ensures a match between what is taught and what is tested.

In line with the above, Maruf and Aliyu (2013), sees TOS as a table indicating topics to be covered or that has been covered in a curriculum; also it contained the objectives

to be attained. It is a plan or guide for test preparation because it clearly states the number of questions to be asked on each topic or course unit, type of questions, recall of facts; comprehension, application etc.

Item writing is an important aspect in test construction. Item writing is often not given the attention it deserves by teachers. Research shows that effective item writing is a challenging process, (Halydyna & Rodriguez, 2013). The purpose of item writing is to develop items that measure specific content area, each item that is written must be valid, reliable and clear. As test items are written, it is expected that they measure what they are supposed to measure, this is called validity. It is also hoped that the test items will consistently measure the knowledge of the test takers; this consistency in measurement is considered reliability. More also, items are suppose to be clear and unambiguous.

After items must have been written and reviewed, another important stage in test construction is to assemble the items. Item assembling entails the arrangement of test items, it involves bringing items that measure the same content area together, arranging items of the same test format together, arranging items in order of difficulty level, varying the position of the correct response in random manner etc the above need to be considered at this stage of tests construction.

Carrying out a study on teachers' knowledge of test construction across variables such as gender, level of experience, qualification and subject of teaching is very important as it has been observed that most teachers are not good in constructing test in their various subject areas (Osadebe, 2012).

This study focused on the knowledge of senior secondary school teachers on tests construction in Ungoggo local government area.

1.2 Statement of the Problem

Over the years, there have been outcries on the academic performance of students in major public examinations which include WEAC and NECO. Stakeholders in the education sector have described the performance of secondary school students in their final examination over the last few years as disappointing. The record made available to the News Agency of Nigeria by the Kano State Educational Resources Department indicated that fifty thousand and seventy five (50,075) students wrote the examination in 2012 but only nine thousand nine hundred and forty four (9,944) students which is less than 20% met the minimum university entry requirement of five (5) credits including Mathematics and English.

Test constructed by classroom teachers are supposed to expose and give the students sound preparatory background for standardized public examinations like WAEC, NECO and JAMB. Many teachers dislike preparing and grading exams (Barbara, 2009). Tests made by classroom teachers are difficult and time consuming; teachers are responsible for constructing test items that will measure the knowledge of their students. The knowledge of tests construction is an essential tool required by every teacher if we want to achieve teaching and learning goals. Test items need to be valid in order to measure what they are supposed to measure. Constructing tests is one important area in educational system that should be given rapt attention in order to address the current challenges on mass failure in standardized examinations. Students in our secondary schools do undergo series of tests made by teachers, these tests are supposed to give them sound foundation for public examinations, that is, if teachers have the required knowledge to construct qualitative tests for their students, it will enable the students to be more prepared and exposed to valid items which will improve their performance in public examinations. By this, we are referring to

Bloom's taxonomy of educational objectives, the cognitive domain, what level of students is the teacher assessing and what is he or she intending to measure? Is it the knowledge base of the students that requires just recollection and recall of the taught curriculum content? Or is it their level of comprehension, or application of the learnt content? These are very important factors that should come to play whenever a teacher is intending to assess the level of understanding of his/her students. Therefore, it is on these notes that this study underscores the paramount importance of conducting a study on teacher's knowledge of tests construction, with a view to finding a viable solution to the identified problem in the study.

1.3 Objectives of the Study

The objectives of this study are as follows:

1. To find out what knowledge teachers have in test construction in Ungoggo local government area.
2. To find out if there is any difference in test construction knowledge between male and female senior secondary school teachers in Ungoggo local government area.
3. To find out if there is any difference in test construction knowledge between experienced and inexperienced senior secondary school teachers in Ungoggo local government area.
4. To find out if there is any difference in test construction knowledge between qualified and unqualified senior secondary school teachers in Ungoggo local government area.
5. To find out if there is any difference in test construction knowledge between science and humanities senior secondary school teachers in Ungoggo local government area.

1.4 Research Questions

The following are the research questions for the study:

1. What is the level of teachers' knowledge of test construction in Ungoggo local government area?
2. Is there any difference in the mean score of test construction knowledge between male and female senior secondary school teachers in Ungoggo local government area?
3. Is there any difference in the mean score of test construction knowledge between experienced and inexperienced senior secondary school teachers in Ugoggo local government area?
4. Is there any difference in the mean score of test construction knowledge between qualified and unqualified senior secondary school teachers in Ungoggo local government area?
5. Is there any difference in the mean score of test construction knowledge between science and humanities senior secondary school teachers in Ungoggo local government area?

1.5 Research Hypotheses

The following are research hypotheses which are tested at .05 level of significance:

1. There is no significant difference in test construction knowledge mean score of male and female senior secondary school teachers in Ungoggo local government area.
2. There is no significant difference in test construction knowledge mean score of experienced and inexperienced senior secondary school teachers in Ungoggo local government area.

3. There is no significant difference in test construction knowledge mean score of qualified and unqualified senior secondary school teachers in Ungoggo local government area.
4. There is no significant difference in test construction knowledge mean score of science and humanities senior secondary school teachers in Ungoggo local government area.

1.6 Significance of the Study

The significance of this study can be seen as follows:

The Beneficiaries of the findings of this study include: students, parents and guardians, school management, practicing teachers, state government and researchers.

This work will have a positive impact on the performance of students in their final examinations; this can be achieved if students are exposed to valid items constructed through valid procedures and processes of test construction which will ensure adequate preparation on the part of the students.

Parents and guardians whose concern is the performance of their children and wards in public examinations will have their needs answered, as valid tests made by teachers in schools will have positive impact on the student's performance in standardized tests made by examinations bodies.

This work will also make school management encourage teachers to construct qualitative test items as this will ensure adequate preparation, hence positive performance of students in public examinations. The findings are equally expected to help practicing teachers improve the quality of tests they construct to assess their

students in schools, this can be achieved through the information provided on the procedures for tests construction.

Moreover, the findings from this study will provide valuable information regarding the knowledge of teachers on test construction, this information will enable the state government identify the problems of test construction and the necessary solution to arrest the situation. It also intends to bring to focus the need for measurement and evaluation lecturers to inculcate in their students test construction procedures at different level of their studies in the universities and colleges of education as this is the foundation for an effective assessment of student's academic achievement in schools.

Finally, this work will be beneficial to researchers as the data and information gathered will be added to the pool of knowledge already available in the area of test construction and also provide guide to researchers interested in the conduct of study in related field.

1.7 Scope and Delimitation of the Study

This study includes all senior secondary school teachers in public schools within Ungoggo local government area. The study focused on the knowledge of test construction of senior secondary school teachers, other aspect of test and measurement such as test administration, test scoring and interpretation were delimited from the study. The instrument for data collection did not cover all the stages of tests construction and also this study is not extended to teachers in private schools, primary schools, junior secondary schools, science and technical school teachers in the study area.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 Introduction

This chapter reviewed literature related to the research topic. The chapter reviewed concepts such as tests, type of tests, test construction, taxonomy of educational objectives and table of specification. Classical and Item Response Theory were reviewed under theoretical framework. Empirical studies related to knowledge of test construction were reviewed. Summary and uniqueness of the study were also presented.

2.2 Conceptual Framework

2.2.1 Test

A test is said to be an instrument used in order to find out the value or worth of something. Cohen (2009), defines test as a measuring device or procedure. According to Anastasi and Urbina (2009), a test is an objective and standardized measure of a sample of behavior. Standardization has to do with uniformity of the testing procedure; the objectivity of the test implies that the tests are free from subjective judgment of the examiner. Munn, as cited in Sidhu (2005) defines test as an examination to reveal the relative standing of an individual in a group with respect to intelligence, personality, aptitude or achievement. In a similar opinion, test is defined as a measuring tool used to determine the understanding of course content. It is a tool used for measuring aptitude, intelligence attitude etc (Maruf & Aliyu, 2013).

2.2.2 Types of test

There are different classifications given by different authors regarding the types of test. According to Sidhu (2005), a test can be classified as given below:

1. On the basis of types of questions
    a- Essay or Free answer type
    b- Short answer type
    c- Objective or New type
2. On the basis of method of administration
    a. Individual and Group Tests
    b. Oral and Written Tests
    c. Speed and Power Tests
3. On the basis of Standardization
    a. Teacher-Made Tests.
    b. Standardized Tests.
4. On the basis of Scoring
    a. Ameable to qualitative scoring
    b. Ameable to stencil or punch board scoring
    c. Ameable to machine scoring.
5. On the basis of Traits
    a. Intelligent tests
    b. Test of special abilities
    c. Personality tests

For the purpose of this research, this study is concerned with tests on the basis of standardization.

2.2.3 Standardized Achievement Tests (SAT)

A Standardized Achievement Test (SAT) is one which is carefully constructed with uniformity in the procedure for scoring, administering and interpretation of the result, these tests are constructed by experts and the test items are pretested before assembling of the tests. According to Anikweze (2014), a standardized test is one which the procedure, apparatus and scoring have been fixed so that precisely the same testing procedure can be followed at different time in different places. Similarly, Sidhu (2005), Reported that it is only a trained and competent expert that can carry out technical responsibility of standardization of a test. It deals with the establishment of norms. During the preparation of SAT, the test is administered to a large sample of population so as to determine the validity and reliability of the test. Standardized test is seen as a procedure designed to assess the abilities, knowledge, or skills of individuals under clearly specified and controlled conditions relating to construction, administration and scoring (Shiel, Kellaghan & Moran, 2010).

