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A Comparative Analysis of Psychometric Properties of Two Nigerian Examining Bodies for Senior Secondary Schools Mathematics

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Abstract: This study compared the Psychometric Properties of WAEC and NECO Mathematics Multiple Choice Items so as to ascertain whether the two papers are equivalent tests. he sample of this study is made up of 500 senior secondary students randomly selected from ten local government areas of Ekiti State. The findings revealed that there were no significant differences between their difficulty level indices, discriminating power, distracter index and validity indices and both are reliable. By implication NECO and WAEC Multiple Choice Items are equivalent.

Key words: Comparative analysis, psychometric properties, senior secondry, mathematics, Nigeria

INTRODUCTION

West African Examinations Council (WAEC) was established through ordinance No 40 of 1951 that charged the body with determining by examination required in the public interest in West Africa and empowered it to conduct such examinations and so award certificates equivalent to those of examining authorities in the United Kingdom.

A lot of criticisms leveled against WAEC, prominent among these are: Temitope (1999), Punch Newspapers Editorial Comment (July, 8, 1999) and supported by Kolawole (2001) were:

"Mass leakage of examination papers, at times, traceable to the officials of the councils and banks where the papers are kept. Uncontrollable population. Explosion of candidates that leads to overcoming in Examination centers, overloading of work, all which leads to unreliability of the examination."

In fact, the "EXPO 77" led the Federal Government setting up the Sogbetan Commission of Inquiry to look into the problems of WAEC be drastically shelved to other examination bodies to the set up such as NATEB (National Technical Examination Board for Technical Subjects, National Teachers Institute (NTI) for grade two Certificate Examination and NECO (National Examinations Council for Senior Secondary Certificate Examination (SSCE) Kolawole (2001) were.

This Sogbetan's recommendation led Federal Government to establish National Examinations Council. NECO in April, 1999. In other words, NECO was transformed from the National Board for Educational Measurement (NBEM) established under Decree No 69 of August 1993 at the instance of the Federal Government, which equally assigned the conduct of SSCE for school certificate to it. NECO conducted its maiden version of SSCE in May/June 2000. The body (NECO) had its taste of criticism, Okororola stated that NECO is an illegal body, lacks capacity for the conduct of SSCE, cannot enjoy national acceptability and Internal recognition.

All criticisms raised against these examinations bodies give the researcher a lot of concern as to whether the two examining bodies' items are not reliable or nor valid, hence the researcher attempts to know whether there exist any relationship between their difficulty levels, discriminating power, distracter index, validity index and reliability coefficient of the WAEC and NECO mathematics multiple choice items and finally to find out whether their mathematics multiple choice items are equivalent test items.

Research questions: This study attempts to answer the following questions:

- WAEC and NECO multiple choices test. Items are not equivalent, are WAEC and NECO reliable and valid?
- Is there any difference between the discriminating power of WAEC and NECO mathematics multiple-choice items?
- Is there any difference between the difficulty level indices of WAEC and NECO mathematics multiple-choice items?

Research hypotheses: Based on the aforementioned questions, the following null hypotheses were postulated and tested at $\alpha = 0.05$ level of significance.

Ho_1: WAEC and NECO mathematics multiple choice test items are not significantly equivalent i.e. WAEC and NECO are not reliable.

Ho_2: There is no significant difference between the discriminating powers of WAEC and NECO mathematics multiple-choice items?

Ho_3: There is no significant difference between the difficulty level of WAEC and NECO mathematics multiple-choice items.

Ho_4: There is no significant difference between the distracter indices of WAEC and NECO mathematics multiple-choice items?

MATERIALS AND METHODS

Research design: The research design used for this study in descriptive of survey type.

Population, sample and sampling techniques: The population of this study is made up of all Senior Secondary Class three (SS 3) students who sat for Senior Secondary Certificate Examination (SSCE) by both WAEC and NECO in May/June 2005.

The sample for the study was 500 students randomly selected from ten out sixteen Local Government Areas (LGA) of the state stratified sampling technique was employed to select (1):

- Fifty students from each of the ten LGA.
- Ten students from each of the five Secondary Schools selected from each LGA.

Instrument: The instruments of the study are:-

Multiple choice test items (objective) in mathematics of both WAEC and NECO and α-Cronbach reliability principles were applied to obtain reliability coefficients of 0.86 and 0.83, respectively. According to Kolawole (2001) if a test made up of 50 pairs and if its calculated "r" is greater or equity to 0.273 and of 60 pairs and r calculated is greater or equal to 0.250 the such test is significantly related. This means that WAEC and NECO for 2005 May/June are reliable.

In finding out the valid of the two tests, concurrent validity principles was applied and they were found to be valid.

The statistical tools used in the study were mean, standard deviation, student t-test, discriminating power formula and Pearson correlation coefficient moment formula and Biseral coefficient formula.

