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COMPARATIVE ANALYSIS OF ITEM DIFFICULTY AND DISCRIMINATION INDICES OF MATHEMATICS EXAMINATIONS OF WAEC AND NECO IN FEDERAL CAPITAL TERRITORY ABUJA, NIGERIA



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ABSTRACT

The study compared the analysis of Item difficulty and discrimination indices of Mathematics examinations of WAEC and NECO in Federal Capital Territory Abuja, Nigeria. The study utilized descriptive survey research design. The study population consists of 18,153 SS III students from 55 public secondary schools that have been presenting students in writing Mathematics examination during WAEC and NECO SSCE in FCT Abuja. Multistage stratified random sampling technique was used to sample 375 respondents. The instruments used for data collection were two Mathematics Achievement Test (MAT); whose items were adopted from WAEC and NECO multiple-choice question papers of 2014. In order to make sure the instrument measured what they are design to measure, content validity was sought and obtained by submitting the test items to two experts in the field of Measurement and Evaluation and Mathematics Education. The logical consensus of the experts enabled the researchers to establish rational validity indices of 0.86 and 0.83 respectively for WAEC and NECO Mathematics. Cronbach Alpha method was used to established internal consistency indices of 0.82 and 0.81 respectively. Classical Test Theory (CTT) model of item analysis was used to establish the difficulty, discrimination and distracter indices of the test items. The mean difficulty indices, mean discrimination indices and mean distracter indices were used to analyze data for answer research questions one to three. By the hypotheses were tested using t-test statistics. This is considered suitable because the two independent mean of the indices were used for the analysis. It recommends that the present levels of difficulty and discrimination indices of Mathematics examination items used by WAEC and NECO should be sustained and improved upon.

Keywords: Psychometric properties, mathematics examinations, mathematics achievement test, classical test theory.

INTRODUCTION

Mathematics is a discipline in the secondary school curriculum whose effects are felt in almost all subjects offered in school, the dependence of Physics, Chemistry astronomy, Biology, Geography, Statistics, Business administration and Economics on Mathematics cannot be over emphasized. Mathematics is also described as the science that draws necessary conclusions for describing the foundations of most branches of natural sciences and technology. It deals with numbers, quantities, measurements, variation, graphs, shapes, volume, fractions, logarithms and indices, algebraic processes and equation. Moyinoluwa (2015) opined that over the years, performance of students in WAEC and NECO Mathematics examinations has not been encouraging. This has been a fundamental source of concern to government, researchers, educators, parents and the general public. Researches has shown that the reasons for the poor performance of students in Mathematics could be attributed, among others, to the poor state of education in the country, low quality teaching staff, difficulty of the items, nature of the subjects, inadequate preparation of students for examinations as well as cut in education budgets leading to shortages of instructional materials for effective teaching and learning. Examinations in Nigeria, particularly the Secondary School Certificate Examinations, have been afflicted by examination malpractices and mass failure. Therefore, since the senior secondary school certificate examinations were set, conducted, scored and graded by bodies external to the schools, it is possible that some of the viruses that account for poor performance could be related to the external examination bodies. Actually, several other factors were observed to be responsible for students' mass failure in WAEC and NECO examinations, some blamed the home, society and parents for failure to inculcate discipline and learning habits in their children (Moyinoluwa, 2015).

Secondary school students in Nigeria during their final year are mandated to sit and write either of the following examinations – Senior School Certificate Examination (SSCE) prepared by National Examination Councils (NECO), West African Senior School Certificate Examination (WASSCE) set by WAEC as well as the National Technical and Business Certificate Examinations (NTCE/NBCE) which is prepared by NABTEB. All these are regarded as external examinations open to all students in Nigeria which are conducted using tests that are expected to possess the required psychometric properties. In the view of Adeyegbe (2004), tests used by different government examination boards are usually more enhanced than the ones set by the teachers in the secondary school setting, including higher institutions. These examination bodies award certificates that are officially recognized in the country as equivalent. Either certificate could be used to obtain employment in the appropriate cadres of public service and/or in privates' companies and corporations. Such certificates are prerequisite for admission into any tertiary institution of learning.

