



FUW CENTRE FOR RESEARCH JOURNAL OF EDUCATIONAL STUDIES (FUWCRJES)



A Comparative Analysis of the Psychometric Characteristics of NABTEB, WAEC and NECO Conducted in Economics Examination in Nigeria: A Study of FCT, Abuja

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Abstract

This study investigated the psychometric characteristic of Economics examination conducted by three examination bodies, WAEC, NECO and NABTEB to establish the quality of items presented to the secondary school students for certification and admission into various tertiary institutions of learning within and outside the country. The study employed a descriptive survey research design to sought information from a small segment of the population of senior secondary III students within the FCT to make generalization on all Federal capital territory who studied in FCT. A multistage stratified sampling technique were adopted , 2 local government areas were selected randomly from the 6 local government areas of FCT using dip hart procedure to obtained a total of 12 schools, the schools were all public schools for uniformity of and conditions of facilities in the Nigerian schools, two government technical schools were elected for the study. 30 SS3 students were used as a sample for the study. Only secondary schools that have been presenting candidates for external examination were considered for the study. The test batteries use for the study was Economics past question paper, 2022 and 2023 conducted in public examination by WAEC, NECO and NABTEB. The statistical tool employed to answer the research questions are calculation of difficulty index using split-half correlation, Distractor power estimation, Discrimination indices using relevant formula and quantitative validations of tests were conducted. Result of findings revealed that the validity of test batteries used by the examination bodies was fairly good. Other psychometric properties of the test were found to be generally acceptable. It was recommended that essay type, more attention should be given to higher order skills required of graduates from secondary schools and coverage of most aspects of the syllabus prescribe by the examination bodies Examination bodies should ensure that questions are well distributed to cover all content area as specified in the syllabus.

Keywords: Comparative Analysis, Psychometrics, NABTEB, WAEC, NECO

Introduction

At the end of senior secondary school education (SS3), students are expected to write examination

conducted by the West Africa Examination Council (WAEC), National Business and Technical Examination Board (NABTEB) and National Examination Council (NECO). The certificate awarded by these examination bodies are officially recognized in

Nigeria as a condition for admission into the various tertiary institutions in Nigeria. The certificate obtained by candidates that passed the examinations conducted by these three examination bodies could also be used to secure employment in both private and public civil service, in fact some students often merge the grades they obtained from sittings in any two of the examinations. Allen, (2017).

Furthermore, the quality of the certificates offered by any of these examination bodies determines the ease with which admission could be obtained into various higher institutions of learning within and outside Nigeria. Normally, a minimum of five credit passes in the relevant subjects in these examinations qualifies a candidate to obtain admission into the tertiary institutions of his/her choice after satisfying the requirements for the University Matriculation Examination Board by Joint Admission and Matriculation Board (JAMB).Anikweze, (2016).

Problem of the Study

Over the years, the academic performance of students obtained in these examinations bodies has not been encouraging. This has been a source of concern to government, teachers, school owners, parents and the general public. Studies revealed that the reasons for the poor academic performance could be attributed, among others, poor state of education in the country, low quality of teaching staff due to lack of motivation, the nature of the subjects, inadequate

preparation of students for the examinations as well as poor funding in the education sector leading to shortages of facilities and equipment needed for effective teaching and learning. Bond, 2018, Obioma, 2016 and Nwana, 2017. These previous studies had assumed that the examinations and the operations of these examination bodies handling them are normal and adequate. This assumption is not mindful of the facts that the general level of performance is not dependent of the quality of the measuring instruments and the social circumstances in which the measurement process has been undertaken. Lal,2(017).

In the light of the above, there is a need to assess the psychometric properties of the public examinations conducted by NABTEB, WAEC and NECO which constitute the major bodies that examines candidates for certification at the end of their senior secondary school education in Nigeria. Psychometric characteristics of examination are a certain attributes inherent in the tests in which an assessment of candidates is based. These characteristics include: facility and difficulty indices, the discrimination index, the power of distractors, validity and reliability indices. Becker, 2016 and Schnitzer, 2018. It is worthy of note, that these attributes of a test are often ignored.

