



Relevance Of Table Of Specification In Educational Assessment

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ABSTRACT

Table of specification also known as test blue print is an essential component in testing as it specifies the proportion of questions allotted to each of the behavioural objectives and topics to be constructed. It serves as a guide to teachers during assessment of students. The functions, benefits and conditions for constructing specification/test blue prints were fully discussed. It was concluded that teachers should use table of specification as it contributes toward setting of valid and reliable questions for assessment of students. Teachers should endeavour to use test blue prints as they help to improve the content validity of a test. Teachers should ensure that the test constructed measures adequately all level of domains and also comply with all the laid down techniques when preparing table of specification in schools.

Keywords: Relevance, Table of Specification, Education, Assessment.

INTRODUCTION

Specification or test blue print is an essential component in measuring learning outcomes. One major problem most teachers face is how to set valid and reliable questions that measure what they are supposed to measure. Due to insufficient knowledge of how to use a table of specification, some teachers set questions in one area and not touching other areas, yet others set their own questions to cover only low level objectives such as knowledge and comprehension. Again, some set confusing, complicating and repeat same questions every year for different sets of students, thereby registering poor and unsatisfactory conditions for assessment. This lack of coherence leads to a test that fails to provide evidence from which teachers can make valid judgment about students' progress (Brookhart, 2001). Teachers need to develop a table of specification that will provide a guide to the item construction which takes into account the relative importance of each component of the syllabus and each level of cognitive domain. Mehrens and Lehmann (2009) identified that the "specs" can help to provide for optimal learning on the part of students and optimal teaching efficiency on the part of the teacher. Table of specification can help teachers map the amount of class time spent on each objective with the cognitive level, and also helps to identify the type of items teachers include in their tests. It ensures that teachers include test items that tap different levels of cognitive complexity when measuring student's assessment (Kubiszyn & Borich 2003).

Therefore, Asuru (2015) sees table of specification or test blue print as a two-dimensional grid that shows the content and the objective. It also specifies the proportion of questions allotted to each of the behavioural objectives and topics of the content. This will help a teacher to test students in all cognitive domain. Most teachers find it difficult to set questions that covers the domain's of synthesis and evaluation.

Downing (2006) also noted table of specification as an activity which enumerates the information and cognitive tasks on which examiners are to be assessed. Students are assessed in examination based on what they have learnt which is expected to cover all areas. Assessment is a systematic process of determining the extent to which instructional objective are met by students. It is a process of collecting information for the purpose of specifying, verifying problems as well as making decision about students (Onunkwo, 2002). Asuru (2015) also acknowledged that assessment is the process of organizing measurement data and fashioning them in an interpretable manner on the basis of which judgment could be made. It entails gathering data from diverse sources in order to have a clearer understanding of the learner's attributes as a result of the learning encounter. There is a relationship between assessment and test blue print.

Linn and Gronlund (2002) asserted that table of specification maybe referred to as content of a course or curriculum that can be broadly defined to include both subject matter content and instructional objectives. This simply means the performance students are expected to demonstrate. For the fact that a teacher is required to touch all areas of the curriculum, he teaches students to master the course content so as to yield a positive result.

Kubiszyn and Borich (2003) supported when they acknowledged table of specification or test blue print as the content areas to be covered and the relative emphasis to be placed on each area and instructional objective. It is a flexible plan by a teacher and should be properly designed by him with the aim of making teaching and examination comprehensive so as to harness the best and academic achievement of students in school subjects.

In addition, Akem (2006) opined that, table of specification is a guide to assist a teacher or examiner in the evaluation system. The table shows the total number of items to be allocated to each instructional objective, suggests what might be covered under each item, and the types of item to be used. In fact the blue-print stage is the last and crucial stage in a test plan since it enables the teacher to combine properly the objective and the content areas, bearing in mind the importance and the weight attached to each areas. Akem and Agbe (2003) revealed that table of specification is an outline relating behaviour to topics. By it, teachers can determine what topics are being stressed and also assist in the preparation of test that reflect what students have learned and also the limit time spent on each unit.