2.2.4 Teacher-Made Tests (TMT)

Teacher-Made Tests are achievement tests developed, administered and scored by classroom teachers. TMT are very useful in our educational system, they are largely used as continuous assessment and end of the term examinations in our secondary schools. According to Sidhu (2005), TMT are tests prepared by teachers for local use. In a similar view, Anikweze (2014), posits that TMT are those achievement tests prepared by classroom teachers. It is very much clear from the above that TMT as the name implies are tests made by teachers in order to assess instructional objectives in their classrooms.

This study focused on objectives and essay type of tests made by classroom teachers.

Objectives tests

According to Maruf and Aliyu (2013), objectives test is a modern type of test which requires fixed response. It name is derived from the fact that scoring of the test is free from the bias of the examiner. They further classified objective test into four types.

1. Short answer type
2. True or false
3. Matching or pairing type
4. Multiple choice

1. **Short answer types** – This is the type of objective tests that require the supply of a word or phrase in response to a given question. According to Christopher and Stephen (2011), short answer question is the one in which the learner complete a sentence by supplying a key word or phrase. In a similar view, Maruf and Aliyu (2013), indicated that this type of test usually requires the supply of a word or short phrase, and the test items are either in form of direct question, incomplete statement or instruction.
2. **True or false** – This type of test seek to find the ability of the test taker to identify if a statement is correct or incorrect. According to Anikweze (2014), it is a variant of objective test consisting of true/false or yes/no items. In a similar view, Christopher and Stephen (2011), sees true/false as a statement called a proposition, where the test takers judge whether the proposition is true or false.

3. **Matching type** – in matching test type, items are presented to the test takers in two columns and are asked to match item from the first column to the corresponding item in the second column. The matching format is an effective way to test students' recognition of the relationship between words and definition, events and dates, (Barbara, 2009). In a similar view, Christopher and Stephen (2011), sees matching items question as one which requires the test taker to match an item in one column with an item from a second column.
4. **Multiple choice test** – This is the most commonly used type of objective tests, it consists of a stem (question), correct response and distracters, the test takers are asked to select only the correct response from the list provided. According to Christopher and Stephen (2011), multiple choice items consist of stem, which contain the problem and a list of suggested responses among which the examinee is to select the correct response. Maruf and Aliyu (2013), opines that, it is the most popular and reliable type of objective test, it is a test in which a number of alternative, response, choice are given from which the correct answer is to be selected.

Essay Tests

According to Anikweze (2014), an essay test measures the non- structured types of learning such as creative writing, critical thinking, problem solving, imagination and organizational ability. Maruf and Aliyu (2013), reported that it is called free response test, it is the most popular form of test and is often classified into two.

a. **Restricted Response (Short Essay)**
b. **Extended Response (Long Essay)**

a. **Restricted Response** –According to Christopher and Stephen (2011), this is a type of essay question where the response of the examinee is restricted according to length. Students are restricted or limited in the nature or amount of information they are to provide.

   Example: Discuss two types of measurement scales

   In the above example, the students are required to discuss only two types or level of measurement scales, even though they might know more than two (Maruf & Aliyu,2013).

b. **Extended Response** - This is the most effective in testing students attainment of objectives in the highest levels of cognitive domain and it call for ability to select relevant information, evaluate and synthesize the information and present in a lucid way. In this type of essay tests, students are not restricted in the amount of information they have, they are given complete freedom to organize their answer and present in a convincing manner (Maruf & Aliyu, 2013). In a similar view, Christopher and Stephen (2011), see extended response as the one in which the examinee has virtually no restrictions regarding the supply of response.

2.2.5 Test Construction Procedure

There is no shortcut for constructing tests that are valid and reliable. The process of test construction requires the knowledge on test construction.

A test has to be prepared through many stages. The first thing to know is: why the test is being given or what we are trying to measure (Sidhu, 2005). In the same direction, Anastasis and Urbina (2009), provided that the development of a valid test requires multiple procedures, which are employed sequentially at different stages of test construction. Similar to the above, the *Encyclopedia of Educational Psychology*

(2008), indicated that a systematic process needs to be applied in the development of a test. Cohen (2009), provided that test items need to be piloted in the construction of a test so as to evaluate whether they should be included in the final form of the instrument.

According Notar, Wilson and Yunker (2004), test construction entails the cultivation of a test, generally with a concise or obvious goal to meet the typical standard of validity, dependability, norms and other aspect of test standardization. They further started that writing items requires a decision about the nature of item or question to which we asked student to respond, that is, whether discreet or integrative, how we will score the item, for example, objectively or subjectively, the skill we purport to tests, and so on, we also consider the characteristics of the test takers. When constructing a test, teachers need to be concerned that the test measures an adequate sampling of the class content at the cognitive level that the material was taught.

Test construction is time consuming; teachers need to have patience in constructing a good test. It is very much obvious that invalid and unreliable test have negative consequence on the learners; hence there is need for teachers to construct valid and reliable tests. Valid items are the building blocks of valid test. Whether a test is good or bad measuring instrument depend on the items that make up the test. It is important to go through a number of stages in order to ensure quality of a test even though there is no total agreement of experts about the precise steps for test construction.

Constructing qualitative tests involves adequate preparation and plan, test items cannot be created haphazardly and we expect them to measure what they are supposed to measure, much work needs to be carried out to produce quality test items. Devine and Yaghlian (2013), provides steps for test construction, these steps are

i. **Planning stage**

ii. **Item writing (preparing the test)**

iii. **Analyzing and reviewing the tests(item analysis)**

i. **Planning stage:** This stage is concerned with identifying the learning outcome to be measured, preparing the table of specification and choosing the appropriate type(s) of test items for evaluation of learning outcomes.

ii. **Item writing:** This stage includes writing items according to the rules of construction for the type(s) chosen. Selection of items to be included based on TOS, reviewing and editing items according to guidelines, prepare direction for the test and decide on scoring method.

iii. **Analyzing and Reviewing the test (item analysis):** This involves performing test analysis to assess the essential qualities of the items, retain, edit or discard items on the basis of analysis outcome.

It is very much obvious that analyzing test items have positive effect on the validity and reliability of tests. Teacher need to analyze their test items so as to produce valid and reliable TMT for their students. According to Maruf and Aliyu (2013), item analysis of test is concerned with evaluation of response to each test item so as to ensure that each test item is valid. In the same direction, Anikweze (2014), provided that the assessment of the essential qualities of the test items is known as item analysis. He further provides that the quality of a test could be improved through item analysis.

Anastasi and Urbina (2014), and also in Sidhu (2005), reported that items can be analyzed both qualitatively and quantitatively. Qualitative analysis is done in terms of their content and form, including the consideration of content validity. Qualitative analysis is done in terms of their statistical properties.

2.2.6 Taxonomy of Educational Objectives

Taxonomy of educational objectives entails the classification of objectives as given by educational authorities such as Benjamin Bloom, Thomas .J. Hasting, George .F. Madaus etc (Anikweze, 2014). Benjamin Bloom chaired the committee of education that devised the taxonomy. One of the most widely used ways of organizing level of expertise is according to Bloom's taxonomy of educational objectives.

Bloom's taxonomy is a convenient way to describe the degree to which we want our students to understand and use concepts, to demonstrate particular skills and to have their values, attitudes and interest affected. There are three hierarchical models used to classify educational learning objectives namely; cognitive, affective and psychomotor domain.

I. **Cognitive Domain –** The cognitive domain involves knowledge and development of intellectual skills (Bloom, 1956). This includes the recall or recognition of specific facts and concept that serve in the development of intellectual abilities and skills. There are six major categories under this domain starting from the simplest to the most complex. This six categories are: knowledge, comprehension, application, analysis, synthesis and evaluation. This is the domain that most teaching and learning put more emphasis on and it is equally the domain mostly examined by the teachers.

    - Knowledge – Test exercise that seek to measure knowledge as specified objectives uses items that demand recall of concepts, recognition of facts, ideas and identification of principles, theories and generalization.
    - Comprehension – Comprehension demand learner's ability to understand, interprets, translate, grasp.

- Application – Test items demanding application level of behavioral objectives expect learners to carry over acquired knowledge and understanding out of school situation and use the ideas to solve practical problems.
- Analysis – Analyzing involves examining and breaking information into compound parts, determining how the parts relate to one another.
- Synthesis – This involves building a structure from diverse element; it also means the act of putting part together to form a whole.
- Evaluation – This class of cognition domain expect learners to assess, to appraise, to judge and to evaluate.

II. **Affective Domain –** The affective domain describes the way people react emotionally, it is concerned with the growth in attitude, emotion and feelings. The affective domain is the category of learning that deals with feeling, attitudes, appreciations and values. (Anikweze, 2014). The affective domain has been classified into five hierarchical levels from the simple to the complex just like the classification of the cognitive domain. According to Krathwohl etal (1964) as cited in (Anikweze, 2014), the levels of affective domain are: receiving, responding, valuing, organization and characterization.

- Receiving – Without this level, no learning can take place. It is the description of learner's willingness to learn. It is said to be about the student paying attention and listening to the lesson.
- Responding – At this level, the student actively participates in the learning process i.e. not only attending but also reacting to the stimulus.

- Valuing – The students' affective value to a phenomenon or piece of information. The learner's associate some values to the knowledge they acquired.
- Organizing – This is the level at which the value system of the learner becomes internalized; that is the students can put together different values, information and ideas and accommodate them within his/her own schema.
- Characterization – This is a stage in affective development at which learner becomes habitual in certain behavior that symbolize his/her way of life.

