



**ASSESSMENT OF CONTENT VALIDITY AND
QUALITY OF TEST ITEMS OF WEST AFRICA
EXAMINATION COUNCIL (WAEC) PHYSICS FOR
SENIOR SECONDARY CERTIFICATE
EXAMINATION,**

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Abstract

West African Examination Council (WAEC) provides placement and certification of senior secondary school students, the objectives of the study were to examine the content validity and quality of the physics examination conducted by this body from 2015 – 2019. Two research questions were answered for the study. 250 objectives test items and 75 essay questions were analysed using standard multiple choice item and essay test construction guidelines developed by Haladyna (2011) and Satterly (1981) respectively. The study adopted purposive sampling techniques. The results of the analysis showed that all the two types of test were found to have high content validity and high quality in test construction for the years under review, to maintain the standard and quality of test construction individuals involved in test writing must have adequate knowledge of the content of the subject matter on which the test is being developed. To ensure quality, examination agencies should review their examination syllabus periodically. The objectives of the review are to update the contents of the existing syllabus. New inputs are drawn from relevant stakeholders including subject specialists from secondary schools and tertiary institutions and experts from curriculum developers. In item writing attention should be given to preventing racial, ethnic, religion and gender bias.

Keywords: *Assessment, Content, Validity, Quality, Test.*

INTRODUCTION

Assessment of educational achievement is used to evaluate the content of students achievement, these are continuous assessment (periodic course assessment) and the final examination conducted by independent bodies like

National Examination Council, National Business and Technical Examination Board, West African Examination Council and entry examination conducted by Interim Joint Matriculation Board, Joint Admission matriculation Board etc.

Assessment of the quality of test and content validity of these public examination bodies is very essential in highly competitive situations, it allow greater standardization of tasks and conditions and hence, gives greater comparability of results, one of the problems of students failure in WAEC physics is the difficulty of the pattern of examination questions, particularly their content validity, it is against this background the researcher intends to find out the extent of how the test items of physics is being constructed by the West African Examination Council in terms of its content validity and quality of the test items. The senior secondary physics curriculum by the Federal Ministry of Education Science and Technology (1985) has the following objectives

- To provide basic literacy in physics for functional living in the society.
- To acquire basic concepts and principles of physics as a preparation for further studies.
- To acquire essential scientific skills and attitudes as a preparation for technological application of physics.
- To stimulate and enhance creativity.

Two major concepts permeate the entire curriculum which is motion and energy. Major concepts which related directly to these two concepts are grouped into five sections are:

1. Space, time and motion
2. Conservation principles
3. Waves
4. Fields
5. Quanta

Tyler (1971) defined examination as a standardized situation designed to elicit a sample of an individual's behaviour. Examination as an academic exercise is a means of finding out how much a student has learnt. Ebel (1972) affirmed that examinations have remained popular, the conduct of any examination is to satisfy one or more of the purposes which examination intends to fulfill. According to Grondlund and Linn (1980) test administered under standard conditions, scored according to definite rules and interpreted with reference to

normative data, it has the same fixed set of directions and timing constraints and the scoring procedure is carefully written and uniform.

The concept of validation has been conceptualized by Hamman Tukur and Carew (2005) as the process of collecting and accumulating empirical evidence that supports the claims of an instrument. This means that tests validity should simply measure what it is to measure all of what we want to measure. Thyne (1974) defined validity of an examination as the extent to which it produces results envisaged by its objectives. Kerlinger (1973) defined content validity as the representativeness or sampling adequately of the content. Content validity is difficult to establish but should involve various groups such as subject matter experts, curriculum specialists and educational researchers in the subject area decision regarding the content validity of a test (American Psychology Association, 1988). In order to make these decisions to improve on performance, these experts should be knowledgeable about result research-based changes in the views of how various subjects are taught and learned. Anastasi (1982) viewed that content validation involves essentially the systematic examination of the test content to determine whether it covers a representative sample of the behaviour domain measured. Denga (1987) maintained that content validity addresses the problem of how far the test covers the content, it is supposed to cover, ascertain the level of performance on a test, he opined that a test must reach some agreement as to skills, knowledge to measure, to examine the test to see what skills, knowledge and understanding it calls for and finally to match the analysis of the test content against the analysis of course content and instructional objectives and see how well the former represent the latter.

