

ROLE OF TEST BLUEPRINT IN TEST CONSTRUCTION AMONG SECONDARY SCHOOL TEACHERS IN ONITSHA EDUCATION ZONE OF ANAMBRA STATE

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Abstract

This study examined the role of test blueprints in the test construction process among secondary school teachers in Onitsha Education Zone of Anambra State. In order to guarantee that assessments are in line with curriculum objectives, content standards, and intended learning outcomes, it examined how test blueprints function as a guiding framework. The study emphasized the contributions blueprints make to test validity, reliability, and fairness by giving educators a methodical way to create evaluations that fairly gauge students' knowledge and abilities. The study also addressed the difficulties teachers encounter when putting test blueprints into practice and provides suggestions for improving their efficacy in classrooms. The study highlighted the value of test blueprints in supporting high-quality assessment practices in secondary education through this investigation. The use of test blueprints in assessment design is a key strategy for improving teacher confidence and the overall quality of student evaluations. This research investigated how test blueprints can increase teacher confidence among secondary school educators by looking at the effects of structured test planning on test validity, reliability, and alignment with curriculum objectives. Test blueprints are thorough guides for developing tests that ensure balanced content coverage, fair and equitable evaluations, and adequate representation of cognitive levels. This tool helps teachers create assessments that accurately measure student learning outcomes while lowering bias and ambiguity in test construction.

Keywords; Role, Test blueprint, Test construction

INTRODUCTION

Even though a well-designed test can greatly enhance learning results, many teachers fail to use this important resource, known as "the test blueprint". A test blueprint is a plan that describes the structure and content of an examination. It includes details about the topic that will be covered, the number of questions, the type of questions, and the weight of each part. Maduabuchi and Njoku (2021) defined a test blueprint as an outline of a test that lists the learning goals that students are to demonstrate. The purpose of a test blueprint is to ensure that a test is fair, reliable, and accurately measures what it is intended to measure (Ford & Kozlowski, 2021). A test blueprint, which is also known as a table of specification, is a planning document that outlines the structure, content, and weighting of test items to assess learning outcomes of students serves as a framework for developing and evaluating tests, and helps ensure that test items are aligned with instructional objectives and standards; and provides teachers with a clear roadmap for constructing assessments that are valid, reliable, and comprehensive (Gonzalez, 2022).

Tests are frequently used as evaluation tools to discover more about students' academic progress (Quansah, et al., 2018). A test is a tool or method for observing and characterizing one or more attributes of a student using a numerical scale or a classification scheme. A test is also known as a measuring instrument or procedure. A test is a useful measuring instrument in the hands of a teacher or a school administrator, and it helps each of these professionals to do their work efficiently. For example, tests assist teachers in assessing students' needs, reporting students' success or performance in each subject to parents, and monitoring learning progress, among other things. Well-crafted test items should be used to evaluate what students

already know and have learned about a subject of study. Testing offers feedback on the choices made in education.

According to Lin and Linn (2022), It has been demonstrated that using test blueprints improves the validity and quality of evaluations in learning environments as found that test blueprints were useful for enhancing the validity and reliability of high-stakes tests in healthcare education.

Additionally, test blueprints are used to guarantee that standardized tests are impartial and fair to all students as well as to enhance their quality. Teachers in secondary schools can make sure that their tests accurately measure students' learning outcomes and are in line with instructional objectives by using test blueprints, which offer a framework for planning and designing assessments.

Well-constructed tests are critical for ensuring that tests provide valid, reliable, accurate and informative feedback on students' learning outcomes, while poorly constructed tests can lead to invalid and unreliable results according to Luecht & Nungester cited in Obilor 2024. To create assessments that are fair and equitable for all students, it should be crucial to have adequate test construction skills. Test items should be appropriate for all types of students, free from racial or gender bias, and sensitive to cultural and linguistic differences. Linn et al cited in Obilor 2024 stated that a test blueprint is key for teachers to develop tests that ensure that assessments are aligned with the intended learning objectives, contain appropriate test items, and provide a fair and reliable measure of students' learning outcomes.