III. **Psycho – motor Domain –** This domain deals with the ability of the learner to physically manipulate tools or instrument (Anikweze, 2014). This domain deals with perceptual and sensory – motor learning, as well as mechanical and manipulative skill that abound in technical and vocational education. They include those specific objectives which are concerned with physical functions, reflex actions and interpretive movements. This domain has the following taxonomies (Harrow, 1972):

- Reflex movements – This movement are involuntary, being either present at birth or emerging through maturation.
- Fundamental movements – Objectives in this area refers to skills or movement related to walking, running, jumping, pushing, pulling and manipulating. They are often components for more complex actions.
- Perceptual abilities – Objectives in this area should address skills related to kinesthetic (bodily movements), visual, auditory or

coordination abilities or they are related to the ability to take in information from the environment and react.

- Physical abilities – Objectives in this area should be related to endurance, flexibility, agility or strength.
- Skilled movements – Objectives in this area refers to skills and movement that must be learned for games, sports, dances, performances or for the arts.
- Non-discursive communication – Objectives in this area refers to expressive movements through posture, gesture, facial expressions. These movements refer to interpretative movement that communicates meaning without the aid of verbal commands.

2.2.7 Table of Specification (TOS)

TOS is very vital as far as test construction is concerned, it help the teacher to marry what has been taught in the class and what is to be tested. TOS helps in improving the validity of TMT. It helps teachers in achieving content validity, i.e. it provides the teacher with evidence that the test adequately covers what should be covered.

TOS is a plan prepared by a classroom teacher as a basis for test construction, especially a periodic test (Alvarez, 2014). In a similar view, Maruf and Aliyu (2013), opine that TOS is a table indicating topics to be covered or that has been covered in a curriculum, also it contained the objectives to be attained. According to Anikweze (2014), TOS shows the distribution of test items by process, objectives and by content area. He further provided that teachers should endeavour to plan tests using well designed blue print.

Akem (2006), views the TOS as a guide to assist a teacher or examiners in the evaluation system. In a similar opinion, Gregory (2006) sees TOS as an activity which enumerates the information and cognitive tasks on which examiners are to be assessed.

2.3 Theoretical Framework

Test theory is essentially the collection of mathematical concepts that formalize and clarify certain questions about constructing and using tests, and provide method of answering them (McDonald,1999). According to Hambleton and Swaminathan (1991), there are two popular statistical frameworks for addressing measurement problems such as test development, test score equating and identification of biased test item: Classical Test Theory (CTT) and Item Response Theory (IRT). The ultimate aim of CTT and IRT is to test people. Hence, their primary interest is focused on establishing the position of the individual along some latent dimension.

2.3.1 Classical Tests Theory (CTT)

CTT is a body of related psychometric theory that predicts the outcome of psychological testing such as difficulty of items or the ability of test takers. This theory of testing is based on the idea that a person's observed score on a test is the sum of a true score and an error score. The CTT is a theory about test score that introduces three concepts: test score (often called observed score) True score and Error score. Within theoretical framework, models of various forms have been formulated. For example, in what is often referred to as "Classical Tests Model". A simple linear model is postulated linking observable tests score (X) to the sum of two unobservable variables, true score (T) and error score (E), that is as shown below.

$$X = T + E.$$

For each examinee there are two unknown in the equation, the equation is not solvable unless some simplifying assumptions are made. The assumptions in the classical tests model are that:

a. The error and the true score of these tests have a correlation of zero. Hence the variance of the observed score is expected to be equal to the sum of the variance of the true and error scores (Lord, 1980).
b. The error term have an expected mean of zero. That is the random errors over many repeated measurements are expected to cancel out in the long run, leaving the expected mean of measurement errors to be equal to zero. If the error is zero, it means that the observed score is equal to the true score (X = T).
c. The errors from parallel measurements are uncorrelated. Lord (1980), went further to posit in the definition of parallel measurement in CTT, two measures X and X^1 are considered parallel if the expected values of the two observed scores X and X^1 have the same true score $T = T^1$ and equal to observed variance $\sigma^2(x) = \sigma^2(x^1)$. This error variance for the two parallel scores is usually equal for every population of examinees.

According to Mcalpine (2002), CTT concentrates on two main statistics: Item facility and item discrimination.

Item facility

Item facility is calculated by dividing the mean mark by the maximum mark. It is usually a measure of difficulty, item with high facility indicating an easy item and a low facility indicating a difficult item.

Item discrimination

Item Discrimination is given by the correlation of the item with another indicator of performance, usually the total mark on the test. It is a measure of how the candidate performs on this question as opposed to another measure of performance.

This work reviewed CTT as against IRT because the work is concerned with TMTs which are not that complex in processes and procedures of construction compared to SATs.

Limitations of CTT

Among the limitations of CTT as provided by Hambleton, Swaminathan and Rogers (1991). Include,

a. CTT is test-oriented rather than item oriented, that is the classical true score model provides no consideration of how examinees respond to a given item.
b. It is sample based, in the sense that it is very difficult to compare examinee who takes different tests and very difficult to compare items whose characteristics are obtain using different groups of examinees.
c. The definition of reliability in CTT is established through the concept of parallel tests. The concept of parallel tests is difficult to achieve in practice because individuals are never exactly the same on second administration owing to factors such as forgetfulness, development of new skills or change in motivational or anxiety levels.

d. The last limitation of CTT involve the assumption that standard error of measurement is the same for all subjects and does not take into account variability in error at different trait levels.

2.3.2 Item Response Theory (IRT)

The most important feature leading to the dominance of IRT in operational programs is the characteristics of estimating individual item locations (difficulty) and test – takers locations (abilities) separately, but on the same scale, a feature not possible with classical measurement models. According to Carson and Davier (2013), IRT in their many forms, are undoubtedly the most widely used models in large scale operational assessment programs. They have grown from negligible usage prior to the 1980s to almost universal usage in large-scale assessment programs. IRT and Rash modeling are both latent trait models. A latent trait model says that there is a relationship between the observable test performance of a candidate and the unobservable traits or abilities which underlie that performance (Hambleton & cook, 1977). A key notion of the latent trait theory is that of the item characteristic curves (ICCs), which maps the probability of success on an item to the ability measured by the test. It is a non-linear regression function of item scores on the latent trait which is measured by the test (Hambleton and cook, 1977). IRT provides an alternative to CTT as a basis for examining the relationship between item response and the ability of an examinee being measured by the test or the scale (Hambleton and swaminathan,1985).

Assumptions of IRT

Warm (1978), identify four major assumption of IRT:

a. The assumption of any test theory which states that if the examiner knows the correct answer to the item, he/she will go ahead to answer it correctly.

b. Item Local Independence – This means that the probability of an examiner getting an item correct is unaffected by the answer given to another item in the test. Local independence does not mean that item do not correlate with each other, but that performance on different items is independent but conditional on the student's ability. This means that the probability that a student will answer correctly any two items must be the product of the probability that the student will answer correctly each separate item. According to Vermunt and Magidson (1996), the axiom of local independence states that the observed items are independent of each other given an individual's score on the latent trait. Similarly, Yen (1993) argue that when items are statistically independent, each exhibits its quality and takes examinees' good display of ability in unfolding the characteristics function about them.

c. Unidimensionality – this means that the item measure one and only one area of knowledge or ability. The unidimensionality concept therefore requires that all the items on a test or ability scale must measure a single latent trait of an individual and violation of this assumption will lead to serious misleading result (Hulin, Drasgow & Parson,1983).

d. Item Response Function (IRF) – This is also called item characteristics curve (ICC) which it is a mathematical function that relates the probability of success on an item to the ability measured by the item set or test

containing the item. ICC is a non-linear regression function of item scores on the latent trait measured by the test. An ICC represents the probability of a correct answer of to an item expressed as a function of ability. According to Baker (2001) the ICC is the basic building block of IRT, all other construct of the theory depends on this curve. There are two typical properties of an ICC that are use to describe it.

I. The difficulty of the item- The difficulty of an item in IRT describes where the item functions along the ability scale.

The discrimination of the item- This describe how well an item can differentiate between examinees having abilities below the item locations and those having abilities above the item location. The steeper the curve the better the item can discriminate and the flatter the curve the less the item is able to discriminate.

2.4 Review of Empirical Studies

Many studies have been conducted in the field of test construction among teachers, for instance, Agu, Onyekuba and Anyichie (2013), conducted a study in Anambra on teachers' competence in constructing classroom based tests in Nigerian secondary schools, they developed and validated a test construction skill inventory (TCSI) for assessing the secondary school teachers' competencies in constructing classroom – based tests. 543 secondary school teachers in Onitsha education zone were used for the study. Factor analysis was done on the 30 – items instrument developed by the researchers. 25 items were found to be factorially valid. The TCSI was also found to be reliable with a coefficient of 0.73 and the secondary school teacher found almost all the 25 items important skill for quality classroom – based test construction. On the

basis of the findings, it shows that there is no significant difference in the mean ratings of male and female teachers, experienced and inexperienced teachers regarding their competences in constructing classroom base tests, it also implies that the state education commission can use the instruments developed by the researchers to assess the extent to which teachers possess the skills to developed valid and reliable tests and also such instrument can be use in recruiting and evaluating staff for test development unit in the commission.

Also Rufa'i (2005), conducted a study on test construction skills among teachers in senior secondary schools in Kano Municipal, ten senior secondary schools were sampled out of the fifty three secondary schools in the area, tests was used by the researcher as instrument for data collection, the findings showed that there is significant difference in the possession of skills required for test construction between experienced and inexperienced teachers, and between qualified and unqualified teachers. In addition, the finding showed that there is no significance difference in the possession of skills required for test construction between male and female teachers, also the study recommend improvement in test construction skills such that students will be properly evaluated.