Quality of test according to Moahi (1997) is the process and product based concepts in which every stage is identified and fine-tuned to the highest possible level to ensure that the resultant examination is fit for the purpose for which it was designed. Kpodo (1997) defines quality in Educational assessment in terms of performance of the instrument or the predictive functions of the test. She observed that assessment may be narrowed down to the degree to which a given assessment shows consistency with the actual future performance of the person assessed.

Generally, to achieve quality in a testing situation the test should have:

Intrinsic quality and

Extrinsic quality.

Intrinsic quality refers to properties that are internal to the test which relates to both the designer and the design and the actual process of developing the test items. They include the test design in terms of the test speculations and the process is adopted to ensure that the final product reflects or approximate to a considerable degree of the test speculations.

Extrinsic quality relates to properties that may be external to the test but may affect perception of the test and the products by stakeholders, it also relates to effort aimed at reducing the influence of extraneous factors on performance in the test. Moahi (1997) stressed that the test development should follow a due process which includes:

- Determination of the purpose of the test.
- Development of the test blue prints and item writer's manual.
- Pilot testing.
- Item analysis to determine validity and reliability.
- Modification of non-functional items.
- Production and administration of the test.
- Scoring and analyzing of the results.

Pigeon (1997) further listed eight (8) steps which ought to be followed when an examination is being prepared, they are:

1. Identification of purposes.
2. Development of test plan.
3. Development of detailed specifications.
4. Preparation of appropriate items.
5. Review and editing of items.
6. Preliminary trial.
7. Testing and item analysis.
8. Final selection of items, organization of question papers and production of question papers.

In this study efforts will be made to find out how WAEC formulates examination question papers in physics and assess the quality of the test items in both multiple choice items and essay test as relates to SSCE syllabus.

Statement of the Problem

The poor performance especially in the WAEC physics conducted examination has become a concern to the parents, teachers and the schools at large, since the emergence of WAEC, there has been a lot of discussion over the level of students performance in these examination bodies, particularly in physics. It is against this backdrop that this work attempts to examine the content validity and quality of the physics examination set by the West African Examination Council (WAEC) and proffers recommendations for the improvement of the passing rate in Borno state and Nigeria at large.

Objective of the Study

- (i) To find out whether there is significant content coverage of the physics objectives and essay test items set out as relates to SSCE syllabus.
- (ii) To assess the quality of SSCE physics test constructed by WAEC.

Research Questions

- a) What is the level of content coverage of the physics objectives and essay test items that is constructed by WAEC as it relates to SSCE physics syllabus?
- b) What is the extent of the quality of physics test constructed by WAEC?

Scope of the Study

This work is restricted to Examination set by the West African Examination Council in physics for five years from 2015 – 2019. It examines all the objectives and essay test.

METHODOLOGY

Research Design

This is a survey study that investigated the pattern of multiple choice items and essay test construction of WAEC physics examination.

Population and Sample

The target population of this study was the West African Examination Council (WAEC) question papers for Senior Secondary School Certificate Examination physics. A sample of five years question papers for the senior secondary

certificate examination ranging from 2015 – 2019 were selected using purposive sampling techniques.

Method of Data Analysis

The question papers for the seven years were divided into two sections; ‘A’ Objectives test items made up of fifty (50) and ‘B’ Essay questions which is made up of fifteen (15), ten compulsory questions and five optional questions to answer any three. A total of two hundred and fifty (250) objective test items and seventy five (75) essay questions were analysed year by year for the period 2015 – 2019. Standard guidelines for construction of multiple choice items compiled by Haladyna., Downing and Rodriguez (1992) was used to assess the content and the quality of the objective test items by comparison of each item with the eleven guidelines stated. Similarly, the essay questions were also compared with the seven standard guidelines for essay test construction which was developed by Satterly (1980).