Objectives of the Study

The objective of the study is to analyse the psychometric characteristics of NABTEB, WAEC and NECO

examination conducted in Nigeria, but specifically, the study sought to achieve the following objectives:

- i. Calculate the difficulty or facility index of the test items used by WAEC, NECO, and NABTEB for SSCE Economics.
- ii. Compute the discrimination power of each item used by the examining bodies in Economics
- iii. Determine the distracter power of the multiple choice questions
- iv. Calculate the validity (estimation of the internal consistency) of the test instruments.
- v. Determine the reliability of the test instruments

Research Questions

The following research questions were raised to guide the study:

- i. How appropriate are the difficulty or facility index of the test items used by WAEC, NECO, and NABTEB for SSCE Economics.?
- ii. What is the discrimination power of the test item used by the examining bodies in Economics?
- iii. How functional are the distractor powers of the test items options in these examinations?
- iv. To what extent is the content of SSCE test items use in public examination valid?
- v. What are the reliability coefficients of each of the tests conducted by various examination bodies?

Method of Investigation

The study employed a survey research design. Descriptive survey research design was employed since the data involved in the study were collected from the source without manipulation. This approach is considered appropriate because the study south information from a small segment of the population to make generalization for all Nigeria senior secondary III students. This study focused on validation of test instruments with the aim of obtaining data from sample respondents establishing the psychometric characteristics of the public examinations.

A multistage and stratified sampling technique was adopted. First, the FCT was considered on the basis of the existing six local governments' area council. All six area council were involve in the study. 2 schools were selected randomly from each local government area council using 'dip hart' procedure to obtain a total of 12 schools involved in the study. Only public secondary schools were involved in the study for uniformity of school type and condition of facilities. 2 government technical college was selected randomly within the state. The public schools were selected taking into consideration adequate representation of location (Urban and Rural areas), gender/sex (boys and girls).

A total of two schools from the area council within the FCT were used in the study. Special attention was given to identification of schools that take NABTEB, examinations (technical

college) since the examinations are taken by special candidates. The sample comprise of 30 SS3 students selected using systematic random sampling technique in the sampled secondary schools from the six area council of FCT. Only secondary schools that have been presenting students for external examinations were considered.

Randomised block application / distribution of the test of the candidates was used (i.e in a class sample of 30, all students (intact class) participated in the examinations but the six forms of tests in Economics was simultaneously administered) i.e 2022 and 2023 in WAEC, NABTEB and NECO, this called for proper coding of the tests by subjects, years of consideration and examination.

A comprehensive list of schools in each area council was obtained from the FCT Secondary Education Board and used with the assistance of the Director of secondary schools in the state to select sample schools with the stated preference for school types, school location, and gender dichotomy.

Test batteries were the main instruments used in this study. Specifically, the test batteries were past questions paper developed in Economics offered in public examinations conducted by NABTEB, WAEC and NECO. The instrument for the study was administered on the

sample students in SS III class in the selected schools from the 12 selected schools for the study.

The following statistical tools were tools were employed to provide empirical information/answer to each research question as appropriate.

- Calculation of difficulty indices using relevant formula Split half correlation
 - Distractor power estimation
 - Discrimination indices using relevant formula
- Also quantitative validations of tests were conducted using the following criteria:
- Content validity of tests by year and examination body
 - Spread of items in relation to syllabus and number of items in the test
 - Structure of items in respect to coherence, tenses specificity, ambiguity etc.
 - Reliability of test items to emphasis specification of the curriculum.

Results and Discussion

The results of data analysis and discussion of findings considered here was based on the research questions raised to guide the study:

Research question 1

How appropriate are the difficulty indices of the test items used by WAEC, NECO, and NABTEB for SSCE Economics.?

Table 3.1: Number of items with appropriate difficulty indices in Economics by exam body and year

SUBJECT	WAEC				NABTEB				NECO					
	ECONOMICS	YEAR	< DI	DI	< DI	Inappropriate difficulty	< DI	DI	< DI	Inappropriate difficulty	< DI	DI	< DI	Inappropriate difficulty
		2022	11	48	1	13	13	47	0	14	25	24	1	27
		2023	9	50	1	9	11	49	0	10	18	14	2	19

Number of items with appropriate difficulty indices (DI) by examination body and year for Economics

Number of items with appropriate difficulty index by examination and year for Economics

