

## CLASSICAL ITEMS LEVEL STATISTICS OF 2020 BUSINESS STUDIES BASIC EDUCATION CERTIFICATE EXAMINATION OF KANO STATE, NIGERIA

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### Abstract

*The study investigated the psychometric properties of 2020 Business Studies Basic Education Certificate Examination (BECE) in Kano state Nigeria. The study has four objectives, four research questions. The study employed ex-post factor design in order to generate data from an already existing document. The population of the study consisted of twenty five thousand six hundred and ninety two (25,692) multiple choice answered scripts of J.S.S. 3 students who sat for BECE Business studies in 2020 in public own junior secondary schools. Using Multi-stage cluster sampling, 378 answered scripts were selected. The Classical Test Theory served as a model of the study for determining items difficulty and discrimination power abilities. The finding showed that 35 (58.3%) of the 60 items were difficult, 20 (33.3%) have moderate difficulty level and 5(8.3%) were easy. The discriminations levels showed that 12 (20%) have excellent discrimination, 1(1.6%) have good discrimination, 13 (21.6%) were acceptable while 34 (56.6%) poor. The mean difficulty index and mean discrimination index was obtained to be 0.25 and 0.15 respectively. It was concluded that 2020 Business Studies BECE items need improvement. It is therefore recommended that, Test developer for BECE should be trained for item analysis using CTT frame work because of its important in judging the quality of the items.*

**Keywords:** Classical Items Level Statistics, Business Studies, BECE

### Introduction:

Assessment is an important aspect of education as it provides feedback information to both individuals and administrators. One way of obtaining this feedback is by testing. Designing a test involves a lot of processes in order to come up with valid and reliable information about the test taker. A good test will be able to provide quality feedback on the intending construct, and in order to determine whether the items used for the test are of high quality, they must be analysed in terms of their difficulty and how well they are able to discriminate between the test takers. Items analysis is an important step in any test building as it looks at “ Students responses to individual test items in order to assess the quality of those items and the quality of the test as a whole”(Pande 2013).

To construct valid and reliable test items during test development process, test developer must rely on any of the two popular statistical theoretical frame works that are used in educational and Psychological measurement namely: The Classical Test Theory (CTT) and Item Response theory (IRT).( Bichi 2016). Classical test theory is a body of related psychometric theory that predicts outcome of psychological testing such as the difficulty of items or the ability of the test taker. It is concerned with items level

statistics and test level statistics. According to Hambleton and Johns(1993) Classical Test Theory is a theory about test scores that introduce three concepts. 1. Test Scores (often called Observed score) 2. True Score and 3. Error Score. It is assumed that observed score is equal to true score plus some error. Therefore the central model of this theory is that, observed score is composed of the true score and error score denoted as:

$$X=T+E.$$

Where: X= Observed score, T= True score and E=Error score. Classical test theory is concerned with relationship between the three variables X,T,E. These relationships are used to say something about the quality of the test scores (Anikweze 2010). The Observed score (X) is simply the score that a student earns and it is familiar to teachers and students. The True score (T) and Error score (E) are unobserved and are confusing to many laymen. This is because they are hypothetical concepts whose values one cannot know (Kurpius & Stafford 2006:105). The True score is usually thought to be the mean score that a person will get if he/she had taken the test for an infinite number of times. The error score is the estimated error that occurs in the measurement. This measurement framework (CTT) is used by public examination bodies that engage in large assessments of students for certification. Hence the need to apply this model in Basic Education Certificate Examinations.

BECE is a public examination in Nigeria conducted at the end of Junior Secondary level of education for the purpose of certification and transition into Senior Secondary level of education.

The National Examinations Council (NECO) conducts BECE for Federal government colleges, while each state of the federation conducts the examination through its Ministry of Education under the Educational Resources Centre (ERC) in which Business Studies is one of the core subjects written by students in this examination.

Business Studies is one of the pre-vocational courses in Junior Secondary school. It is regarded as integrated and comprehensive in nature. It comprises of commerce, Book-keeping, office practice. The subject is geared to offer its products the opportunity for gainful employment upon completion of their programme as well as providing them with the basic knowledge and skills of each component with the ultimate view to specialising in some or any of them in later years as it is expected to contribute to the general objective of education.