Methods used by teachers to improve the construction of test blueprints

Test blueprints can be used in a number of ways to enhance test construction, including the following:

- i. Determine learning objectives: Before creating a test, a teacher must decide which particular learning objectives he wishes to evaluate. The substance of the test blueprint will be derived from the organization of these objectives into categories and subcategories.
2. Choose test item kinds: After determining the learning objectives, teachers can choose test item types (such as multiple-choice, short-answer, and essay) that correspond to the learning level of the target student.
3. Determining cognitive levels and weighting: The cognitive levels and weighting of each test item type may then be determined using the test blueprint. By doing this, you can make sure that the test is fair and that every learning goal is evaluated correctly.
4. Create scoring rubrics: Lastly, instructors can create scoring rubrics for every kind of test item using the test blueprint. This can help ensure that the test is scored consistently and that students receive appropriate feedback on their performance (National Council on Measurement in Education cited in Obilor 2024).

Test Blueprint's Objectives for Teachers in Test Development

The goal of the test blueprint is to assist teachers in creating tests. A test blueprint, which functions as a comprehensive plan outlining the subject areas, learning goals, and cognitive abilities to be evaluated, has the following main purposes: Develop Equitable Cognitive Tests: In order to improve their understanding, blueprints make sure that examinations include a variety of cognitive levels, including knowledge, comprehension, application, analysis, synthesis, and evaluation. The many cognitive levels of Bloom's Taxonomy, from basic recall (knowledge) to higher-order thinking abilities (analysis, application, synthesis, and assessment), are balanced by a test pattern. The design can be used by secondary school teachers to group questions according to cognitive level, guaranteeing that the test evaluates students' application, analysis, synthesis, and evaluation of the material in addition to basic recollection. Teachers can develop assessments that are in line with the intended learning objectives and offer a valid and equitable gauge of students' learning outcomes by using a test blueprint.

By following a systematic approach to test construction, teachers can improve the quality of their assessments and provide more accurate feedback on students' performance (Amrein-Beardsley & Collins, 2021). Shepard (2000) revealed that the objectives of a test blueprint may vary depending on the type of assessment, but by generally, the primary aim of a test blueprint is to provide a comprehensive and organized plan for developing a valid and reliable test.

A test blueprint can also be used for the following purposes:

1. Content coverage: To guarantee that the test is thorough and covers all pertinent topics, the test blueprint should specify the content areas and skills that the evaluation will measure.
2. Alignment with curriculum and learning objectives: The test design should be in line with the course or program's learning objectives or results. This makes it possible for teachers to create tests that accurately

reflect the learning objectives outlined in the syllabus and helps guarantee that assessments are evaluating what students should learn.

3. **Balanced representation of content:** Test blueprint ensures that each content area is adequately represented in the assessment. This helps ensure that no single content area dominates the test and that all content areas are given appropriate weight meaning that it prevent overemphasis or neglect of particular areas

4. **Clarity and specificity:** Test with specify or content areas and skills to be assessed are enhanced by the test blueprint. This helps to ensure that test developers and teachers have shared understanding of what will be tested.

5. **Promote Validity and reliability:** Validity and reliability of a test are enhanced by the use of the test blueprint. This means that the assessment measures what it intends to measure and produces consistent results overtime. Thompson and Davis (2023) defined validity as the extent to which a test measures what it purports to do. It means a test that is constructed to measure reading expression should not measure reading ability or spoken language. Validity is defined as what a test measures and how well it does.

6. **Fairness and accessibility:** The test's design should guarantee that all students, regardless of their circumstances or background, can take it fairly and easily.

Components of Test Blueprint

According to Nitko and Brookhart cited in Obilor and Omeke (2024) stated that a test blueprint is made up of four main components, which are content, cognitive level, number of items and item percentage or weight.

1. **Content Area:** The precise subjects or themes that a test is intended to assess are referred to as the content area in test construction. Having a thorough understanding of the subject matter is essential to designing a test that is both legitimate and dependable. A thorough examination of the subject area or issue to be evaluated is typically the first step in determining the content area for a test. The main ideas, abilities, and information that the exam should elicit are identified with the aid of this analysis. Once the content area has been identified, test developers can use various strategies to create test items that effectively assess content area (Popham, 2018).

2. **Cognitive Levels:** The many levels of thought that people employ to process information and resolve issues are referred to as cognitive levels. Cognitive levels are employed in test construction to characterize the breadth and complexity of the mental operations needed to respond to test items. Tests can be constructed using a variety of cognitive levels, including as knowledge, understanding, application, analysis, synthesis, and evaluation. Each of these hierarchical levels builds on the one before it and calls for progressively more sophisticated mental operations. To guarantee that a test assesses a broad variety of knowledge and abilities, test items might be developed at several cognitive levels. In order to effectively measure the information and abilities being measured, test designers must make sure that the cognitive levels of the test items match the desired learning goals.