RESULTS

Ho_1: WAEC and NECO mathematics multiple choice test terms are not significantly equivalent.

Table 1 shows that t-calculated is less than t-table, by implication, the null hypothesis is accepted and hence there is no significant difference between the means of NECO and WAEC in mathematics multiple-choice items. Also by equivalence principle of reliability of two equivalent tests, r-calculated is 0.75, this shows that there is a very high relationships between WAEC and NECO and there is no significant difference between their means, this means that the two papers are equivalent hence reliable.

Going by concurrent validity of a test item, Table 1 shows that rc = 0.75 and tc < tc, this means there is a very high relationship between WAEC and NECO mathematics multiple choice test items and there is no significant difference between the two papers, thus NECO is validity using WAEC as the standard paper and WAEC is also valid if we take NECO as the standard paper.

Hypothesis 2: There is no significant difference between the discriminating power indices of WAEC and NECO mathematics multiple choice test items.

Table 2 shows that t_c is less that t-table, thus the null hypothesis is accepted at α = O.05, hence there is no significant difference between D-values of WAEC and NECO items from the data collected, 8 items of WAEC had very good D-values i.e. ? 0.4 while NECO had 16 of such D-values. WAEC and NECO had 19 items and 16 item respectively discriminating poorly.

Table 1: Student-t-test analysis and correlational analysis

Source of variation	N	R	Df	Mean	SD	t_c	t_t	Result
NECO	60	0.75	108	0.856	10.21	0.018	1.98	NS
WAEC	50			0.824	8.01			

p>0.05

Table 2: Discriminating power indices of 2005 NECO and 2005 WAEC papers

Source of variation	N	Mean	SD	Df	t_c	t_t	Result
NECO	60	0.48	0.15	108	1.84	1.98	NS
WAEC	50	0.43	0.18				

p>0.05

Table 3: Student t-test Analysis of P-values of WAEC and NECO items

Source of variation	N	Mean	SD	Df	t_c	t_t	Result
WAEC	50	0.42	0.154	108	0.845	1.98	NS
NECO	60	0.36	0.18				

p>0.05

Table 4: Student t-analysis of the difference in distractor indices of WAEC and NECO

Source of variation	N	Mean	SD	t_c	t_t	Result
WAEC	50	0.36	0.16	1.54	1.98	Ns
NECO	60	0.31	0.18			

p>0.05

In final analysis, since student t-test shows no significant difference these means the two papers discriminate equally. The result of this study in lying with Ogunjemilua (2003).

Hypothesis 3: There is no significant difference between the difficult levels of WAEC multiple-choice items in mathematics and those of NECO items.

Table 3 shows that tc is less than t-table, thus there is no significant difference in P-values of NECO and WAEC. That is, there is no significant difference between the WAEC and NECO in P -values in mathematics multiple choice test items.

Hypothesis 4: There is no significant difference between the distractor indices of WAEC Multiple choice Items In Mathematics and those of NECO Items.

Table 4 shows that t_c is less than t_t, leading to the acceptance of the Null hypothesis, this means that there is no significant difference between the distractor indices of NECO and WAEC. By implication, the level of guessing the correct answers the key to each items of both WAEC and NECO are the same.

DISCUSSION

The findings of this study, show that there is no significant difference between each of the psychometric properties of NECO and WAEC multiple choice times in mathematics. In other words all their items maintained the same difficulty level, distractor index, discriminating of power and they are both reliable and valid. Above all, all sources of variability between two tests are religiously checked, such as objective measured, item writer. Item analysis (difficulty level, Discrimination power) quality of test items, reliability, diagnostic, score interpretation applicability, financial and dependable (Kolawole, 2001). They have the same syllabus meant for the same set of students, the source for item writers and markers from the same sources, they both make use of "stanine" and norm referenced principles to interprete their results, they are both for virtually for the same purposes such as jobs, admission e.t.c. and the two of them are commercially based. This one could conclude that NECO and WAEC multiple choice items are equivalent in all aspects.

The result of these findings had proved some of the criticisms levied against NECO wrong. This study also contradicted Kolawole's submission (2002) on the maiden edition of NECO (2000) in which he fund out that a given x grade in NECO mathematics means x + 1 grade in WAEC maths (e.g. A3 grade in NECO means C4 in WAEC e.t.c). This study contradicted the opinions of Adeniran (2000) who claimed that NECO is inferior to WAEC in all standards and that Okomoua, who claimed that NECO results were worthless. Finally the only difference between the Nigerian examining bodies, that is WAEC and NECO is that WAEC had been established for long while NECO is still at its teething age and within the shorter time possible NECO should get itself properly established like WAEC. It is recommended that the two examining bodies should meet and agree on the same length of (number of questions) of the test items. If this is not done it may affect some of the psychometric properties of test items.

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