In a similar study by Camble and Abubakar (2014), on teachers' characteristics and knowledge of test construction in day secondary schools in Maiduguri. The study investigated the relationship between school type, professionalism, experience, gender and qualification in relation to competence in test construction. The study involved ninety two (92) Teachers from three (3) public secondary schools and ninety eight (98) teachers from three (3) private secondary schools in the metropolis. The instrument used for data collection was adopted from Agu, Onyekuba and Anyichie (2013). The study revealed that a significant relationship between professionalism,

gender and qualification in relation to competence in test construction and revealed no significance relationship between teachers' school type, years of teaching and their knowledge of test construction. The study recommended further studies for teachers with Diploma and NCE so as to enhance their competence on test construction.

In a study conducted by Hamafyelto, Abubakar and Hamafyelto (2015), on Assessing Teachers Competence in test construction and content validity of teacher made examination Questions in Commerce. The population of the study consisted of seventy five (75) teachers of commerce in senior secondary schools in Borno State. The instrument for data collection consisted of forty two(42) items which was administered to the sampled teachers. It was found that teachers concentrated on the lower levels of the cognitive domain. The study recommended workshop and seminars to improve teachers' competence in test construction.

Similarly, Adodo (2014) conducted a study on Evaluation of secondary school teachers' competency in evaluating students' cognitive and psychomotor achievement in Basic Science and Technology. The variables used for the study are gender, experience and qualification. The study used descriptive survey design. The population of the study consisted of all secondary school teachers in Ondo State. The instrument for data collection was constructed by the researcher and consisted of twenty five (25) items. The result of the study indicated that teachers' qualification and their years of experience have no impact on their level of competencies in evaluating BST students. This study recommended seminars and workshops for capacity building of teachers on test construction.

In a similar study by Adeola and Fajonyimi (1991), on what teachers should know about validity of classroom tests, a sample of 89 teachers (46 male and 43female) were randomly selected from a population of 165 teachers from the faculty

of education in the university of Nigeria (Nnsuka). Teacher Validity Knowledge Questionnaire (TVK-Q) was developed by the researcher and validated for data collection, the instrument consist of 41 items, the data was analyzed using percentage, mean, standard deviation, t-tests and ANOVA. The result of the analysis shows that the teachers have some knowledge of content-related evidence, it was also found that there were no significant difference in teachers knowledge of aspect of validity due to gender, academic discipline, years of experience and rank.

In a study conducted by Lasisi and Oni (2016), on learning assessment competence among secondary school teachers within Ibadan metropolis, the population of the study comprises of all teachers in the thirty three (33) secondary schools within the metropolis. A sample of three hundred and thirty (330) teachers was randomly selected from the population. The instrument for data collection was constructed by the researchers with a reliability of 0.82. Statistical analysis was done using simple percentage and t-test. The findings show that there is no significant difference in learning assessment competence of teachers based on their year of experience and level of qualification.

Also, Kinyau and Okunya (2014), carried out a study on the factors influencing the validity and reliability of teacher – made tests in Kenya. The research design employed for the study is descriptive survey design, the data collection instruments used by the researchers were questionnaire and interview, data collected through questionnaire were analyzed using frequency distribution while from the interview they were qualitatively analyzed. The study involved forty two (42) teachers and fifteen (15) key informants selected from teachers holding various positions of academic responsibilities in their schools. The findings of the study reveal that the experience of teachers, training on test construction and analysis, level of education,

use of Bloom's taxonomy, moderation of tests and length of test have an effect on validity and reliability of the tests. In addition, experienced teachers who have prior training in testing and applied a number of these factors in their test construction tend to design tests with higher validity and reliability than their counterparts without such training. It was concluded that TMT are generally valid and reliable.

In another study by Adamu, Dawha and Kamar (2014), on the scheme for assessing technical teachers' competence on constructing assessment instrument in technical colleges in Gombe state. The population of the study consists of ninety six (96) teachers. The instrument for data collection was constructed and validated by the researchers. t-test and one-way ANOVA were used to analyze the data collected from the respondents.

In a similar study by Christiana and Sayita (2016), on what teachers know about validity of classroom tests, the study employed survey research design, the population of the study consist of 165 teachers in the faculty of education from university of jos, a sample of 89 teachers (46 male; 43 female) were drawn using random sampling techniques. The instrument for data collection consist of 41 items which were developed and validated by the researchers. The data collected were analyzed using descriptive statistics, t-test and ANOVA.

Similarly, Kudzai, Moses and Emily (2011), conducted a study to determine the quality, effectiveness and sustainable use of teacher – made tests among rural secondary school pupils in Zimbabwe, the researchers employed descriptive survey design for the study, questionnaire, interview, observation and document analysis were used as data collection instruments, the findings from this research study established that TMT remain invaluable assessment device for generating vital information which will ultimately be used to enhance educational practices. In the

study, a variety of factors have been noted to affect the validity, reliability and quality of test score, these factors include administration and test condition, content of the test itself, some concerning the test takers. This study recommended in – service training program to sharpen the item writing skills of classroom teachers so as to improve the quality of Teacher made tests.

2.5 Summary and Uniqueness of the Study

Tests have significant contribution in our educational system, it helps in assessing the knowledge of students which form the basis for decision making in schools, it also provide sound foundation for students in public examinations. TMTs are widely use in our secondary schools as continuous assessment, for placement and end of the term examinations hence there is need to ensure that these tests are constructed through valid procedures of test construction. This chapter reviewed concepts such as tests, test construction procedure, Bloom's Taxonomy of Educational Objectives, and table of specifications. Classical and Item Response Theory.

Many studies have been reviewed by different researchers on test construction; most of these studies have gender, level of experience and qualification as variables under study. However, despite the similarities these studies have, they still differ with this present study in the following aspect: population and sample size, instrument for data collection and geographical location of the study (Ungogo L.G.A). The fact that this study was carried out in an entirely different area of study from the empirical researches reviewed so far, makes it unique with the possibility of having different results from the ones reviewed.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter presents the methodology upon which the study is conducted. The research design, population and sample of the study, instrument for data collection, scoring procedure, validity and reliability of the instrument, procedure for data collection and analysis are discussed.

3.2 Research Design

The main goal of this research is to assess the knowledge of teachers in test construction on the basis of gender, experienced and inexperienced teachers, qualified and unqualified teachers and science and humanity teachers. Descriptive survey design was employed; this is because the study is concerned with the attempt to determine the present status of the phenomenon under study. As Cohen and Manion (2005) posit, the descriptive method looks with intense accuracy at a phenomenon of the moment and describe precisely what the researcher sees.

3.3 Population and Sample

3.3.1 Population of the Study

The population of this study comprises of all senior secondary school teachers in public schools in Ungogo local government. According to the Kano State Secondary Schools Management Board (2017), there are two hundred and sixty (260) senior secondary school teachers across sixteen (16) senior secondary schools in the local government, out of which eleven (11) are boys schools and five (5) are girls schools.

The table below presents the population of teachers with respect to schools in the local government.

Table 3.1 Summary of Population of Senior Secondary School Teachers in Ungoggo

S/N	Name of Schools	Type	Population of teachers
1	GGASS UNGOGO	GIRLS	12
2	GGSS GAYAWA	GIRLS	10
3	GSS JAMBAKI	GIRLS	16
4	GGSS KADAWA	GIRLS	30
5	GGSS RANGAZA	GIRLS	11
6	GSS BACHIRAWA	BOYS	25
7	GSS DANKUNKURU	BOYS	15
8	GSS JAJIRA	BOYS	12
9	GSS KADAWA	BOYS	10
10	GSS PANISAU	BOYS	12
11	GSS RIGIYAR ZAKI	BOYS	24
12	GSS RIMIN GATA	BOYS	22
13	GSS S/DOKA	BOYS	12
14	GSS UNGOGO	BOYS	16
15	GSS Z/ GABAS	BOYS	17
16	GSS Z/DANBABBA	BOYS	16
TOTAL			**260**

Source: Kano State Secondary Schools Management Board (2017)

3.3.2 Sample Size

All the members of the population in the study are used as sample. Popoola (2011), pointed out the reasons under which a researcher may study the entire population, among which include small population size. The population as given by the state secondary schools management board is two hundred and sixty (260) which is

relatively small in size, the instrument was administered to two hundred and thirty seven (237) teachers with a mortality rate of twenty three (23) teachers.

The table below presents the schools and population of teachers used from each school.

Table 3.2 Summary of Sample

VARIABLES	NO OF TEACHERS
Gender	
Male	166
Female	71
Level of Experience	
Experienced	105
Inexperienced	132
Qualification	
Qualified	173
Unqualified	64
Subject of Teaching	
Science	88
Humanities	149

3.4 Data Collection Instruments

The data collection instrument for this study is Teachers Knowledge of Tests Construction Scale (TKTCS); the instrument was developed by the researcher to reveal the knowledge of teachers on test construction. The instrument consists of two sections: section A which was used to find demographic information about the respondents such as gender, level of experience, qualification and subject of teaching.

Section B was used to find the respondent's knowledge on test construction. The instrument consists of thirty (30) items of true or false format. It was developed based on test construction procedure.

3.4.1 Scoring Procedure.

The instrument consisted of thirty (30) items. Correct response was given one (1) mark where as incorrect response is denoted as zero (0). The scores are classified into four groups, respondents who score between 25-30 marks are classified as having "Excellent" knowledge of test construction, those with scores between 20-24 were classified as having "Very Good" knowledge, teachers with scores between 15-19 were classified as having "Good" knowledge and those with scores between 9-14 were classified as having "Fair" knowledge of test construction.