Okpala, et al (2003) documented that table of specification enables the test developers to complete the cells in the table and decide the percentage of the total number of items that will go to each of the cells. Notar, *et al* (2004) stated that table of specification or test blue print is a device that enables the teachers to arrive at a representative sample of the instructional objectives and the subject matter treated in the class. Thus, once the instructional objectives and the subject matter have been clearly identified, a table of specification is then prepared to link both and also indicate the number of test items to be written for each level of the objective and each subject matter area. The classroom teacher will decide first on the number of test items or questions he intends to write. Once a decision has been taken on this, the teacher will proceed to preparing the table of specification by listing the instructional objectives across the top of the table and the topics treated by the side.

Downing (2006) sees it as a chart that helps item writers to ensure that instrument measures desired cognitive level of students. It provides a two-way chart to help teachers relate their instructional objectives, the cognitive levels of instruction and the number of test items that should assess each objective. The table of specification serves to clearly define the scope and focus of the test. It ensured that teachers include item that tap different levels of cognitive complexity when measuring students' achievements.

Kubisz and Borich (2003) suggested that teachers should use a table of specification so that they would not forget the details.

Functions of Table of Specification (Test Blue Print)

Mehrens and Lehmann (2001), Akem and Agbe (2003) and Asuru (2015) noted the functions of table of specification/test blue print as follows:

- It specifies the appropriate number of items in the appropriate content area and behaviours and ensures a balance between them.
- Without the table, there would be the tendency for more questions to be asked in some areas and few or non in other areas.

- It helps to avoid the usual lazy man's approach in setting questions by lifting them from textbooks (and) or writing them as they come to mind.
- It is more difficult to write items that measure higher level objectives like synthesis and evaluation, without a blue print, they may also be ignored.
- It stressed and also assists in the preparation of tests that reflect what students have learnt and also limit the amount of time spent on each unit.
- No important objective or content area will be advertently omitted.
- It assists immensely in the preparation of test items, production of valid and well robust test items, in the classification of objectives to both teachers and students and in assisting the teacher to select the most appropriate teaching strategies.
- Only those aims and objectives actually involved in the instructional process will be assessed. That each objective will receive a proportional emphasis on the test in relation to the emphasis placed on the objective by the teacher

Conditions that should be fulfilled when constructing test blueprint

Asuru (2015), Thorndike and Hagen as cited by Chikwe (2017) acknowledged that the following conditions should be fulfilled when constructing a test blueprint:

- The cell of each matrix should include some indications of the weighting of each cell.
- The weighting of each cell is a matter of personal judgment. However, the time spent in teaching each topic and its importance should be considered.
- The test only represents a sample of the content and objectives and not all the contents or all the objectives. As a result of this, it is not necessary for all the cells to be allotted.
- The test blue print is flexible plan and should therefore not be followed rigidly.
- The proportion of test items on each content area should correspond to the proportionate emphasis or importance given to the topic in the class during instruction. This emphasis is in terms of the amount of time spent teaching the topic and it also depends on the volume of the topic. Hence a topic taught in three weeks will contribute more questions than the topic taught in two weeks. Also, the proportion of test items set on each cognitive level should correspond to the importance the teacher considers that cognitive level of his students.
- The test maker must choose the type(s) of the test items which will be most appropriate to constitute the test. That is whether to use objective questions or essays
- The test maker must decide the total number of items for the test.
However, the number of items to be constructed depends on the following:
 - The type of items used on the test.
 - The age and education level of the students.
 - The ability level of the students.
 - The length and complexity of the items.
 - The type of process objectives being tested.
 - The amount of computation or quantitative thinking required by the items.

The use of test specifications produce tests of equal difficulty and discrimination. Besides, their use will also increase test reliability, validity and practicality, test taking strategies and grading consistency and strictness. This does not only add to the importance of preparing tables of specification before test construction, but also shows that the way a table of specification is developed may alter students' scores. Hence, the step of preparing tables of specification is very crucial since invalid and unreliable results may be obtained (Kashkouli, et. al, 2015). Tables of specifications are needed in the development of tests for all purposes, levels of education and various disciplines.

Preparing a table of specification helps the test to have high content validity.

Let us consider a construction of a test blueprint for 50 item multiple-choice objective test in mathematics below.