The obtaining of five credit including both Mathematics and English in five relevant subject is a pre-requisite for meeting the Joint Admissions and Matriculation Board (JAMB) minimum requirement for admission into tertiary institutions in Nigeria. Some prospective candidates usually merge the grades obtained from sittings in two of the examinations. According to the WAEC chief examiner's report (2014 – 2016) less than 60% of the candidates who sat for WASSCE mathematics and physics between 2013 and 2015 in Nigeria had credit pass (A1-C6) and above.

Tests such as multiple-choice tests are judged worthwhile when they possess psychometric properties. Omole (2012) defined psychometric properties of examination as certain attributes inherent in tests upon which an assessment of candidate is based. These properties include the facility and difficulty indices, the discrimination index, the power of distracters, validity and reliability indices. The field of psychometrics is principally dealing with the development and validation of measurement items such as test, questionnaire items and traits inventories. The concept of Psychometrics is utilized in wide range of learning evaluations to estimates the abilities of students in area of writing, reading, and Science Subjects. The psychometric properties that every measuring instrument such as a test should possess are validity and reliability. Validity is the watchword or foundation stone over which the entire

superstructure of testing is based (Sidhu, 2005). Therefore, Abanobi *et al.* (2014) stated that tests are required to be valid if results based on them are going to be utilized for value judgment. If an item is valid, such an item is said to be reliable to a greater extent. Item analysis is useful in helping test designers determine which items to keep, modify, or discard on a given test; and how to finalize the score for a student.is also concerned with the examination of individual items on a test, rather than the test as a whole, for its difficulty, appropriateness, and relationship to the rest of the test. In carrying out item analysis, scores of tests are arranged, starting with the highest to the least scores. In practice, the criterion groups of 25% to 33% are taken while the middle papers are discarded (Hopkins & Antes in Orluwene, 2012).

Item Difficulty is the mean performance score for an item in Mathematics achievement. It is an estimate of the skill level needed to pass an item. It is frequently measured by calculating the proportion of individuals passing an item. Item difficulty also can be seen as the proportion of test takers who answer an item correctly. Item difficulty for a dichotomous item under CTT assumption is referred to as P - value, the proportion of test takers getting the item while with polychromous items it is simply the correct average score. In calculating P - value shows the fraction of students in both the upper and lower ability group that got an item right (Ugodulunwa and Orluwene in Joe-Kinanee & Goodness 2017). It ranges from 0.0 (none of the students correctly responded to the item) to 1.0 (all responded to the item correctly). The criteria by Sidhu (2012) recommended a difficulty level which range from 0.4 to 0.9. An item that has a low difficulty value of less than 0.4 might have been wrongly keyed, too difficult in comparison to the general level of ability of the class, vague or not writte n clearly. An item with difficult indices of 1.0 is too easy. T h s is because interpretation of item difficulty is in reverse fo rm. Thus, the larger the index the easier the item while the smaller the index the difficult the item. So the item difficulty indices range of 0-1 is an inverse scale (Wiersma & Jurs in Orluwene, 2012).

The discriminating power of an item is an indication of the extent to which an item distinguishes the better learners from the weaker students in terms of test or examination. It is also called item efficiency because it determines how efficient the particular item is in discriminating between those who know the correct answer to the item and those who do not know in the test or examination. The index is the difference between the proportions of scores on the single item and the scores on the total test (Anikweze, 2013). Item Discrimination is also described how well an item discriminates between the upper and lower ability group of testees (Ugodunlunwa & Orluwene in Joe-Kinanee & Goodness, 2017). The item total correlation gives the measure of the discrimination or differentiating power of the item. It is positive if more students from the higher achievers responded to the item correctly more often than low achievers did, and negative if the opposite occurred. It ranges between -1 to +1 and the discrimination is better when the value is closer to 1 while Items with negative discrimination values are very bad items hence should be reviewed and or replaced (Emaikwu, 2011).