3. **The quantity of items:** One crucial factor that might impact the validity and reliability of test findings is the quantity of questions included in the test design. In general, there should be enough questions to give a representative sample of the abilities, knowledge, or skills being evaluated. A smaller question count, like 5-10, might be suitable for shorter assessments, such quizzes or knowledge checks. However, in order to effectively evaluate a broad variety of knowledge or skills, longer tests like exams or standardized tests need more questions. The test-taker's time limits should also be considered while determining the amount of questions. The validity of the results may be impacted if the test is too lengthy since test takers may become tired or lose focus. The type of questions utilized, such as multiple-choice, short answer, or essay questions, and how these questions relate to the learning objectives or outcomes being assessed should be taken into account by test designers in addition to the quantity of questions. Ultimately, the goal should be to construct a test that is fair, valid, reliable, and aligned with the learning objectives (Sireci & Zenisky, 2006).

4. **Percentage of Items:** In test construction, the percentage of items is the weight or value given to each test item or question. In most cases, the percentage of items is determined by the test's learning objectives, content significance, or degree of difficulty. The number of points or marks allotted to each item or the percentage of the test score that each item is worth are two ways to indicate the percentage of the test. A multiple-choice exam with 50 questions, for instance, each worth two points, would have a total score of 100. To make sure the test covers all the subjects or content areas it is meant to evaluate, you can also use the test's percentage. In this instance, the percentage of test items or questions that cover each topic or content area determines the test's percentage.

Tabular Representation of Chemistry Objective Tests**Table 1: Hypothetical Test Blueprint of Test Construction in Chemistry**

CONTENT	KNOWLEDGE (24%)	COMPRESSION (28%)	APPLICATION (28%)	ANALYSIS #8%)	SYNTHESIS (4%)	EVALUATION (8%)	ROW TOTAL
Introduction to Chemistry (24%)	2	2	1	1	0	0	6
Particulate Nature of Matter (32%)	2	2	2	1	0	1	8
Symbol, Formula & Equations (28%)	1	2	2	0	1	1	7
Chemical Combination (16%)	1	1	2	0	0	0	4
Column Total	6	7	7	2	1	2	25

Test Blueprint's Advantages and Effects on Secondary School Teachers

1. **Clear Guidance in Test Creation:** A test blueprint gives educators a well-defined framework for developing assessments, ensuring that all pertinent material and learning goals are addressed. Teachers can build a complete and balanced test by simply following the pattern. Because the blueprint walks them through the test creation process step-by-step, teachers save time and effort and are less likely to overlook important content areas.
2. **Alignment with Learning Outcomes:** The design makes it possible for the test to be in line with the course's particular learning objectives and curriculum. The content of the test can be immediately linked by teachers to the lessons that students have learned. More accurate and relevant assessments can result from teachers making ensuring that the test accurately represents students' learning and understanding of the subject.
3. **Facilitates exam Validity:** Teachers can make sure that the exam's questions assess the knowledge, abilities, or particular competencies they want to measure by using a test blueprint. The test material is balanced with the standards and objectives thanks to the blueprint. Instructors become more assured that their assessments are reliable and accurately represent students' knowledge and skills.
4. **Assists in Balancing Cognitive Levels:** The plan encourages educators to create assessments that evaluate a variety of cognitive abilities, from simple memory to higher-order thinking skills like application or analysis. The distribution of questions across various cognitive levels can be planned by teachers. In order to ensure that the test challenges students at different levels and aids in measuring both critical thinking and information recall, teachers can evaluate a range of student competencies.
5. **Promotes Fairness and Equity:** By allocating content and cognitive levels equitably, a test blueprint helps guarantee that every student is assessed properly. Teachers can make sure that all important topics are covered and that no one topic is overemphasized. In order to promote fair evaluation, teachers can design tests that are devoid of bias and guarantee that each student is assessed on a wide variety of skills.
6. **Efficiency in Test Design:** By giving teachers a framework that makes decisions about question kinds, content coverage, and question weighting easier, the blueprint expedites the test construction process. By designing tests more effectively, teachers may create high-quality assessments in less time while organizing and creating exams.
7. **Facilitates Objective Scoring:** Teachers can more easily create rubrics and scoring criteria when a test blueprint outlines the focus topics for each test component. Grading can be done consistently

because of the correlation with learning objectives. Assessment results can be more consistent and dependable when teachers grade exams more fairly and objectively.