Steps involved:

- (1) Determine the number of weeks used to teach all the content areas.
That is $2+3+1+2+1+3=12$ weeks
- (2) Compute the number of items each content area would contribute to the 50 items needed.
 - a. Number base system = $\frac{2}{12} \times \frac{50}{1} = 8$ items
 - b. Fraction = $\frac{1}{12} \times \frac{50}{1} = 4$ items
 - c. Simple Equation = $\frac{3}{12} \times \frac{50}{1} = 13$ items
 - d. Mensuration = $\frac{2}{12} \times \frac{50}{1} = 8$ items
 - e. Variation = $\frac{1}{12} \times \frac{50}{1} = 4$ items
 - f. Trigonometry = $\frac{3}{12} \times \frac{50}{1} = 13$ items

Constructing of table of specification: When constructing a table of specification the teacher should be guided by;

- Content of the curriculum
- Followed by learning outcomes/objectives
- Followed by Bloom’s taxonomy and its level and weight keeping in mind the content and learning outcomes.
- Followed by methods of instruction matching with content, learning outcomes, weight and time spent on the topic. Percentage should be worked back to 100%.
- Assessment plan, keeping in mind content, learning outcomes, weight and time spent on instruction.

Table showing test blue print for 50 items in mathematics

No. of weeks	Content Area	Know ledge 15%	Compre hension 25%	Applic ation 20%	Analy sis 25%	Synthe sis 10%	Evaluati on 5%	Total %100
2	Number base system	1	2	2	2	1	0	8(16%)
1	Fraction	1	1	1	1	0	0	4(8%)
3	Simple Equation	2	3	3	3	1	1	13(26%)
2	Mensuration	1	2	2	2	1	0	8(16%)
1	Variation	1	1	1	1	0	0	4(8%)
3	Trigonometry	2	3	3	3	1	1	12(24%)
12	Total	8	12	12	12	4	2	50(100%)

$$\frac{\text{No of weeks}}{\text{Total of Weeks}} \times \frac{\text{Total No. of Questions}}{100}$$

(3) Compute the No. of items each cognitive level would contribute to each content area bearing in mind respective percentage emphasis.

For Number base system

Knowledge level = $15/100 \times 8 = 1$
 Comprehension = $25/100 \times 8 = 2$
 Application = $25/100 \times 8 = 2$
 Analysis = $25/100 \times 8 = 2$
 Synthesis = $10/100 \times 8 = 1$
 Evaluation = $5/100 \times 8 = 0$

Simple Equation

Knowledge level = $15/100 \times 13 = 2$
 Comprehension = $25/100 \times 13 = 3$
 Application = $20/100 \times 13 = 3$
 Analysis = $25/100 \times 13 = 3$
 Synthesis = $10/100 \times 13 = 1$
 Evaluation = $5/100 \times 13 = 1$

Fraction

Knowledge level = $15/100 \times 4 = 1$

Comprehension = $25/100 \times 4 = 1$

Application = $20/100 \times 4 = 1$

Analysis = $10/100 \times 4 = 0$

Synthesis = $10/100 \times 4 = 0$

Evaluation = $5/100 \times 4 = 0$

Variation

Knowledge level = $15/100 \times 4 = 1$

Comprehension = $25/100 \times 4 = 1$

Application = $20/100 \times 4 = 1$

Analysis = $10/100 \times 4 = 0$

Synthesis = $10/100 \times 4 = 0$

Evaluation = $5/100 \times 4 = 0$

Mensuration

Knowledge level = $15/100 \times 8 = 1$

Comprehension = $25/100 \times 8 = 2$

Application = $20/100 \times 8 = 2$

Analysis = $10/100 \times 8 = 2$

Synthesis = $10/100 \times 8 = 1$

Evaluation = $5/100 \times 8 = 0$

Trigonometry

Knowledge level = $15/100 \times 13 = 2$

Comprehension = $25/100 \times 13 = 3$

Application = $20/100 \times 13 = 3$

Analysis = $25/100 \times 13 = 3$

Synthesis = $10/100 \times 13 = 1$

Evaluation = $5/100 \times 8 = 1$

Benefits of Specification/Test Blue Print

- Clarity of learning outcome.
- Ensuring content coverage.
- Matching method of instruction.
- Helps in assessment plan.
- Evaluation of the programme