Item distracters are distinctly the incorrect options while the key is the correct option. The distracter should be seeming reasonable to an examinee that is not adequately conversant in the content area. Distracter analysis describes the efficiency of the distracters in the options in deceiving those who do not know the right answer. It is computed as Item Discriminability but putting the options to each

question in place of items. Good distracters will normally have negative index values since more candidates from the poorer scorers are prone to accept distracters as correct responses. Thus, positive discrimination indices are signs of inappropriate distracters (Anikweze, 2013). Distracter index shows how well incorrect options distract the lower ability grouping from selecting the correct option (key). A good distracter should attract more students from the lower ability group than the upper ability group (Iweka, in Orluwene, 2012). The distracter indices range from -1 to +1. A positive value shows that more Mathematics students in the lower ability group choose it, while a negative value shows that more Mathematics students in the higher ability group chose it. A zero index indicates that both groups were equally distracted (Orluwene in Joe-Kinanee and Goodness, 2017).

Subsequently, item analysis is a technique that examines students' responses to individual test items to evaluate the importance or value of those items and the test itself. It is particularly valuable in improving items that might be sourced in subsequent tests, eliminating vague or misleading ones before the test administration. This analysis is also concerned in reviewing of test item content and statistics which describes testes' performance on the item (Orluwene, 2012). Wiersma and Jurs in Joe-Kinanee and Goodness (2017) stated that when student perform surprisingly low or high, teachers should investigate if the performance level results from error inherent in the test items, instructions or the students' abilities before appropriate action can be taken.

NERDC (2010) assert that Psychometric properties of examinations are the internal and/or external attributes inherent in tests upon which an assessment of candidates is based. This property includes difficulty indices and discrimination indices the power of distracters validity and reliability indices. It is perhaps worth mentioning that this attributes of a test are most often ignored during assessment and/or application of test results by public examination bodies. Olatunji and Owolabi (2009) examined the difficulty and discrimination of economics test items with various option formats among secondary schools in Ilorin, Nigeria. Findings from the study show that students had the highest mean performance in the three options format of the tests. Significant mean difficulty and discrimination indices in NECO MCT items were also recorded in three options test. It was further shown that number of options significantly affected the difficulty and discrimination indices of NECO MCT items in Economics. Conversely, number of options did not significantly affect the difficulty and discrimination indices of WAEC MCT items in Economics.

Joe-Kinanee and Goodness (2017) found out that, the criteria set for item analyses, all of the tests had good item difficulty and discrimination indices except 2014. Mathematics test item that had just 23% pass on the difficulty indices criteria and 43% on the discrimination criteria. All of the tests items passed the distracter indices criteria. Obinne (2011) found out that there were significant differences in the SEM of Biology examinations conducted by NECO and WAEC in 2000, 2001 and 2002. This implied that Biology examinations conducted by NECO had smaller SEM (high reliability) than those of WAEC. More so, the study was carried out on Psychometric study of two main Examinations in Nigeria using Biology but this study used the same two main Examinations in Nigeria using Mathematics.

Bandele and Adewale (2013) their results showed that there was no significant difference in the item difficulty levels of WAEC, NECO and NABTEB Mathematics achievement

examinations and it was recommended that none of this examination should be seen as being lower in standard than the other and there should be no discrimination in the recognition of WAEC, NECO and NABTEB certificates. Moyinoluwa (2015) investigated the psychometric properties of Mathematics examinations conducted by four examination bodies (NABTEB, NECO, JAMB and WAEC) to establish the quality of the items presented to secondary school students for of the purpose of certification and placement. A fairly high proportion of the test items have appropriate difficulty index within ranges 0.25 - 0.75. Validity of test batteries used was fairly good and other psychometric characteristics were found to be generally acceptable. It is recommended that, for easy tests, attention should be given to higher order skills required of graduate of secondary schools and coverage of most aspects of the syllabi prescribed by examination bodies.

Olutola (2015) found out that 2008 SSCE Biology multiple choice test had mean difficulty index of 0.42 and this is slightly higher than NECO Biology multiple choice test with mean difficulty index of 0.40 and 2008 SSCE in Biology had a discriminating power of 0.43 and this is higher than NECO with mean discriminating power of 0.39. It was therefore recommended that 4 option items in multiple choice Biology tests should be encouraged but if 5 options items should be used more attention should be given to psychometric properties of tests. Also, governments should periodically organize in-service training programme for teachers on regular basis to broaden their knowledge in test construction, test administration and interpretation in order to improve students' performance in Biology in external and internal examinations.