3.5 Validity of Data Collection Instrument

3.5.1 Validity of the Instrument

An instrument is said to be valid if it measures what it is supposed to measure. According to Hartrithcoat (2013), a test can be judged valid if it measures what it is intended to measure. Content validity essentially involves the systematic examination of the test content to determine whether it covers a representative sample of the behavior domain to be measured (Anastasi & Urbina, 2009). Items were carefully reviewed in the course of validating the instrument, some items that do not match the content of the research objectives were replaced with those that are relevant for the study. Experts in the field of tests and measurement from Bayero University, kano have agreed to items in the instrument.

3.5.2 Reliability of the Instrument

A pilot study was conducted using the instrument on twenty six (26) teachers which is ten percent (10%) of the sample. Trecee and Trecee (1982) and Connelly (2008), suggests that a pilot study sample should be ten percent (10%) of the sample projected for the larger parent study. Spilt half reliability was used to determine the reliability index of the instrument. The scores obtained were divided into two halves of even and odd numbers. The reliability index obtained was 0.67, which means the responses by the respondents are similar; hence the instrument is statistically judged as reliable for the study.

3.6 Procedure for Data Collection

The researcher went to the respective schools with an introductory letter obtained from the Department of Education, Bayero University, Kano and a letter obtained from the Zonal Education Office. These letters were presented to the principals of the respective schools indicating the purpose of the study and confidentiality of the respondents. The instruments were administered on face to face basis, these is done with the assist of staff usually attached to the researcher by the principal.

3.7 Procedure for Data Analysis

Data obtained from the tests of knowledge for teachers were analyzed using simple percentage and t-test for independent sample, the research question which seek to find the extent of teachers' knowledge on test construction was answered using percentage where as t-test for independent sample was used to analyze hypotheses one , two, three and four. The statistical analysis was done using statistical package for social sciences (SPSS). According to Gay (2009), t-test for independent samples is appropriate statistical test for determining the difference between two groups of independent samples.

CHAPTER FOUR

DATA PRESENTATION AND ANALYSIS

4.1 Introduction

This chapter presents the analysis of data obtained from the respondents. The chapter provides answer to the research question and tested null hypothesis, simple percentage was used to answer research question where as t-test for independent sample was used to test all hypotheses i.e hypothesis one, two, three and four. The chapter is arranged under the following sub-headings: introduction, data presentation, answer to research question, testing of null hypotheses, summary of major findings and discussion of the research findings.

4.2 Summary of Data

Data obtained by the instrument have been summarized and presented: distribution of respondents by gender, distribution of respondents by years of experience, distribution of respondents by educational qualification and distribution of respondents by teaching subject.

Table 4.1 Distribution of Respondents by Gender

Gender	Frequency	Percentage
Male	166	70.0%
Female	71	30.0%
Total	**237**	**100%**

Table 4.1 above shows the distribution of respondents by gender. The total number of male respondents is one hundred and sixty six (166) which represent 70.0% while the female respondents are Seventy one (71) representing 30.0%.

Table 4.2 Distribution of Respondents by Years of Experience

Working Experience	Frequency	Percentage
Experienced	105	44.3%
Inexperienced	132	55.7%
Total	**237**	**100%**

Table 4.2 above shows the distribution of respondents by years of experience. One hundred and five (105) respondents representing 44.3% were experienced teachers, while the inexperienced teachers are one hundred and thirty two (132) representing 55.7%.

Table 4.3 Distribution of Respondents by Educational Qualification

Qualification	Frequency	Percentage
Qualified	173	73.0%
Unqualified	64	27.0%
Total	**237**	**100%**

Table 4.3 above shows the distribution of respondents by educational qualification. One hundred and seventy three (173) respondents representing 73.0% were qualified teachers, while sixty four (64) respondents representing 27.0% were unqualified teachers.

Table 4.4 Distribution of Respondents by Teaching Subject

Subject Area	Frequency	Percentage
Humanity	149	62.9%
Science	88	37.1%
Total	**237**	**100%**

Table 4.4 above shows the distribution of respondents by subject of teaching. One hundred and forty nine (149) respondents which represents 62.9% are teachers teaching humanity base subjects while eighty eight (88) respondents which represent 37.1% are teachers teaching science base subjects.

4.3 Answer to Research Question

Research Question: What is the level of teacher's knowledge of test construction in Ungoggo local government area?

Table 4.5 Classification of Teachers' Knowledge on Test Construction

Scores	Frequency	Classification	Percentage
25-30	9	Excellent	3.8%
20-24	99	Very Good	41.8%
15-19	120	Good	50.6%
9-14	9	Fair	3.8%
Total	**237**		**100%**

Table 4.5 above shows the classification of teachers' knowledge on tests construction. From the Table, nine (9) teachers representing 3.8% scored between 25-30 marks and were classified as having an "Excellent" knowledge of test construction. Ninety nine (99) teachers representing 41.8% scored between 20-24 marks and are classified as

having “Very Good” knowledge of tests construction. One hundred and twenty (120) teachers representing 50.6% scored between 15-19 marks and are classified as having “Good” knowledge of test construction where as nine teachers representing 3.8% scored between 9-14 marks and were classified as having a “Fair” knowledge of test construction.

4.4 Hypotheses Testing

The four hypotheses raised were tested at .05 level of significance using t-test for independent sample.

Hypothesis One: There is no significant difference in the mean value of test construction knowledge between male and female senior secondary school teachers in Ungogo local government.

Table 4.6 Summary of t-test for Gender Difference in Teachers’ Knowledge of Test Construction

Gender	N	Mean	SD	SEM	t – cal	Df	P–value (2–tailed)	Remark
Male	166	19.18	2.638	.205	.042	235	.967	NS
Female	71	19.20	3.138	.372				

Significant at P ≤ .05

Table 4.5 above shows (t (.042) = 235, P= .967) indicating that male and female teachers did not differ significantly in knowledge of test construction. Therefore, null hypothesis which state that there is no significant difference in the mean score of test construction knowledge between male and female senior secondary school teachers is

accepted and concluded that teachers' knowledge of test construction is the same irrespective of gender.

Hypothesis Two: There is no significant difference in the mean value of test construction knowledge between experienced and inexperienced senior secondary school teachers in Ungogo local government.

Table 4.7 Summary of t-test for Level of Experience Difference in Teachers' Knowledge of Test Construction

Level of Experience	N	Mean	SD	SEM	t –cal	d.f	P-value (2-tailed)	Remark
Experienced	105	19.30	2.955	.288	.538	235	.591	NS
Inexperienced	132	19.10	2.661	.232				

Significant at $P \leq .05$

Table 4.6 shows (t (.538) = 235, P= .591) indicating that there is no significant difference in test construction knowledge between experienced and inexperienced teachers. Therefore, the null hypothesis which states that there is no significant difference in the mean value of test construction knowledge between experienced and inexperienced teachers is accepted and concluded that teachers' knowledge of test construction is the same irrespective of level of experience.

Hypothesis Three: There is no significant difference in the mean value of test construction knowledge between qualified and unqualified senior secondary school teachers in Ungogo local government.

Table 4.8: Summary of t-test for Qualification Difference in Teachers' Knowledge of Test Construction

Qualification	N	Mean	SD	SEM	t – cal	Df	P–value (2–tailed)	Remark
Qualified	173	19.42	2.837	.216	2.160	235	.032	S
Unqualified	64	18.55	2.575	.322				

Significant at $P \leq .05$

Table 4.7 shows (t(2.160) = 235, P=.032) indicating that teachers' knowledge of test construction differ among qualified and unqualified teachers. Individual mean score shows that qualified teachers (*M* = 19.42; 2.837) have knowledge of test construction than their counterpart (*M* = 18.55; 2.575). Therefore, the hypothesis which states that there is no significant difference in mean score of test construction knowledge between qualified and unqualified teachers is rejected and alternate one accepted, it is concluded that teachers that are qualified have more knowledge of test construction than their counterpart without teaching qualification.

Hypothesis Four: There is no significant difference in the mean value of test construction knowledge between humanity and science senior secondary school teachers in Ungogo local government**.**

Table 4.9: Summary of t-test for Subject of Teaching Difference in the Knowledge of Teachers on Test Construction

Subject of Teaching	N	Mean	SD	SEM	t – cal	Df	P–value (2–tailed)	Remark
Humanity	149	19.09	2.864	.235	.706	235	.481	NS
Science	88	19.35	2.670	.285				

Significant at P ≤ .05

Table 4.8 shows (t(.706) = 235, P = .481) indicating that humanity and science teachers did not differ significantly in knowledge of test construction. Therefore, null hypothesis which state that there is no significant difference in mean score of test construction knowledge between humanity and science teachers is accepted and concluded that teachers' knowledge of test construction is the same irrespective of subject of teaching.

4.5 Summary of Findings

1. Senior secondary school teachers in Ungogo local government do not differ significantly in their knowledge of test construction based on gender, the mean score for male teachers is 19.18 and that of female teachers is 19.20, which shows no significant difference.
2. Teachers teaching at senior secondary schools in Ungogo local government do not differ significantly in the knowledge of test construction on the basis of level of experience, the mean score for experience teachers is 19.30 and that of inexperience teachers is 19.10, which shows no significant difference.
3. Senior secondary school teachers in Ungogo local government differ significantly in the knowledge of test construction based on qualification. The

result from the table clearly indicated that the mean score for qualified teachers is 19.42 which is higher than 18.55 as the mean score of unqualified teachers.

4. Senior secondary schools teachers in Ungogo local government do not differ significantly in the knowledge of test construction based of subject of teaching. The result from the table shows that humanity based teachers have a mean score of 19.09 while science based teachers have a mean score of 19.35, which shows no significant difference.