### **Statement of the Problem**

Test items are the most important or basic blocks for building any good instrument for assessment. The items level information of BECE Business Studies in Kano state is unknown as there was no evidence to show the standardization procedure passed through the process of item analysis as done by WAEC and NECO. Item analysis reveals vital information about the quality of test items by telling about the strengths and weaknesses of each item. It was also observed by the researchers from Kano Educational Resource Department (KERD) that in 2020, 73% of the students obtained grade 'A' to 'C', while 27% of the students got grades 'P' to 'F' in Business Studies Basic Education Certificate Examination. This signifies that the pass rate obtained in this examination for placement was very high in consideration to the number of students that obtained grade 'A' to 'C'.

In view of the need to ensure the quality of test items administered for public examinations are of good standard, this study conducts classical items analysis to determine the items level statistics of Kano state 2020 Business Studies BECE test items in order to determine their qualities.

### **Objectives of the Study**

The objectives of the study are to:

1. determine the difficulty levels of 2020 Business Studies BECE Items of Kano State.
2. determine the discrimination levels of 2020 Business Studies BECE Items of Kano State.
3. determine the mean items difficulty index of 2020 Business Studies BECE Items of Kano State.
4. determine the mean items discrimination index of 2020 Business Studies BECE Item of Kano State.

**Research Questions**

The following research questions were raised:

1. What is the difficulty levels of 2020 Business Studies BECE Items of Kano State?
2. What is the discrimination power abilities of 2020 Business Studies BECE Items of Kano State?
3. What is the mean items difficulty index of 2020 Business Studies BECE Items of Kano State?
4. What is the mean items discrimination index of 2020 Business Studies BECE Items of Kano State?

**Methodology**

The study employed Ex-post facto design. The population of the study consisted of twenty five thousand six hundred and ninety two (25692) answered scripts of JSS 111 students, who sat for Business Studies BECE in 2020 in Kano State government owned Junior secondary school. Three hundred and seventy eight (378) answered scripts were selected as a sample using Multi-Stage Cluster sampling. Having sorted and arranged the performance of the students in a manner of magnitude 27% (102) upper ability students and 27% (102) lower ability students , making the total number used for items analysis 204. The item difficulty levels were calculated as the percentage of the total number of correct response to the items. Item discrimination power abilities were determined by finding the difference between high ability students and low ability students, who got the item right divided by half of their number with aid of excel. The mean difficulty index and mean discrimination index were determined with SPSS.

**Result and Discussion**

**Research Question One:** What is the difficulty levels of 2020 Business Studies BECE Items?

**Table 1. Distribution of BECE Business Studies 2020 items based on difficulty levels.**

Item Difficulty Range	%	N	Level of Difficulty
≤ 0.30	58.3	35	Difficult
0.31≤70	33.3	20	Moderate
> 0.70	8.3	5	Easy
<b>Total</b>	<b>100</b>	<b>60</b>	

Table1 revealed the result of item difficulty levels of 2020 Business Studies BECE Items. Interpreted based on standard guidelines for interpreting difficulty index provided by Henning (1987) in Bichi,(2015) shows that 35 (58.3%) of the 60 items were difficult, 20 (33.3%) have moderate difficulty level and 5 (8.3%) were easy. On the basis of the item selection ( $0.30 \leq 0.70$ ), 20(33.3%) of the 60 items are ‘good’ (moderate difficult) 40 items that failed to satisfy the condition need to be revised for future use or rejected.

**Research Question Two:** What is the discrimination levels of 2020 Business Studies BECE items?

**Table 2. Distribution of BECE Business Studies 2020 items based on Discrimination Levels**

Items Discrimination Range	N	%	Level of Discrimination
0.40 to 1.00	12	20	Excellent
0.30 to 0.39	1	1.6	Good
0.20 to 0.29	13	21.6	Acceptable
-1.00 to 0.19	34	56.6	Poor
<b>Total</b>	<b>100</b>	<b>60</b>	

Table 2, showed that out of the 60 items, 12 (20%) have excellent discrimination, 1(1.6%) have good discrimination, 13 (21.6%) were acceptable while 34 (56.6%) poor items base on the standard guideline by Ebel,(1991) in Bichi. (2015). It signifies that only 26 (43.2 %) of the 60 items are in the range of good and acceptable discrimination level ( $\geq 0.20$ ). Base on the selection criteria of items discrimination 38(63%) that fail to satisfy the condition can be eliminated or revised completely.

**Research Question Three:** What is the mean items difficulty index of 2020 Business Studies BECE items?

**Table 3: Mean Difficulty and Discrimination index of 2021 BECE Mathematics items**

Index	Mean
Difficulty	0.25
Discrimination Index	0.15

The mean difficulty index of BECE 2020Business studies items is 0.25 as shown by Table 3. This signifies that averagely the test items are difficult. It can be attested by the result of the P-value computed in Table 1. That shows majority of the items are difficult: 35 (58.3%) of the 60 items were difficult, 20 (33.3%) have moderate difficulty level and 5 (8.3%) were easy.