The abysmal performance of candidates in Mathematics is reflected in the candidates performing below expectation during the Senior Secondary Certificate Examinations (SSCE), which have caused low enrolment of students to read the science courses in tertiary institutions. The students' academic performance in senior secondary school examinations in science courses such as Physics specifically, has been rated as poor by many researchers (Falalu, 2015). The notable cases of putting blames on the examination bodies necessitate this study. Beside, Bandele and Adewale (2013) argued that WAEC is more superior to NECO by all criteria. This argument has not been backed by any defined or definable parameters. To say that an examination body's standard is low or high, one must explicitly indicate the parameters that were used as the basis for comparison between the examination bodies and other equivalent public examinations in and outside Nigeria, as a way of leading one to establishing a valid and reliable judgment. It is quite inappropriate that an important judgment concerning examination bodies should be based on unfounded opinions without reference to psychometric properties and other parameters to establish the difficulty level of the examination, and the indices of reliability, discrimination, validity, variability and other factors like examination administration, supervision and item development processes. It is on this premise that this study was conceived and thus compares and analyzes Item difficulty and discrimination indices of Mathematics examinations of WAEC and NECO in Federal Capital Territory, Abuja, Nigeria.

Research Questions

In view of the above problem stated, the following research questions were asked:

- 1. What are the difficult indices of 2014 Mathematics items used by NECO and WAEC?
- 2. What are the discrimination indices of 2014 NECO and WAEC Mathematics examination?

3. What are the distracter indices of 2014 Mathematics examination prepared by NECO and WAEC?

Objectives of the Study

The main objective of this study was to make a comparative analysis of psychometric properties of compare and analyze Item difficulty and discrimination indices of Mathematics examinations of WAEC and NECO in Federal Capital Territory, Abuja, Nigeria. However, the specific objectives were to:

- 1. Estimate the difficult indices of 2014 Mathematics examination conducted by NECO and WAEC.
- 2. Compute the discrimination indices of 2014 Mathematics examination used by WAEC and NECO.
- 3. Investigate the distracter indices of 2014 Mathematics examination items conducted by WAEC and NECO.

Hypotheses

For this study, the following null hypotheses were formulated and tested at 0.05 level of significance:

- 1. There is no significant difference between the mean difficulty indices of 2014 Mathematics examinations conducted by WAEC and NECO.
- 2. There is no significant difference between the mean discrimination indices of 2014 Mathematics items used by WAEC and NECO.
- 3. There is no significant difference between the mean distracter indices of 2014 Mathematics examinations conducted by WAEC and NECO.

METHODOLOGY

The study utilized descriptive survey research design. Since the data involved were collected from the source and were used to describe the prevailing situation as it affects the psychometric properties of the examinations. The study population consists of 18,153 SS III students from 55 public secondary schools that have been presenting students in writing mathematics examination during WAEC and NECO SSCE in FCT Abuja. The common characteristic of the population was that they were SS III students' in public secondary schools in FCT, Abuja. The schools registered students for WAEC and NECO and offered mathematics as subjects at SSCE. The choice of using SS III students was on the basis that the study assumed students at this level had acquired some basic skills of writing SSCE examination.

The sample of the study was determined using Kreicie and Morgan (2006) Table for determining sample size from a given population. The study used multistage stratified random sampling technique to sampled 375 respondents. First, the Federal Capital Territory was considered on the basis of the existing six area councils. All public schools in each of the six council areas were involved in the study. The sampled schools were selected proportionate to the number of schools in each council area. The sample size of schools obtained was 12. In the identification of the sampled schools, only secondary schools that have been presenting students in writing mathematics during WAEC and NECO examinations were used. Students were selected using proportionate sampling technique in the sampled secondary schools from the six council area of FCT Abuja.