4.6 Discussion on Findings

The data analyzed revealed that no significant difference was found regarding the knowledge of teachers on test construction between the male and female teachers; this means that gender has no significant effect in the knowledge of teachers on test construction in Ungogo. This finding is supported by the work of Rufai (2005), who conducted a study on test construction skills among teachers in senior secondary schools in Kano Municipal, the study revealed that there is no significant difference in the skills possessed by teachers on test construction between male and female teachers. In agreement with the above, the findings from Agu, Onyekuba and Anyichie (2013), show no significance difference in the mean ratings of male and female teachers regarding their competencies in constructing classroom based tests.

The data revealed that teachers do not differ significantly regarding the knowledge of test construction on the basis of level of experience. This finding is supported by the work of Adeola and Fajonyimi (1991) which revealed that teachers do not differ in their knowledge of test construction based on years of experience.

This is also in agreement with the work of Adodo (2014), which revealed that teachers experience have no impact on test construction knowledge. But contrary to these findings is the work of Rufai (2005), which shows that there is significant difference in the skills of test construction between experienced and inexperienced teachers.

The result of this study indicated that obtained qualification has effect on the knowledge of teachers on test construction. This means that qualified teachers have more knowledge of test construction than unqualified teachers. This is supported by the work of Rufai (2005), which revealed that there is significant difference in the skills of test construction between qualified and unqualified teachers. In agreement with the above, the study of Camble and Abubakar (2014), revealed that qualification have impact on the competencies of teachers in test construction. But contrary to the above, a study by Adodo (2014), revealed that teachers qualification do not have any impact on their level of competencies in evaluating students.

The result indicated that subject of teaching have no effect on teacher's knowledge of test construction. The findings agreed with that of Rufai (2005), which indicated that subject of teaching has no significant influence on the knowledge of teachers on test construction.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary, conclusions and recommendations drawn from the study and recommendations for further studies.

5.2 Summary

Chapter one of this study covers the significance of both standardized and teacher-made tests in our educational system, there is no shortcut for constructing valid and reliable test items, teachers need knowledge of test construction for valid and reliable tests to be constructed. Five objectives with corresponding research questions were raised, and four hypotheses which aimed at finding out if there is significant difference in the mean score of teachers' knowledge on test construction based on gender, level of experience, qualification and subject of teaching. The researcher was motivated to choose the topic based on the poor performance of students in public examinations.

Chapter two of this study reviewed literature on concepts such as tests, type of tests, taxonomy of educational objectives, test construction procedure and table of specification. Classical test theory and Item response theory were reviewed under the theoretical framework. Also, empirical study as well as summary and uniqueness of the study were presented.

Chapter three of this work covered the research design, population and sample for the study. Two hundred and thirty seven (237) teachers were used out of the population of two hundred and sixty teachers (260) senior secondary school teachers in Ungogo. The instrument was constructed by the researcher which aimed at assessing the knowledge of teachers on test construction; simple percentage and t-test for

independent sample were used to carry out the statistical analysis of the data obtained from the field.

Chapter four contains the summary of the data and statistical analysis to find out the extent of teachers knowledge on test construction and if there is significant difference in the mean score of teachers' knowledge on test construction based on gender, level of experience, qualification and subject of teaching, the result shows that no significant difference was found in the mean score of teachers' knowledge on test construction on the basis of gender, level of experience and subject of teaching but significant difference was observed based on qualification.

5.3 Conclusion

From the findings of this study, it can be concluded that gender has no significant effect on teachers' knowledge of test construction in Ungogo. It can also be concluded that there is no significant difference in the mean score of test construction knowledge based on years of experience and subject of teaching of teachers in senior secondary schools in Ungogo.

Finally, this study concluded that there is significant difference in the mean score of teachers' knowledge on test construction with respect to educational qualification, meaning qualified teachers have more knowledge of test construction than unqualified teachers.

5.4 Recommendations

5.4.1 Recommendations from the Study

The following recommendations were made from the study:

1. Teachers should be given refresher courses in measurement and evaluation on test construction procedures so as to refresh their memory, improve their understanding and knowledge of test construction.

2. School principals should encourage experienced teachers to guide the inexperienced ones in the act of test construction.
3. Unqualified teachers should be encouraged to go for post-graduate diploma in education in order to acquire the necessary knowledge required for test construction.
4. Adequate training should be given to teachers with below five years teaching experience.

5.4.2 Recommendations for further Studies

1. There is need for the study to cover other local governments in Kano State because this present study covered only Ungoggo local government area.
2. This study can also be extended to secondary schools owned and managed by private individuals because this study covers only teachers from public senior secondary schools.
3. There is also a need for a study to be conducted to cover primary, junior secondary and technical schools in the area.
4. This study can also be extended to higher institutions, more especially in departments where education courses are not part of their curriculum.
5. There is also the need for a study on other aspects of tests such as administration, scoring and interpretation.

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APPENDIX ONE

Department of Education
P.M.B. 3011
Kano State
Head Prof: Talatu M. Garba
Email: talatufm24@gmail.com
Date : 17-08-2015

B.U.K.
Bayero University, Kano

Dear Sir,

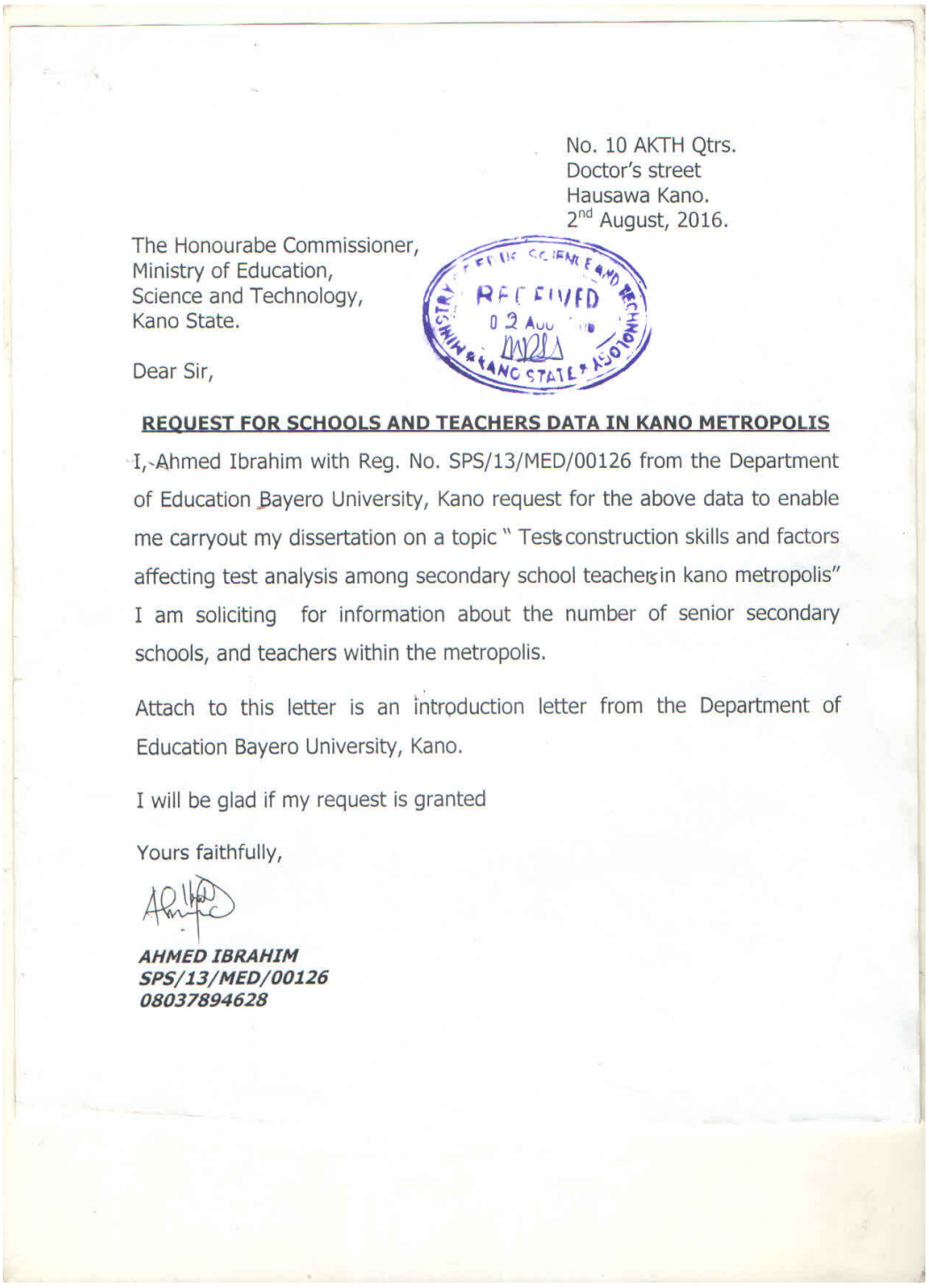
LETTER OF INTRODUCTION

This is to certify that: AHMED IBRAHIM with Registration Number: SPS/13/MED/00126 is our student in the Department of Education. Bayero University, Kano.

Kindly render any assistance he/she may require from you.

For: *Prof Talatu Musa Garba*
Head of Department

APPENDIX TWO



No. 10 AKTH Qtrs.
Doctor's street
Hausawa Kano.
2nd August, 2016.

The Honourabe Commissioner,
Ministry of Education,
Science and Technology,
Kano State.