Alade and Igbinsosa (2014), confirmed that frequently there is real mismatch between content examined in class and the material assessed at the end of the unit test and lack of coherence leads to a test that fails to provide evidence which teachers can make valid judgment on academic performance of students. Notar, et.al, (2004) also supported the study when they noted that inappropriate construction of table of specification would lend hand to in balance in several areas and encourages content validity problems. However, they explained that the degree of content validity is largely a function of the content to which test items are true representation of sample of the content and skills to be learned. Therefore, constructing fair test that give accurate information about students learning is an important skill for teachers because it promotes academic achievement of students.

Majason (1995) also noted that positive relationship exist between table of specification and student's academic achievement as this makes the students to study hard to achieve the objectives of instruction. He noted that since students are aware that questions will be set across all the domain of learning, they study to improve their academic performance which has a reflection in their test and examination scores.

Teaching has been described as one of the human endeavours which require more wisdom, humility, labour and dedication. Asikhia (2010) explained that an experienced teacher in a particular field could understand better from success or failure, from past and this experience can be brought to bear upon content selection. The act of writing table of specification, constructing questions for examinations (evaluating), explaining, motivating etc, is aimed at helping the learner to acquire some skill, knowledge or ideas. A teacher becomes more successful when he is able to understand the theories and use the strategies effectively. Carey (1988) opined that the success or failure of any teacher's proposed curriculum depends heavily on the teacher because they are the implementers thereof. If the teacher who is supposed to inculcate knowledge into students is incompetent, inexperienced and unqualified, it will affect the performance of students. However, effective teaching requires the teacher to step out of the realm of personal experience and set into the world of the learners, hence assessment is very important (Brown, 1983). It concerns the tactics teachers use to meet teaching objectives, including instructional organisation, subject matter, and use of teaching tools and materials. Okoye (2014) observed that strategy is very vital in any teaching-learning situation and any strategy adopted by the teacher may promote or hinder learning. Fahinta (2014) said that most untrained instructors point accusing fingers at learners when learners are unable to carry out the expected behaviour at end of lesson or examination rather than on themselves in failing to utilize appropriate and effective approach in testing the student's ability and performances.

However, poor academic performance by majority of students is fundamentally linked to the application of ineffective teaching strategies by teachers to impact knowledge to learners (Adunola 2012). In order for the strategies to be effective, teachers need to be conversant with numerous strategies that take into recognition of the magnitude of complexity of the concepts to be covered, especially table of blue print. Al-zoubi and Youness, (2015) are of the view that teachers should be well equipped with the necessary-teaching factors and experiences needed for use in teaching school subjects if learners are to learn maximally. Instructional strategies adopted by teacher influence the cognitive, effective and psychomotor outcome. Teaching involves an experienced person that effect positive change in peoples' behaviour. It aims at involving the learner in activities that would give him experience that would produce or effect learning motion of teaching. Okeke (2004) state that in bringing about the desired behavioural changes in learner, and for teaching to be effectively done, the teacher plays a major role. In essence, teachers are very important in educational and learning process that is expected to change the behavioural pattern of students. Its success or failure is to a large extent dependent on how good or bad the teacher is able to present his/her instruction. Omieibi-Davids in Okujagu (2003) explained that teachers have a lot of effect on the behaviour of learners. As such teacher should be mindful of their behaviour in and out of the learning environment.

Ortese (2018) noted that over the years, investigations on factors that predict academic achievement have attracted the interest of teachers, counsellors and school administrators in Nigeria, as a result of the public concern for the declining academic achievement among students. Academic achievement is something of great importance to parents, teachers and students themselves.

Therefore, constructing fair test(s) that gives accurate information about students learning is an important skill for teachers. The table of specification is often useful to organize the planning process of designing a test which allows the teacher to determine the content of the test. Every classroom assessment measure must be appropriately reliable and valid, be it the classroom achievement test, attitudinal measure, or performance assessment. A measure must first be reliable before it can be valid. Test reliability and validity must relate to consistent (reliable) and accurate (valid) measurement.