The instrument study used in this study were WAEC Mathematics Multiple-Choice Achievement Test (WMMAT) and NECO Mathematics Multiple-Choice Achievement Test (NMMAT). The multiple-choice test items in mathematics from WAEC comprised 50 items each to be answered by candidates within 1 hour 30minutes while NECO comprised 60 items each to be answered by candidates within 1 hour 15mins. Each item was followed by four options lettered A to D. Students were allowed to respond to the questions by ticking the correct option on the question paper.

In order to make sure the instrument measured what they are design to measure, content validity was sought and obtained by submitting the test items to two experts in the field of Measurement and Evaluation. They were asked to rate the instrument using 5- points scale (Very = good 5, Quite good = 4, Fairly good = 3, Manageable = 2 Irrelevant = 1). The experts were requested to check for relevance, clarity and whether the items were capable of eliciting the right responses. (Corrections were affected based on the observations of the experts. The logical consensus of the experts enabled the researchers to establish rational validity indices of 0.86 and 0.83 respectively for WAEC and NECO Mathematics.

The WAEC and NECO 2014 mathematics adopted multiplechoice items were piloted on 50 candidates in Government Senior Secondary School Zuba and Government Day Secondary School Gwagwalada who were part of the population of the study but not part of the sample. The Cronbach's Alpha coefficient model of measuring reliability was utilized to compute the internal consistency of the coefficients. The instrument yielded 0.82 and 0.81 as indices of internal consistency respectively.

The consent of the students, privacy of information and other ethical assurances were guaranteed to the students. The

0.29 & below – difficult

instruments (test) were administered on SS III students along with two research assistants who acted as invigilators for the exercise. The common characteristic of the research assistants was that they were all holders of first degree as minimum academic qualification. Three hundred and seventy-five (375) copies of instruments were distributed to the testees. At the end of the test, the scripts were collected and marked by the research assistants and the scores were handed over to the researchers.

The following statistical tools were employed to provide empirical information/answer to each research question as appropriate. Classical Test Theory (CTT) model of item analysis was used to establish the difficulty, discrimination and distracter indices of the test items. The mean difficulty indices, mean discrimination indices and mean distracter indices were used to analyze data for answering research questions one to three. Finally, the hypotheses were tested using t-test statistics. This is considered suitable because the two independent mean of the indices was used for the analysis.

RESULTS

The data were presented and analyzed according to the research questions asked and hypotheses formulated in the study. For deciding whether an item was difficult, moderate or simple, the guideline provided by Ugodulunwa (2008) was followed as shown in Table 1.

Table 1: The Acceptance Range for Difficulty and Discrimination Indices

For Difficult Index	For Discrimination Index
0.70 & above – easy	0.30 and above - moderate
0.30-0.69 – moderate	0.20 - 0.29 - low

Research Question 1: What are the difficult, indices of 2014 Mathematics items used by NECO and WAEC?

Table 2: Difficulty Indices of WAEC and NECO 2014 Mathematics Multiple-Choice Test Items									
Exams Body	No and % of items	No and % of	No and % of	Average	Total No. of				
	that are difficult	items that are	items that are	difficulty index	Items				
		Moderate	easy						
WAEC	6 (12%)	44 (88%)	0 (0%)	0.45	50 (100%)				
NECO	4 (6.67%)	56 (93.33%)	0 (0%)	0.47	60 (100%)				
Table 2 shows dif	fficulty indices of WAF	EC and NECO 2014	items while	WAEC had 44 (889	%) moderate (appropriate)				
Mathematics mul	tiple-choice items. The	e result shows that	items. Likewi	ise. NECO had 0.4	7 average difficulty index				
WAEC had 6 (1	2%) difficult (inappro	priate) items while	while WAEC	had 0.45 average dif	fficulty index.				
NECO had 4	(6.67%) difficult (in	appropriate) items.	Research Ou	estion 2: What are	the discrimination indices				
However, NECO	had 56 (93.33%) mo	derate (appropriate)	of 2014 NEC	O and WAEC Mathe	matics examination?				
Table 3: Discrim	ination Indices of WA	EC and NECO 2014	Mathematics Multip	ole-Choice Items					
Exams Bodies	No and % of items No	No and % of items	No and % of items	Average	Total No of Items				
V	with Moderate v	vith low	with poor	discrimination					
C	discrimination d	liscrimination index	discrimination	index					
i	ndex		index						
WAEC 3	32 (64%) 4	(8%)	14 (28%)	0.38	50 (100%)				
NECO	44 (73.33%) 3	8 (5%)	13 (21.67%)	0.45	60 (100%)				