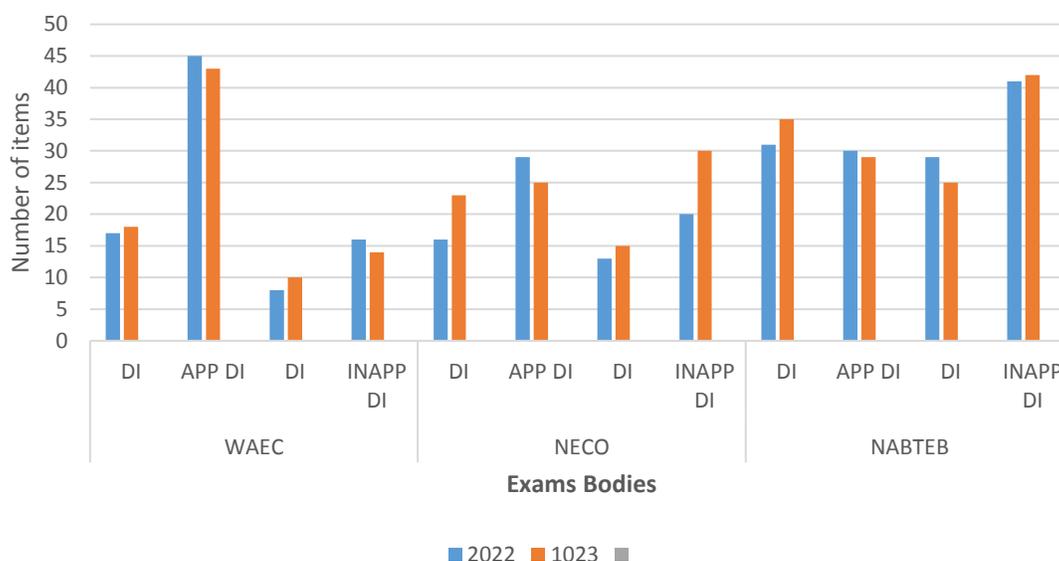


Figure 3.1. Here, the acceptance range of difficulty was widened a little from the middle course is 0.4-0.6 to 0.25 - 0.75. All items having difficulty index lower or higher than this acceptance range were considered to be inappropriate. From the table above, 3.1, NECO has the highest percentage of items with inappropriate difficulty index as 54% in 2022, followed by NABTEB and WAEC in that order of decreasing percentages.

The lowest number of items with inappropriate difficulty index was recorded by WAEC with 13.33% in 2022. For NECO the 2023 Economics had 16, 69% while NABTEB paper was recorded 18% in 2022.

Research Question 2

What is the discrimination power of the test item used by the examining bodies in Economics?