Assessment plays a major role in the school curriculum by providing a way to monitor student progress toward the learning outcomes that we expect them to achieve (Downing, 2006). To ensure that assessments are consistent with course objectives and address truly important learning outcomes in a balanced manner, it is important that assessments be developed according to a well thought-out plan.

The cornerstone of classroom assessment practices is the validity of the judgments about students' learning and knowledge (Wolming & Wilkstrom, 2010). Therefore, table of specification is one of the tools that teachers can use to support their professional judgment when creating or selecting test for use with their students. It can be used in conjunction with lesson and unit planning to help teacher make clear of the connections between planning, instruction, and assessment. However, a test blueprint is a document that reflects the content of an assessment given to students.

Gronlund (2002) stated that table of specification for practical classroom application is intended to help classroom teachers develop summative assessments that are well aligned to the subject matter studied and the cognitive process used during instruction. However, for this strategy to be helpful in teaching practice, teachers need to make their own table of specification in practical assessment.

Assessment during the instruction (formative assessment)

Formative assessment, sometimes refer as internal, is a method of judging the worth of students while the programme activities are in progress. It informs of development. Its main purpose is to catch deficiencies so that proper learning can take place that allows the learners to master the required skills and knowledge. Here the learner is assessed in the course of teaching. This could take the form of observing, listening to students' answers to questions and comments by other students in order to note their difficulties and to adjust to teaching accordingly. Formative assessment also involves identifying possible misconceptions and taken care of it, in order to prevent future occurrences (NTI Module, 2014).

Formative assessment provides the following:

- Insight on the pedagogical strength and challenges to specific course concept.
- Guidance to improve teaching strategies.
- A means of monitoring progress or growth in teaching and learning.

Assessment at the end of instruction (Summative assessment)

It emphasizes on the overall judgement of one's effectiveness in teaching and learning. It is conducted at the end of a course or programme. The focus is to measure and document quality indicators for decision making purposes. The information from summative evaluation maybe used to improve future teaching performance. It provides information on whether the students have mastered the concepts taught and to what extent. The results of this assessment are given to parents for purpose of knowing the progress of their children.

Summative assessment provides the followings:

- Information concerning teacher's adherence to teaching expectation.
- A bases for comparing teacher's performance to reference group and external performance.
- A means of determining the effectiveness of instructional activities.
- Objective information for determining course assessment.
- Diagnostic information about strength and weakness of teachers' performance.
- Data to determining achievement or curriculum performance expectation.

Principle of Assessment

- Assessment, is aimed at improving student's learning achievements.
- It provides complete information about students' achievement.
- Assessment is a complementary part of the teaching and learning.
- It is based on making use of different methods.
- It is a continuous process.
- It should be fair.
- It should be transparent.
- Assessment should be valid and reliable.

A test blueprint also helps the teachers to see at a glance whether they have challenged students' performance at different levels—from low to high—in each learning domain.

CONCLUSION

In view of the discussion, teachers should use table of specification when setting questions as a component of assessment tool. Table of specification makes the teachers to be serious and committed in their teaching so as to cover the content areas since examinations are expected to cover all levels of learning which brings about greater performance in any of subject or course by students. There should also be regular and frequent monitoring of student learning progress and provision of feedback so as to adopt instructions as appropriate to meet learning needs. However, when constructing a test, teachers need to be concerned that the test measures an adequate sample of the class content at the cognitive level that the material was taught. The table of specification can aid immensely in the construction of test items, in the production of valid and well balanced test, in the classification of objectives to both teachers and students. It also assist the teacher in choosing the most appropriate teaching strategy. Table of Specification helps teachers to relate instructional objectives, cognitive level of instruction and the amount of test that should be stressed in each of the objective; teachers would not forget details; also, helps in preparing test items and selecting most appropriate teaching strategy.

RECOMMENDATIONS

1. Teachers should be mandated to use table of specification as this will help them not to forget important details in their questions for assessment.
2. There is need for teachers training on use of assessment tools and other components of assessment in which table of specification is not left out.
3. Teachers should always set valid and reliable questions to measure what is expected to measure in order to find out how much students have achieved in their programme studies.

4. Teachers should carry out their assessment professionally as this has an impact on academic achievement of students.

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