**Research Question Four:** What is the mean items discrimination index of 2020 Business Studies BECE Items?

The discrimination power of the test can be measured by the mean discrimination index from the Table 3 the mean discrimination index is 0.15. Which shows that averagely 2020 Business Studies items need to be revised for future use or eliminated completely. This can be further explain by the result of discrimination levels in Table 2 which shows 12 (20%) of the 60 items have excellent discrimination, 1(1.6%) have good discrimination, 13 (21.6%) were acceptable while 34 (56.6%) poor.

## Discussion

The study applied Classical Test Theory (CTT) model on assessing the items level information (difficulty levels and discrimination levels) of 2020 BECE Business Studies. The analysis of difficulty levels shows that 35 (58.3%) of the 60 items were difficult, 20 (33.3%) have moderate difficulty level and 5 (8.3%) were easy. This shows that only 20 (33.3%) of the 60 items falls within the acceptable level of difficulty (moderate  $0.31 \leq 0.70$ ). This result is contrary to the submission of Anigbo, (2015) in which the findings showed that the all the items achieved acceptable moderate difficulty level .The result is also contrary to the submission of Ugodulunwa, and Barko (2015), which found that 83% of the (60) items of 2011 JSCE Business studies items were at a moderate difficulty level which is considered to be good. The finding also is in disagreement with study of Bichi (2015) who found that 70% of the 40 items of 2014Chemistry test items of the Qualifier Examination were at the acceptable

difficulty level.

The result of discrimination power of 2020 BEC Business Studies items showed that out of the 60 items, 12 (20%) have excellent discrimination, 1(1.6%) have good discrimination, 13 (21.6%) were acceptable while 34 (56.6%) poor items. This signified that only 26 (43.2 %) of the 60 items are in the range of good and acceptable discrimination level ( $\geq 0.20$ ). This shows that some of the items did not discriminate adequately. This finding is not in agreement with result of the study by Ado, and Sa'ad (2020) which indicated that 36 equivalent to (60%) of the 60 items functions very well and differentiate between students of higher and lower abilities It also disagree with result of John et al. (2020) which revealed that 45(75%) of the 60 items discriminated well.

The result of the mean difficulty index showed that 0.25 which signifies that averagely 2020 BECE Business Studies items are difficult. It was also found that the mean discrimination index is 0.15. Which shows that averagely 2020 BECE Business Studies items need to be revised for future use or eliminated completely. This results disagree with the submission of Deborah et al.(2021). Which revealed that 2013/2014 Pre-UTME and Post-UTME in the same subject areas of Arts, Commercial and Science having average difficulty indices p of 0.62, 0.54, 0.60 and 0.53, 0.46, 0.55 respectively). Similarly the results revealed that the items of the 2013/2014 Pre-UTME and Post-UTME in the subject areas of Arts, Commercial and Science discriminated appropriately between students in the high scoring group and those in the low scoring group with average discrimination indices of 0.45, 0.43, 0.46 and 0.46, 0.43, 0.42 respectively.

When the purpose of the test is to discriminate among those who take the test, it should have average item difficulty of approximately 0.50. (Kurpius & Stafford 2006). The result of this study contradicted with this statement. Since the purpose BECE is to measure the achievement of students and discriminate between those who take it for proper placement into Senior Secondary Schools classes, the items on the test should be in agreement with this submission.

## Conclusion

This study applied classical test theory model and analysed items level statistics of 2020 Business Studies BECE. However only few items were found at acceptable difficulty and discrimination level. The average difficulty and discrimination index fell below the recommended value for placement purpose. The inability of the 2020 BECE Business Studies items to satisfy the theoretical expectation of Classical Test Theory require the involvement of tests and measurement expert during the item development process for the selection of items to be included in the test.

## Recommendations

1. Test developer for BECE should be trained for item analysis using CTT Frame work because of its important in judging the quality of the items.
2. Items for BECE should also be trial tested and analysed after they have been developed to ascertain their qualities before final administration of the items to the students during examinations.
3. Items that satisfied the selection criteria for both difficulty and discrimination index of BECE 2020 Business Studies should be retained for future use by the items developers. Those items that failed to satisfy the condition of items selection should be revised. It is more economical to revise the items rather than rejecting them.

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