Discrimination power of Test items by examination body and year

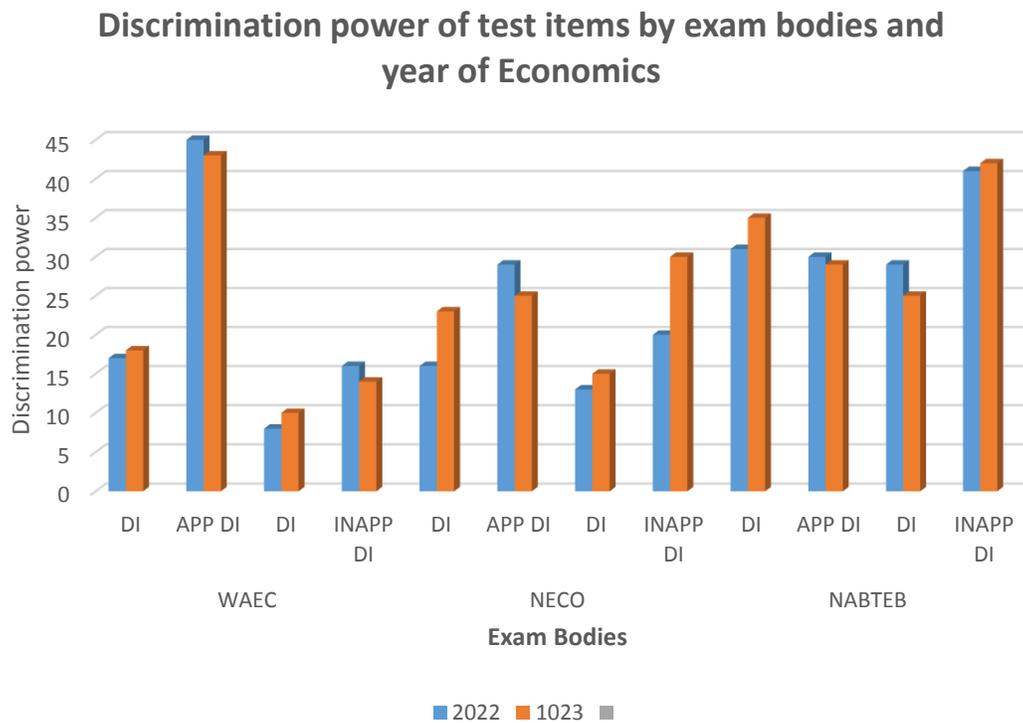


Figure 3.2. In this case, the acceptance range of discrimination power of multiple choice items is 0.4 and above. In this study, the lowest level was extended to 0.35. It was therefore observed NECO had the least percentage of 29% of the items that discriminate well between the high and lower achievers in 2022 then follow 2022 WAEC had 45% followed by NABTEB 40% IN 2023, in 2023 WAEC had a discrimination power of 40%, NECO 25% NABTEB 22%, from this analysis, we can see that WAEC had a better discrimination power in 2022 than in 2023, the result also showed that NABTEB has the worst discrimination index below the acceptance level of 22% in 2022 of the items having good discrimination index.

Research Question 3

How functional are the distractor powers of the test items options in these examination?

The research question was answered using content validity. The items in each year of interest in the study were compared with the table of specification of the syllabus used by each examination body under scrutiny with the help of the subject teachers. Three examination bodies were considered WAEC, NECO and NABTEB. In this case, it was discovered that all the examination bodies have the same syllabus structure and the objectives questions were set in line with their syllabus, the purpose of this work was to determine whether the objectives of the syllabus were attained in terms of

coverage and contents of the tests. The easy type questions were equally examined

in the same manner to determine whether the questions were properly structured

Table .3.2: Distribution of multiple choice Economic questions paper/Topics by examination bodies in 2022

S/NO	Topics	WAEC	NECO	NABTEB
1	Definition and basic concepts of Economics	2	3	1
2	Basic economic problem of the society	2	1	2
3	production and factors of production	1	5	3
4	Division of labour and specialization	2	3	4
5	Basic tools for economic analysis	2	3	1
6	Demand	10	9	3
7	Supply	2	8	7
8	Theory of costs/Revenue concept	3	3	-
9	Theory of consumer behavior	1	-	2
10	Distributive trade	2	1	6
11	International trade	8	2	2
12	Economic integration	1	-	3
13	Market structure	2	2	5
14	Economic growth and development	2	3	4
15	Inflation	1	8	-
16	Deflation	-	3	1
17	National income accounting	2	3	3
18	Economic system	3	1	2
19	price system	1	1	-
20	public finance	2	1	1
	Total	50	60	50

Table 3.3: Distribution of multiple choice Economic questions paper/Topics by examination bodies in 2023

S/NO	Topics	WAEC	NECO	NABTEB
1	Definition and basic concepts of Economics	1	2	1
2	Basic economic problem of the society	4	2	2
3	production and factors of production	2	4	3
4	Division of labour and specialization	3	4	4
5	Basic tools for economic analysis	5	3	1
6	Demand	4	7	3
7	Supply	2	10	5
8	Theory of costs/Revenue concept	3	2	2
9	Theory of consumer behavior	2	1	6
10	Distributive trade	3	1	2
11	International trade	3	2	2
12	Economic integration	1	-	3
13	Market structure	4	2	5
14	Economic growth and development	3	3	4
15	Inflation	1	8	1
16	Deflation	1	3	-
17	National income accounting	2	3	3
18	Economic system	3	1	1
19	price system	2	1	2
20	public finance	1	1	1
	Total	50	60	50

The test contents is considered to have fairly adequately covered the objectives stated in the syllabus. The multiple choice questions are still set in conformity with the previous patterns of having too many questions in certain topics leaving out others. For example, in WAEC past question, Demand had 10 questions, international trade had 8 compare to theory of consumer behavior, inflation, economic integration and price system with only 1 question each out of 50 multiple items set. The essay part had a lot of questions covering several topics.

WAEC Instructions given in the questions were clearly stated. There was enough time allotted for the multiple choice questions. The option A to D were adequate. The 50 questions were well-spread over the given syllabus. There were efficient allocation of marks in the essay section, the question carried full information that were clear and unambiguous.

NECO, August, 2023 paper 1 (objective and essay test) the timing for multiple choice questions was adequate, 1h was allocated to 60 questions, there was a wide coverage of the syllabus with adequate option s (A to D) given in the

multiple choice questions. The easy questions were set under section B, Two questions were calculation question, candidate were given option to answer only one questions from section B and eighth questions were theory questions in section C in which the candidate were given an option to answer only four questions.2 and a half hours was given to the candidate to answer the questions.