MINISTRY OF EDUCATION SCIENCE AND TECHNOLOGY KANO STATE RECEIVED 02 AUG

Dear Sir,

REQUEST FOR SCHOOLS AND TEACHERS DATA IN KANO METROPOLIS

I, Ahmed Ibrahim with Reg. No. SPS/13/MED/00126 from the Department of Education Bayero University, Kano request for the above data to enable me carryout my dissertation on a topic " Tests construction skills and factors affecting test analysis among secondary school teachers in kano metropolis" I am soliciting for information about the number of senior secondary schools, and teachers within the metropolis.

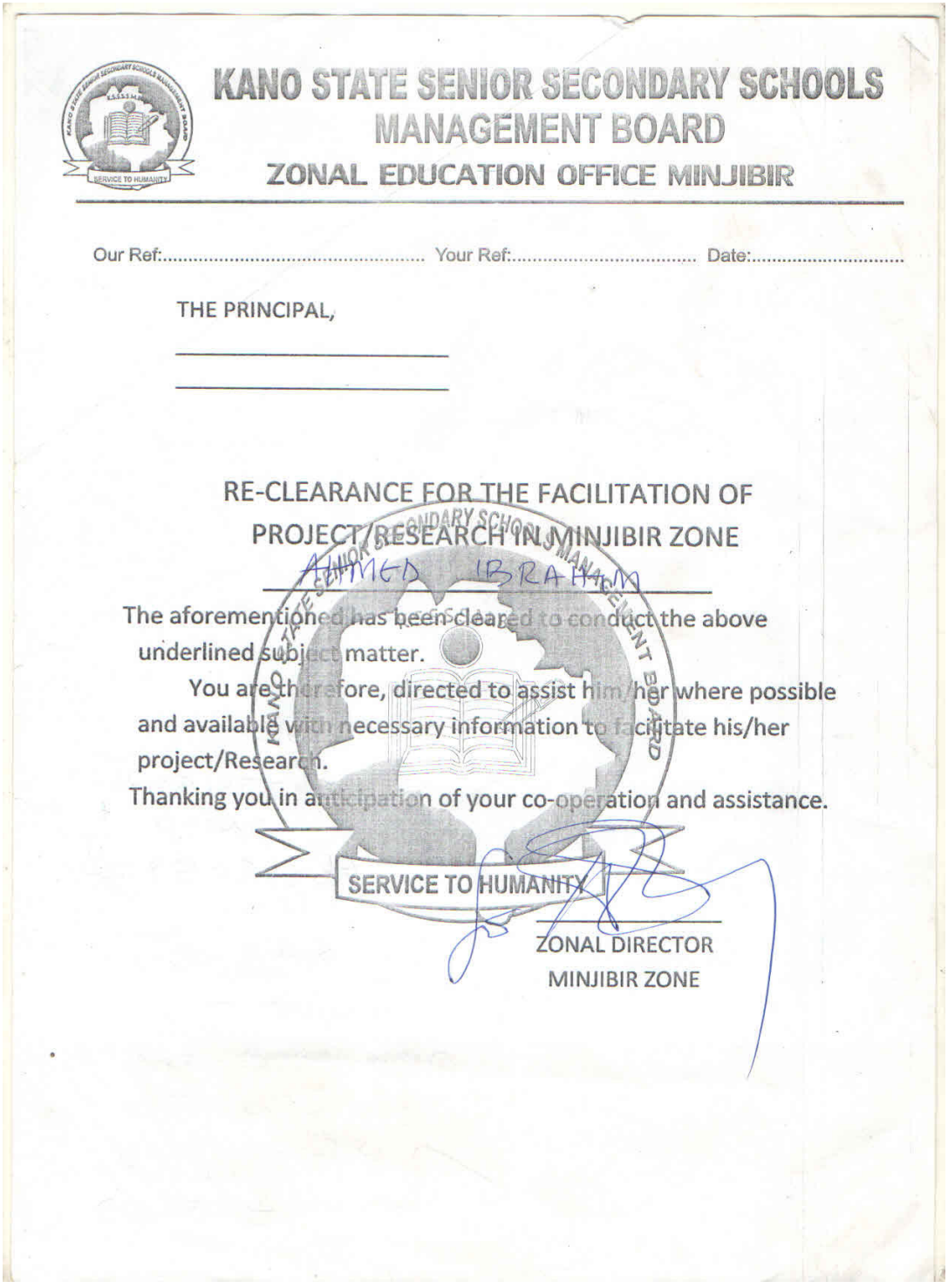
Attach to this letter is an introduction letter from the Department of Education Bayero University, Kano.

I will be glad if my request is granted

Yours faithfully,

AHMED IBRAHIM
SPS/13/MED/00126
08037894628

APPENDIX THREE



KANO STATE SENIOR SECONDARY SCHOOLS MANAGEMENT BOARD

ZONAL EDUCATION OFFICE MINJIBIR

Our Ref:..... Your Ref:..... Date:.....

THE PRINCIPAL,

_____

_____

RE-CLEARANCE FOR THE FACILITATION OF PROJECT/RESEARCH IN MINJIBIR ZONE

AHMED IBRAHIM

The aforementioned has been cleared to conduct the above underlined subject matter.

You are therefore, directed to assist him/her where possible and available with necessary information to facilitate his/her project/Research.

Thanking you in anticipation of your co-operation and assistance.

SERVICE TO HUMANITY

ZONAL DIRECTOR
MINJIBIR ZONE

APPENDIX FOUR

KANO STATE SECONDARY SCHOOLS MANAGEMENT BOARD
DEPARTMENT OF PLANNING RESEARCH AND STATISTICS
LIST OF SCHOOLS AND NUMBER OF TEACHERS IN UNGOGO LG
AS AT JANUARY'2017

S/N	ZONE	LGA	SCHOOL NAME	STATUS	TYPE	GENDER	TOTAL TEACHERS
1	MINJIBIR	UNGOGO	GGASS UNGOGO	SENIOR	DAY	GIRLS	12
2	MINJIBIR	UNGOGO	GGJASS FANISAU	JUNIOR	DAY	GIRLS	2
3	MINJIBIR	UNGOGO	GGJASS TARDA	JUNIOR	DAY	GIRLS	1
4	MINJIBIR	UNGOGO	GGJASS ZGABAS	JUNIOR	DAY	GIRLS	1
5	MINJIBIR	UNGOGO	GGJSS CHIROMAWA	JUNIOR	DAY	GIRLS	1
6	MINJIBIR	UNGOGO	GGSS GAYAWA	SENIOR	DAY	GIRLS	10
7	MINJIBIR	UNGOGO	GGSS JANBAKI	SENIOR	BOARDING	GIRLS	16
8	MINJIBIR	UNGOGO	GGSS KADAWA	SENIOR	DAY	GIRLS	30
9	MINJIBIR	UNGOGO	GGSS RANGAZA	SENIOR	DAY	GIRLS	11
10	MINJIBIR	UNGOGO	GJASS INUSAWA	JUNIOR	DAY	BOYS	3
11	MINJIBIR	UNGOGO	GJSS KARO	JUNIOR	DAY	BOYS	2
12	MINJIBIR	UNGOGO	GJSS R/MALAM.	JUNIOR	DAY	BOYS	3
13	MINJIBIR	UNGOGO	GJSS R/MALAM	JUNIOR	DAY	BOYS	7
14	MINJIBIR	UNGOGO	GJSS T/FULANI	JUNIOR	DAY	BOYS	1
15	MINJIBIR	UNGOGO	GJSS W/BABA	JUNIOR	DAY	BOYS	7
16	MINJIBIR	UNGOGO	GSS BACHIRAWA	SENIOR	DAY	BOYS	25
17	MINJIBIR	UNGOGO	GSS DAN KUNKURU	SENIOR	DAY	BOYS	15
18	MINJIBIR	UNGOGO	GSS JAJIRA	SENIOR	DAY	BOYS	12
19	MINJIBIR	UNGOGO	GSS KADAWA	SENIOR	DAY	BOYS	10
20	MINJIBIR	UNGOGO	GSS PANISAU	SENIOR	DAY	BOYS	12
21	MINJIBIR	UNGOGO	GSS RIMYAR ZAKI	SENIOR	DAY	BOYS	24
22	MINJIBIR	UNGOGO	GSS RIMIN GATA	SENIOR	DAY	BOYS	22
23	MINJIBIR	UNGOGO	GSS S/DOKA	SENIOR	DAY	BOYS	12
24	MINJIBIR	UNGOGO	GSS UNGOGO	SENIOR	DAY	BOYS	16
25	MINJIBIR	UNGOGO	GSS ZGABAS	SENIOR	DAY	BOYS	17
26	MINJIBIR	UNGOGO	GSS ZIDAN BABBA	SENIOR	DAY	BOYS	16

APPENDIX FIVE

Teachers Test Construction Scale

Dear Respondents,

I am a Postgraduate student conducting a study on the topic "Assessment of test construction knowledge of senior secondary school teachers in Ungogo local government area of Kano state" I will be very grateful if you give me little of your time to respond to the instrument. I assure you that all information provided will be treated confidentially. Thank you for your cooperation.

s Ahmed Ibrahim SPS/13/MED/00126

Instruction: please you are required to choose the correct response (True or False)

Section A: Demographic information

Sex: Male □ Female □
Years of experience as a teacher: 0-4years □ 5years and above □
Subject of teaching: ……
Obtained Qualification: NCE □ B.A □ B.A (ED) □ Bsc □ Bsc (ED) □ Msc □
M (ED) □ Others □ Please Specify …….