Based on the assessment carried, percentage of fitness of each item constructed was determine the results are presented in tables I, II and III below from which conclusions were drawn.

Results

The results of the analysis to determine the extent of content validity and quality of test construction of both multiple choice item and essay test in physics prepared by WAEC from 2015 – 2019 are presented below:

Research question 1:

What is the level of content coverage of the physics objective test and essay test items constructed by WAEC?

Table I: Item Analysis for WAEC Physics Question Paper from 2015 – 2019

Year of examination	Level of content coverage of the items			
	Objective Test (out of 50)	Percentage	Essay Questions (Out of 50)	Percentage
2015	50	100%	09	60%
2016	48	84%	11	73%
2017	50	100%	13	87%
2018	50	100%	14	90%
2019	50	100%	14	90%

Source: WAEC Physics Examination Question papers

From the table above, content validity for objectives and essay test items indicates 100% and 60% in 2015, 84% and 73% in 2016, 100% and 87% in 2017, 100% and 90% in 2018, 100% and 90% in 2019 respectively. This indicates high content validity for all the five years.

Research Question 2:

What is the extent of the quality of physics questions constructed by WAEC?

Table II: Quality of Objective Test Items for WAEC Physics Examinations from 2015 - 2019

Year of examination	Avoidance of trick items (Out of 50)	Simple vocabulary (Out of 50)	Formally vertical (Out of 50)	Central ideas in the stem (Out of 50)	Use of positive in the stem (Out of 50)	Many plausible distractors (Out of 50)	Logical numerical order (Out of 50)	Options homogeneous in content (Out of 50)	Careful use of none of the above (Out of 50)	Avoidance of all the above (Out of 50)	Sparingly use of humor (Out of 50)
2015	49(98%)	50(100%)	50(100%)	50(100%)	50(100%)	50(100%)	50(100%)	50(100%)	50(100%)	50(100%)	50(100%)
2016	46(92%)	50(100%)	50(100%)	50(100%)	50(100%)	50(100%)	50(100%)	50(100%)	50(100%)	50(100%)	50(100%)
2017	49(98%)	50(100%)	50(100%)	50(100%)	50(100%)	50(100%)	50(100%)	50(100%)	50(100%)	50(100%)	50(100%)
2018	50(100%)	50(100%)	50(100%)	50(100%)	50(100%)	50(100%)	50(100%)	50(100%)	50(100%)	50(100%)	50(100%)
2019	50(100%)	50(100%)	50(100%)	50(100%)	50(100%)	50(100%)	50(100%)	50(100%)	50(100%)	50(100%)	50(100%)

Source: Haladyna (2011) Handbook of Test Development.

From the results of the table above, based on the guidelines of objective test construction from 2015 – 2019 physics objectives test items was found to have high quality as revealed by the analysis results. However, 2015 and 2017 question paper was found to have 1(2%) tricked question while 2016 question paper has 4(8%) tricked question representing 1% and 8% of the total objective questions.

Table 3: Quality of Essay Test Items for WAEC SSCE Physics Examination from 2015 – 2019

Year of Examination	Measure learning outcome	Matching objective with essay type of what is taught	Clarity of learning objective to the examinee	Simple interpretation of test	Construction of model answer for each question	Don't use of optional question	Provision of information to the examinee
2006	15(100%)	15(100%)	15(100%)	15(100%)	15(100%)	Mixed	15(100%)
2007	15(100%)	15(100%)	15(100%)	15(100%)	15(100%)	Mixed	15(100%)
2008	15(100%)	15(100%)	15(100%)	15(100%)	15(100%)	Mixed	15(100%)
2009	15(100%)	15(100%)	15(100%)	15(100%)	15(100%)	Mixed	15(100%)
2010	15(100%)	15(100%)	15(100%)	15(100%)	15(100%)	Mixed	15(100%)

Source: Satterly, D. *Assessment in schools*

Table 3 above shows that there is high quality of essay test construction for all the five years physics questions (2006 – 2010). It has all the required guidelines of construction of essay test items, however the question papers was found to have mix optional question and compulsory question which is an additional development in the area of essay test construction.