0.19 & below – poor

Table 3 shows the discrimination indices of WAEC and NECO 2014 Mathematics multiple-choice items. The result shows that NECO had 44 (73.33%) items with moderate (efficient) discrimination index while WAEC had 32 (64%) items with moderate (efficient) discrimination index. However, WAEC had 4 (8%)items with low discrimination index while NECO had 3 (5%)items with low discrimination

index. Similarly, WAEC had 14 (28%)items with poor (inefficient) discrimination index while NECO had 13 (21.67%) items with poor (inefficient) discrimination index. Likewise, NECO had 0.45 average discrimination index while WAEC had 0.38 average discrimination index.

WAEC?

Table 4: Number of WAEC and NECO 2014 Mathematics Mult	ple- Choice Test Items with Appropriate Distracter Indices
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Exams Body	No and % of items with effective distracter index	No and % of items with ineffective distracter index	Average distract index	Total No of Items	
WAEC	31 (62%)	19 (38%)	-0.16	50 (100%)	
NECO	37 (66.67%)	23 (38.33%)	-0.18	60 (100%)	

Table 4 shows the distracter indices of WAEC and NECO 2014 Mathematics multiple-choice test items. The result indicates that NECO had 37 (66.67%) items with effective distracter indices while WAEC had 31 (62%) items with effective distracter indices. Similarly, NECO has 23 (38.33%) items with ineffective distracter indices while WAEC had 19 (38%) items with ineffective distracter indices. Also, NECO had -0. 18 averagedistract indexwhile WAEC had -0.16 averagedistract index.

Testing of the Hypotheses To determine whether the difference between the difficulty indices of WAEC and NECO 2014 mathematics multiplechoice items is statistically significant, hypothesis 1 was tested.

Null Hypothesis 1: There is no significant difference between the mean difficulty indices of 2014 Mathematics examination questions conducted by WAEC and NECO.

Fable 5: t -test for the Mean Difficult	v Indices in WAEC and NECO	2014 Mathematics Multiple-Choice Test Iter
	y	

Exams Body	No.	Mean	df	t _{cal}	t _{tab}	
WAEC	50	0.45	108	-0.893	1.658	
NECO	60	0.47				

Table 5 shows *t*-test for the mean difficulty indices in WAEC and NECO 2014 Mathematics multiple-choice test items. It's obvious that since -0.893<1.658 at 0.05, there is sufficient evidence to fail to reject the null hypothesis. Therefore, there is no significant difference between the mean difficulty indices of 2014 Mathematics examination questions conducted by WAEC and NECO.

Null Hypothesis 2: There is no significant difference between the mean discrimination indices of 2014 Mathematics examination questions conducted by WAEC and that of NECO.

To ascertain whether the difference in the mean discrimination indices between WAEC and NECO 2014 Mathematics multiple-choice items is statistically significant, null hypothesis 2 was tested.

Table 6: t-test for the Mean Discrimination Indices in WAEC and NECO 2014 Mathematics Multiple-Choice Test Items

Exams Body	No.	Mean	df	t _{cal}	t _{tab}	
WAEC	50	0.38	108	-1.939	1.658	
NECO	60	0.45				

Table 6 shows *t*-test for the mean discrimination indices in WAEC and NECO 2014 Mathematics multiple-choice test items. From Table 6, it is clear that since -1.939 < 1.658 at 0.05, there is sufficient evidence to fail to reject the null hypothesis. Therefore, there is no significant difference between the mean discrimination indices of 2014 Mathematics examination questions conducted by WAEC and NECO.

Null Hypothesis 3: There is no significant difference between the mean distracter indices of 2014 Mathematics examination questions conducted by WAEC and that of NECO.