NABTEB in June, 2022, past question paper, the contents of the syllabus has a lots of topics to meet up with the objectives of NABTEB, the questions were fairly distributed in 2023 except that in 2022, more questions was allotted to distributive trade 6,, supply 7, and market structure 5, while none was distributed to theory of cost and revenue concept, inflation and price system. In the theory part, certain concepts considered difficult were completely left out, Two sector economy (saving and investment) MPS and MPC and the multiplier effects of investment.

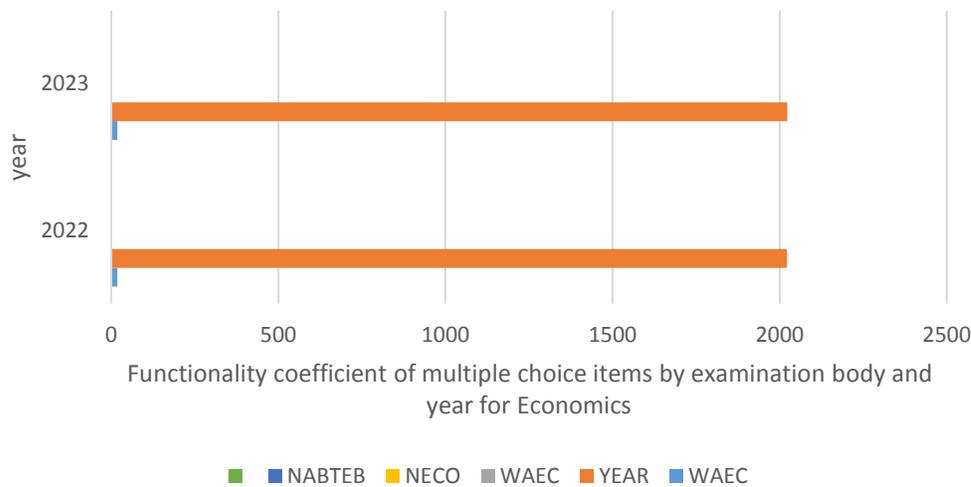
Research Question 4

To what extent is the content of SSCE test items use in public examination valid?

The research question was answered using table 3.3 and 3.4 with pictorial illustration in figure 3.3 and 3.4

Table 3.3: The functionality coefficient of multiple choice test items by examination body and year

SUBJECT	YEAR	CORRELATION COEFFICIENT					
		WAEC	%	NATEB	%	NECO	%
ECONOMICS	2022	18	7.5	42	14	8	4
	2023	18	4.50	33	11	30	15



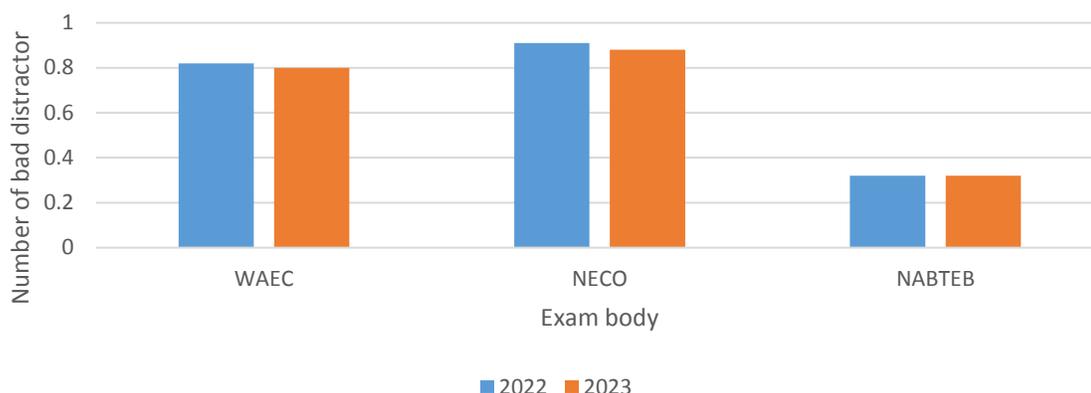
The functionality coefficient of the multiple choice items computed showed that the highest percentage of the items that had less than 5% of testees choosing any of the options provided is found in NABTEB IN 2023 Economics, 15%, followed by 2022 and 2023 NECO with 14% and 11% respectively. WAEC 2022 and 2023 rank the next with 7.5% and 4.50%.

A critical observation at the choices made by the candidates in respect of options available to each multiple choice items in the 6 batteries considered indicated that were not good as none of the testees in the upper and lower one quarter chose them. Table 3.4 show the distribution of the number of bad distractor by year and examination body which was transformed into pictorial representation in figure 3.4 as seen below.