Section B: Respondent's knowledge

S/N	ITEMS	RESPONSE	
		TRUE	FALSE
1.	Identifying the objective to be measured is an important variable to be considered in constructing test items.		
2.	Confirming weather the instructional objective to be measured is main or minor, overt or covert is relevant in constructing test items.		
3.	Test blue-print is relevant in preparation of items in a test.		
4.	There is no need of marrying items in a test with the level of the learners in test construction.		
5.	Designing each item in such a way to measure learning outcome is relevant in test construction.		
6.	Constructing test items that require the application of formula is concern with the affective domain of bloom's taxonomy of educational objectives.		
7.	Decisions regarding the number of items to be constructed (objective or essay) is relevant in test construction		
8.	Test items are required to be within the limit of the scheme of work.		
9.	Test items need to be intellectually challenging to the test takers.		
10.	Test items are said to be valid if the measure what they are developed to measure.		

11.	Test items that are lopsided are said to have content validity		
12.	Test blue-print specifically list what was thought and how many items on the test will cover the topics.		
13.	Objective of the test entails the purpose the test would serve.		
14.	Essay and objective tests are said to be qualities of a good test.		
15.	Test items need to be unambiguous to the test takers.		
16.	Test items with more wordings in the stem are more encouraged than those with more wordings as distracters.		
17.	Stating the correct response in detail which will provide the examinee with clue is encouraged in test construction.		
18.	In test construction, the intended answer (correct response) should clearly be the correct response.		
19.	Stating distracters that are attractive to the uninformed is recommended in test construction.		
20.	A distracter is said to be a good distracter if test takers with higher score select it than those with lower score in a test.		
21.	Test items should be worded in a manner that the correct response can be deduced easily from the test itself.		
22.	It is not recommended for teachers to construct more test items than required before the final form of the test.		
23.	The central idea is required to be in the choice rather than the stem.		
24.	Negative wordings need to be emphasized when used in the stem of an item.		
25.	It is important to vary the position of the correct response in a random manner.		
26.	Arranging test items in order of difficulty is recommended in test construction.		
27.	Arranging items in terms of test format means arranging items in order of difficulty.		
28.	Arranging items in terms of content area means arranging test items from the same section together.		
29.	Enemy item is item that provide clue to correct response of another test item.		
30.	Subjecting items to proper scrutiny by an experience person is a requirement in the assembling of test items.		

APPENDIX SIX

SUMMARY OF TEACHERS TEST SCORE

S/N	GENDER	EXPERIENCE	SUBJECT	QUALIFICATION	SCORE
1	1	1	1	1	19
2	1	1	2	2	12
3	1	1	2	1	12
4	1	1	1	1	19
5	1	2	1	1	18
6	1	1	2	1	19
7	1	1	2	1	20
1	1	2	1	1	18
9	1	1	1	1	20
10	2	1	2	1	22
11	1	2	1	1	16
12	2	1	1	2	16
13	1	2	2	2	19
14	1	2	1	1	16
15	1	2	1	1	17
16	1	2	1	1	22
17	1	2	1	1	20
18	2	2	1	1	22
19	1	2	2	1	22
20	2	1	1	2	22
21	1	2	2	1	17
22	1	2	2	1	18
23	1	2	2	1	21
24	1	2	2	1	21
25	1	1	2	1	22
26	1	2	2	1	22
27	2	1	1	2	19
28	1	1	1	1	20
29	1	1	1	1	22
30	2	2	1	2	20
31	1	1	1	1	20
32	1	1	2	1	18
33	1	2	1	1	21
34	2	1	2	1	19
35	1	1	2	1	19
36	1	1	2	1	20
37	1	2	1	2	15
38	1	1	2	2	18
39	1	2	1	1	18
40	1	2	1	1	18
41	1	2	1	1	16
42	1	2	1	1	15

43	1	2	1	1	17
44	1	1	1	2	17
45	1	2	1	1	16
46	1	2	1	1	16
47	1	2	1	1	16
48	1	2	1	1	16
49	1	1	2	1	19
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77	1	2	2	2	16
78	2	2	1	2	22
79	2	2	1	1	27
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87	2	1	1	1	14
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89	1	2	1	1	16
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127	1	1	2	2	20
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129	1	1	1	2	21
130	1	1	2	2	24
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132	2	2	1	1	18
133	1	1	2	1	20
134	2	2	1	1	17

135	2	2	1	2	18
136	2	1	1	1	23
137	1	2	2	2	21
138	2	2	2	1	13
139	2	2	1	2	17
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153	1	1	2	2	18
154	2	1	1	1	12
155	2	2	1	1	17
156	1	1	1	2	21
157	2	2	2	2	20
158	1	1	1	2	20
159	2	2	2	1	20
160	1	1	1	2	20
161	1	1	1	2	19
162	1	2	1	1	17
163	1	1	2	2	19
164	2	1	1	2	16
165	1	2	2	2	18
166	1	2	1	1	17
167	2	1	2	1	16
168	2	1	2	1	18
169	1	1	1	1	18
170	1	1	1	1	20
171	1	1	1	2	19
172	2	2	2	1	19
173	1	1	2	1	23
174	1	1	2	1	21
175	1	1	2	1	19
176	1	1	1	2	19
177	1	2	1	1	22
178	1	1	2	1	23
179	1	1	2	1	20
180	1	1	2	1	18

181	2	1	1	1	19
182	1	2	1	1	18
183	2	2	2	1	19
184	1	1	1	1	21
185	2	2	1	1	24
186	1	2	1	1	19
187	1	2	1	1	20
188	1	2	1	1	19
189	1	1	2	1	18
190	1	1	1	1	20
191	2	2	1	1	19
192	2	2	1	1	19
193	1	2	1	1	19
194	1	1	1	1	19
195	1	1	1	1	19
196	1	1	1	1	23
197	1	2	1	2	16
198	1	2	1	2	16
199	1	1	2	1	20
200	1	2	1	1	15
201	1	2	1	1	18
202	1	2	1	1	18
203	1	1	2	2	21
204	1	1	1	1	20
205	2	2	1	1	18
206	1	1	1	1	17
207	1	1	2	2	17
208	1	1	1	1	15
209	1	1	2	2	18
210	1	1	2	1	25
211	2	2	1	1	28
212	2	1	1	1	20
213	1	2	1	2	20
214	2	1	2	1	18
215	2	1	2	1	27
216	2	2	2	1	20
217	1	2	1	2	20
218	1	1	1	1	18
219	2	1	1	1	23
220	1	1	2	1	21
221	1	1	1	1	19
222	1	2	1	1	25
223	1	1	1	1	23
224	1	2	1	1	22
225	1	2	2	2	19
226	1	2	1	1	20

227	2	2	2	1	23
228	1	2	1	1	23
229	1	2	1	1	21
230	2	1	1	1	18
231	1	2	1	1	18
232	1	2	1	1	20
233	1	2	1	1	19
234	2	1	1	2	16
235	1	2	1	1	16
236	1	2	1	1	20
237	2	2	1	1	23

APPENDIX SEVEN

t-test result for gender

Group Statistics

GENDER		N	Mean	Std. Deviation	Std. Error Mean
SCORE	Male	166	19.18	2.638	.205
	Female	71	19.20	3.138	.372

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
SCORE	Equal variances assumed	.551	.459	-.042	235	.967	-.016	.397	-.798	.765
	Equal variances not assumed			-.039	114.300	.969	-.016	.425	-.858	.825

APPENDIX EIGHT

t-test result for level of experience

Group Statistics

EXPERIENCE		N	Mean	Std. Deviation	Std. Error Mean
SCORE	Experience	105	19.30	2.955	.288
	Inexperience	132	19.10	2.661	.232

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
SCORE	Equal variances assumed	.148	.701	.538	235	.591	.197	.365	-.523	.917
	Equal variances not assumed			.532	211.586	.595	.197	.370	-.532	.926

APPENDIX NINE

t-test result for qualification

Group Statistics

QUALIFICATION		N	Mean	Std. Deviation	Std. Error Mean
SCORE	Qualified	173	19.42	2.837	.216
	Unqualified	64	18.55	2.575	.322

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
SCORE	Equal variances assumed	.021	.885	2.160	235	.032	.875	.405	.077	1.673
	Equal variances not assumed			2.258	123.161	.026	.875	.387	.108	1.642

APPENDIX TEN

t-test result for subject of teaching

Group Statistics

	SUBJECT	N	Mean	Std. Deviation	Std. Error Mean
SCORE	Humanities	149	19.09	2.864	.235
	Sciences	88	19.35	2.670	.285

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
SCORE	Equal variances assumed	.697	.405	-.706	235	.481	-.265	.376	-1.005	.475
	Equal variances not assumed			-.719	193.030	.473	-.265	.369	-.992	.462

APPENDIX ELEVEN

Data for Pilot Test

RESPONDENT	EVEN SCORES	ODD SCORES
1	8	7
2	11	10
3	12	10
4	10	12
5	9	9
6	9	8
7	7	7
8	10	9
9	8	8
10	10	11
11	8	9
12	8	10
13	9	8
14	8	10
15	7	8
16	10	12
17	10	11
18	7	8
19	10	8
20	10	7
21	12	10
22	8	9
23	11	10
24	9	9
25	9	10
26	9	9

APPENDIX TWELVE

Result for Pilot Test (Split half Reliability)

Case Processing Summary

		N	%
Cases	Valid	26	100.0
	Excluded	0	.0
	Total	26	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Part 1	Value	1.000
		N of Items	1[a]
	Part 2	Value	1.000
		N of Items	1[b]
	Total N of Items		2
Correlation Between Forms			.500
Spearman-Brown Coefficient	Equal Length		.667
	Unequal Length		.667
Guttman Split-Half Coefficient			.667

a. The items are: VAR00001

b. The items are: VAR00002