8. Promotes Professional Development: Creating a test blueprint pushes educators to consider their lesson plans, instructional methodologies, and evaluation techniques. It gives educators a chance to evaluate how well they are teaching and how it fits into the assessment. By learning more about how to design relevant assessments that support learning objectives, educators can advance their practice and further their professional development.

9. Promotes Effective Communication with Stakeholders: Teachers can discuss the exam's goal, content, and structure with students, parents, and school administrators by using a test blueprint. It makes the assessment's parameters and success criteria more clear. By making sure that everyone involved understands the assessment, teachers may promote openness and trust in the review process.

10. Encourages Reflective Practice: Teachers can examine the blueprint to determine whether the examination appropriately measured the learning objectives and whether the subject areas were sufficiently covered. Future evaluations are enhanced by this introspective process. Teachers can improve the overall learning experience for students by using data to support their judgments about how best to teach and assess.

11. Rises Teacher Confidence: Teachers are more confident in the caliber and impartiality of their assessments when they have a blueprint. The test's comprehensiveness, balance, and curriculum alignment are guaranteed by the methodical methodology. More professional satisfaction results from teachers' increased confidence in their capacity to create and administer tests that accurately gauge students' learning enhances assessments in the future.

Conclusion

In conclusion, test blueprints are valuable resources that boost teachers' self-esteem by offering a methodical, coordinated, and equitable approach to test development. Through comprehension of the classical test theory, they guarantee that assessments are valid, fair, and dependable, which results in more accurate assessments of student learning. Teachers can enhance the quality of their assessments and produce more accurate and insightful assessments of students' learning by implementing a test plan. In the end, the test plan is essential for advancing learning objectives and improving the general efficacy of the secondary school evaluation procedure. The studies also mentioned the difficulties secondary school teachers encounter while creating tests utilizing test blueprints. Additionally, the study offered some suggestions.

Challenges of Secondary School Teachers on the use of Test Blueprints in Test Construction

Test blueprints are useful resources for making sure that evaluations match standards and learning objectives. However, while trying to employ test blueprints in test construction, secondary school teachers frequently run into a number of difficulties. Among these difficulties are:

Poor comprehension of test blueprints: Many teachers are confused about how to match test items with learning objectives and cognitive levels since they have not received professional training in test design building. Teachers may struggle to understand key principles of measurement, such as content validity and item specification (Crocker & Algina cited in Eber 2024). Aligning objectives with assessment can be difficult for teachers. They may have trouble ensuring that all subject areas are fairly represented and mapping curriculum objectives to particular test items.

Time Restrictions: It takes a lot of time to create an extensive test blueprint. Teachers often juggle multiple responsibilities, leaving little time for detailed planning and blueprint creation (Sharma & Kulshreshtha, 2021).

Lack of Resources: It's frequently difficult to find the tools, templates, and training materials needed to create test blueprints. Effective blueprint creation may be especially challenging for educators working in environments with limited resources.

Complexity of Taxonomies: When developing higher-order thinking skills, teachers may find it difficult to categorize test items according to cognitive levels using taxonomies like Bloom's Taxonomy.

Opposition to Change: Because they are accustomed to more conventional approaches to test construction, some educators may be reluctant to embrace new techniques, such as test blueprints. Fear of Evaluation: Instructors may be concerned that utilizing a blueprint may reveal weaknesses in their instruction or curriculum covering.

Recommendations for action

Based on the findings and challenges of this study, the following recommendations are made: The following suggestions are offered in line with the study's conclusions and difficulties:

1. Administrators of secondary schools should assist instructors by organizing seminars for professional development where they can work together.
2. To prevent limitations when creating assessments, the government, through the ministry of education, should provide schools with all the resources they require.
3. The vice principal's Academics should make sure that students tests are vetted before administering to the students.

Suggestions for Further Research

The following suggestions are made:

1. Similar study must be conducted in elementary schools as well.
2. A secondary school teacher investigation is necessary for this work to be generalizable.

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