Discussion

The result of findings for research question one indicates high content validity, this is in line with the concept of validation conceptualized by Hamman and Carew (2005), Anastasi (1982), hence a test can only be valid if it collects and accumulates empirical evidence that supports the claims it measures. The result of findings of research question two indicates that nature of the test construction of the objective and essay test items is of high quality, this is in line with Bowerman and O'Connel (1997) who noted that the quality of a product is described by its designs and conditioned by the production process, also quality of a test is a product of a well thought out plan/design, which requires following some processes in which every step is identified and followed meticulously to ensure that the resultant test is fit for the purpose for which it is designed.

Conclusion

From the findings of this study, it can be concluded that, there is significant content coverage in WAEC SSCE physics question paper as well as the test items have high quality construction in nature for the year 2006 – 2010 WAEC SSCE physics question papers reviewed.

Recommendation

Generally, to maintain the standard and quality of test construction, the following recommendation should be strictly adhered among others:

1. The individuals involved in test writing must have adequate knowledge of the content of the subject matter on which the test is being developed.
2. To ensure quality, examination agencies should review their examination syllabus periodically. The objectives of the review are to update the contents of the existing syllabus. New inputs are drawn from relevant stakeholders including subject specialists from secondary schools and tertiary institutions and experts from curriculum development.
3. In item writing attention should be given to preventing racial, ethnic, religion and gender bias.
4. There is need to further investigate the factors responsible for the failure in the SSCE physics examination despite the fact that the items constructed are excellent in nature and have high quality.

REFERENCES

- American Psychological Association (1988). Ethical principles of Psychologists. Washington, D.C Retrieved 14th February, 2009, <http://www.epnet.com/ehost/finland/login.html>.*
- Anastasi, A (1982). Psychological Testing. Fifth Edition. New York.*
- Bowerman, B. & O'Connell, R.T (1997). Applied Statistics, Improving Business Processes. The MC Graw-Hill Companies, Inc., IRWIN, Chicago USA., 1997.*
- Denga,D.I (1987). Educational Measurement. Continuous Assessment and Psychological Testing, Rapid Educational publishers Ltd, Calabar.*
- Ebel, R.L (1972). Essentials of Educational Measurement. Eaglewood Prentice hall.*
- Federal Ministry of Education, Science and Technology Comparative Education and Adaptation Centre (CESAC) (1985). Physics Curriculum for Senior Secondary Schools.*
- Gronlund, N.E & Linn, R.L (1980). Measurement and Evaluation in Teaching (2nd edition) New York: Macmillan publishing Co. Inc.*
- Hamman-Tukur, A., & Carew, P.F.C (2005). Development and validation of the study of Habits and Examination Techniques Inventory (SHETI). Counselling psychology and Human Resource Development P48, Ajisafe Press, Lagos.*
- Haladyna T.M & Downing S.M (2001). Handbook of Test Development. Educational Psychology Handbook, Routledge Publishers, NY. ISBN: 1135283370.*
- Kpodo, L (1997). Quality in Educational Assessment and its Indicators. Proceedings of 15th Annual conference of AEAA held at Sheraton Hotel and Towers, Abuja, 21-27 September, 1997.*

Moahi, S. (1997). Improving the Quality of the Primary School Leaving Examination in Botswana. Why criterion testing? Proceedings of 15th annual Conference of AEAA held at Sheraton Hotel and Towers, Abuja, 21-27 September 1997.

Pigeon, D.A (1967). Modern look at Examinations. Physics Education vol. 2, 1967.

Satterly, D. (1981). Assessment in Schools. Basil Blackwell Publishers Ltd. Oxford England.