Table. 3.4: Distribution of the number of bad distractor by year and examination body

SUBJECT	YEAR	NUMBER OF BAD DISTRACTOR		
		WAEC	NECO	NABTEB
ECONOMICS	2022	1	4	7
	2023	3	6	29

Frequency of bad distractors by exam body and year for Economics



Bad distractors are the options that were not chosen by any of the candidate who sat for the examination in both the upper and the lower groups. The frequency of bad distractor can be seen from the perspective of the total number of options developed and used by the various examination bodies. Example, 1 option out of 200 used in 2022 Economics

paper was bad this indicate an error level of 0.005. Which is the lowest frequency of bad distractor as compare to NECO 0.02 and NABTEB 0.035? is quite high.

Research Question 5

What are the reliability coefficients of each of the tests conducted by various examination bodies?

Table. 3.5: Reliability indices by exam body, year and subject

SUBJECT	YEAR	CORRELATION COEFFICIENTS		
		WAEC	NECO	NABTEB
ECONOMICS	2022	0.82	0.91	0.32
	2023	0.8	0.88	0.32

Reliability indices by exam body and year for Economics

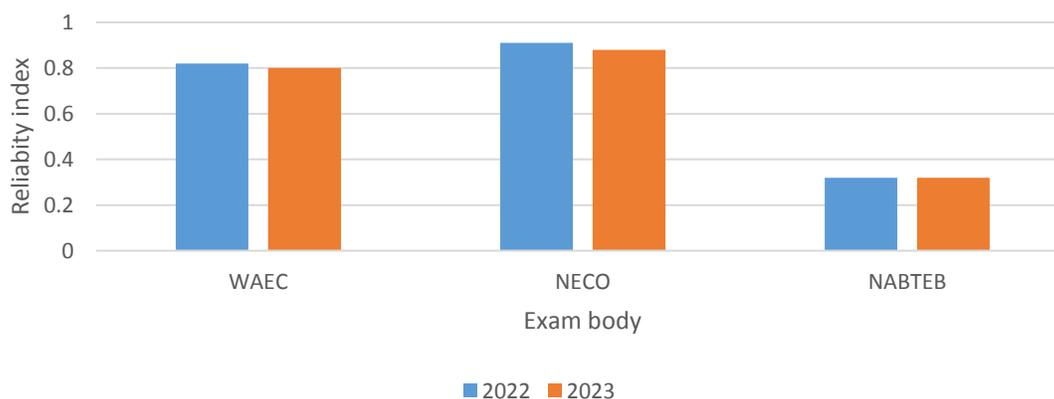


Table 3.5 indicated that the coefficient of internal consistency which measure the degree of reliability of the test batteries varies from year and from one exam body to another, however, WAEC and NECO have a better indices of reliability in the years review while NABTEB have relatively low reliability coefficients with few outliers. NECO recorded the highest reliability coefficient of 0.91 and 0.88 in 2022 and 2023 respectively, this was better compare to the finding of Becker, 2012 of his NECO analysis of item reliability which was 0.79. NABTEB has the lowest reliability coefficient of 0.32 in 2022 and 2023. In line with literature review, reliability coefficient of 0.8 and above was considered good, and between 0.70 to 0.79 acceptable and below 0.70 as poor. Therefore, NABTEB multiple choice questions are below acceptable region. The other two examination bodies WAEC and NECO had acceptable reliability coefficients in the two years

Conclusion

In conclusion, this study covered the entire state of FCT but focus only on Economics. The observation reflects that the validity of the test used by the examination bodies for the award of certificate at the secondary school level is fairly good. Other psychometrics characteristics of the test were found to be generally acceptable.

Area needing attentions were identified and recommendations were made for improvement, there is need to extend this study to other subjects for a better

standard in the education sector of this country at the secondary school level.

Recommendations

Base on the findings of this study, the following recommendations were made:

- i. Though more than 80% coverage was observed, the examination bodies should develop and use items in the remaining 20% of the syllabus content in order to ensure complete learning process
- ii. All forms of unbalance and ambiguity in the questions should be avoided in developing test items and this will ensure students are not missing the questions.
- iii. For essay type, more attention should be given to higher order skills required of graduates from secondary schools and coverage of most aspects of the syllabus prescribe by the examination bodies
- iv. Examination bodies should ensure that questions are well distributed to cover all content area as specified in the syllabus.

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