To ascertain whether the difference in the mean distracter indices between WAEC and NECO 2014 Mathematics multiple-choice items is statistically significant, null hypothesis 3 was tested.

able 7: t -test for the Mean Distracte	r Indices in WAEC and NECO	2014 Mathematics Multi	ple-Choice Test Items
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Exams Body	No	Mean	Df	t _{cal}	t _{tab}
WAEC	50	-0.16	108	2	1.658
NECO	60	-0.18			

Table 7 shows *t*-test for the mean distracter indices in WAEC and NECO 2014 Mathematics multiple-choice test items. It is clear that since 2>1.658 at 0.05, there is sufficient evidence to reject the null hypothesis. Therefore, there is significant difference between the mean distracter indices of 2014 Mathematics examination questions conducted by WAEC and NECO.

DISCUSSION

The findings from this study revealed that NECO had the higher percentage (93.33) of Mathematics examination items with appropriate difficulty index, followed by WAEC Mathematics examination items with 88 percent moderate difficulty index. However, the findings revealed that the difference between the mean difficulty indices of mathematics examination items conducted by WAEC and NECO was statistically insignificant. This finding is in

consonance with the findings of Kolawole (2007) who reported that there was no significance difference between the WAEC and NECO difficulty indices of Mathematics examination items. Although the finding negates that of Olatunji and Owolabi (2009) who reported that there was significance difference between the WAEC and NECO difficulty indices of Mathematics examination items. The result also disagrees with earlier findings in other discipline such as Obinne (2011) who found significant differences in the standard error of measurement (SEM) of Biology examinations conducted by NECO and WAEC and Olutola (2015) who reported that there was significant difference in the difficulty indices of Biology examinations conducted by NECO and WAEC.

Similarly, the result revealed that NECO had the higher percentage (73.33) of Mathematics examination items that

discriminate well between the high and lower achievers, followed by WAEC mathematics examination items with 64 percent moderate discrimination index. However, the findings revealed that the difference between the mean discrimination indices of mathematics examination items conducted by WAEC and NECO was statistically insignificant. This finding is in consonance with the findings of Kolawole (2007) who reported that there was no significance difference between the WAEC and NECO discriminating powers of Mathematics examination items. However, this finding is inconsistent with that of Olatunii and Owolabi (2009) who reported that there was significance difference between the WAEC and NECO discrimination indices of mathematics examination items. The result also negates the earlier findings in other discipline such as Obinne (2011) who found significant differences in the standard error of measurement (SEM) of Biology examinations conducted by NECO and WAEC. Olutola (2015) who reported that there was significant differences in the discrimination indices of Biology examinations conducted by NECO and WAEC.

Accordingly, the result revealed that NECO had 66 percent of Mathematics examination items with effective distracter index. This is higher than that of WAEC with 62 percent of mathematics examination items. Similarly, the findings revealed that the difference between the mean distracter indices of Mathematics examination items conducted by WAEC and NECO was statistically significant. The result contradicts the findings of Kolawole (2007) who find out that there was no significance difference between the WAEC and NECO distracter indices of Mathematics examination items.

CONCLUSION

The performance of candidates in Mathematics is reflected in the candidates performing below expectation during the Senior Secondary Certificate Examinations (SSCE), which have caused low enrolment of students to read the science courses in tertiary institutions. Therefore, in 2014 Mathematics multiple-choice test items used by WAEC and NECO, the difficulty indices and discriminating powers were found to be generally acceptable. However, the distracter powers of NECO Mathematics multiple-choice test items were more functional than those of WAEC.

RECOMMENDATIONS

In view of the findings of this study, the researcher recommends that:

- i. The present levels of difficulty and discrimination indices of Mathematics examination items used by WAEC and NECO should be sustained and improved upon.
- ii. WAEC and NECO should ensure that the functionality of multiple-choice test item options fall within the acceptable limits by experts in psychometrics.
- iii. Teachers of Mathematics should endeavour to use WAEC and NECO past questions papers for assessing their students before SSCE in order to expose them to standard tests that will allow them to successfully pass their examinations.

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