Psychometric Properties: Difficulty Index Deferential Between WAEC and NECO Computer Studies Examination Items in Kaduna State, Nigeria

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Abstract

The paper assessed difficulty index as psychometric properties of West African Examination Council (WAEC) and National Examination Council (NECO) Computer Studies objective test items of 2019 using Item Response Theory (IRT). There has been a continuous misconception of the standard of WAEC being superior to NECO based on the scope of coverage and duration of operations. This paper investigated the difficulty index of items in the two examination's multiple test on Computer Studies conducted in 2019 among final year secondary school students in Kaduna state. The instruments were administered to the 322 sampled students in 12 public secondary schools selected for the study under similar conditions as given by the two examination bodies. Fifty objective questions were assessed for WAEC while 60 questions were assessed for NECO. The scores were graded for item difficulty index and subjected to statistical analysis using the Statistical Package for the Social Sciences (SPSS, IBM version 26. The scores were then categorized into simple (0.7 – 0.9), moderate (0.4-0.6) and difficult (0.0 – 0.3). The chi-square procedure was used to determine differences in difficulty index associated with the different examination bodies. Findings revealed that, of the total items involved in the assessment, 61.7% of NECO items and 58.0% of WAEC items were of moderate levels respectively. No significant difference was observed in the difficulty index of the two examinations' objective test questions in Computer studies (p > 0.05). There distraction index was not significantly different. The study therefore recommended among others that the present standard of the examinations conducted by the Public Examination Bodies in Nigeria should be sustained and improved upon by subjecting the test items to more regular and rigorous item analysis procedures and selection of items that fall within the acceptable range of psychometric characteristics

Key Words: Psychometric properties, Difficulty index, Distraction index

Introduction

Public examination became necessary when the educational industry was overcrowded after the industrial revolution. It is now used as qualification examination to move students from one educational level to another (Udofia & Udoh, 2017). The essence of public examination is to provide uniform assessment to all candidate who were exposed to a given curriculum (Udofia & Udoh, 2017). Candidates who participate in public examinations are in different settings and therefore, receive uniform instruction of the same subject matter. As a result, the problem of item bias cannot be ruled out in these examinations (Sa'ad, Ali & Abdullahii, 2020). This study is concerned with the West African Examinations Council

(WAEC) and the the National Examination Council (NECO) which determine the placement of Nigerian students in tertiary institutions and occupational placement in their career endeavor (Ololube in Udofia & Udoh, 2017). WAEC and NECO are usually conducted nationally for candidates who seek to sit for them and have uniform system of grading which is applied in judging their performance (Kenni, 2020). The examinations have uniform mode of test construction, administration, scoring and interpretation, and they are therefore expected to pass through the same rigorous standardization procedures before they are administered to candidates. This is partly to ensure that differences in performance is exclusively the result of chance factors like the individuality and academic dedication of candidates (Kpolovie et al., 2011). Computer studies is one of the examination items constructed by the two examination bodies and has been acknowledged for its importance in scientific and technological developments.

The West African Examination Council (WAEC) is a Board established by law to determine the examinations required in the public interest of the English-speaking West African countries, to conduct examinations and to award certificates that are comparable to those of other equivalent examining authorities internationally (Oguguo et al., 2020). The board was established in 1952, and since then, the council has contributed to education in Anglophonic countries in West Africa (Ghana, Nigeria, Sierra Leone, Liberia, and Gambia) based on the numbers of examinations they have coordinated and the certificates they have issued. The Board also founded an endowment fund that is responsible for contributing to educations in West Africa with the help of lectures and provisions of aids to those who cannot afford education (Akinbolati in Oguguo et al., 2020).

National Examinations Council (NECO) created with a decree by the Abdulsalami Abubakar military administration in April 1999 with same mandate like the WAEC. The examination body was established in 2001 following the passage of an Act of the National Assembly during the Obasanjo presidency. The examination body was therefore seen as a welcome development in the face of WAEC dominance in its attempt to conduct reliable examinations that could command widespread national and international respect and acceptability. NECO was therefore seen as alternative equivalent examination body (Raji, 2013). Though the initial conception was that NECO would take over the responsibilities of the National Board for Educational Measurement (NBEM) which was created, in 1992, by the Ibrahim Babangida administration but the conduct of the Senior School Certificate Examinations (SSCE) which had, hitherto, been the exclusive preserve of WAEC was an additional responsibility of the new examination outfit (Raji, 2013). NECO was to take exclusive charge of the conduct of the SSCE for school-based candidates while WAEC was to take charge of the same examination for private candidates. NECO administered its first SSCE in 2000 (Kenni, 2020). It is argued that NECO had standard quality of question papers set and grades when compared to Broom's principles of evaluating students which proponents are of the view made it to be superior to WAEC (Ahmed 2014 in Kenni, 2020) and that NECO

candidates are tested on a minimum of eight and a maximum of nine subjects (Salako et al (2017) for both junior and senior secondary schools including the General Certificate in Education (GCE). This paper is aimed at assessing differences in the difficulty index of items used Computer Studies questions in National Examinations Council (NECO) and the West African Examination Council (WAEC). The Computer Studies questions constructed by WAEC and NECO comprise of three parts. The first part is multiple choice, tagged Computer studies paper I, the second part is an essay test tagged Computer studies paper II and third part is practical, tagged Computer studies paper III. The objective past questions of both examinations, which is the focus of this research work showed that the two examining bodies pattern their questions the same way. This paper is therefore aimed at finding out difference in the difficulty index levels Computer Studies items of both examination bodies.

Methodology

The study is assessed students' scores in the 2019 WAEC and NECO Computer studies objectives tests with respect to item difficulty index of the questions constructed by the two examination bodies using the survey method. A total of 50 items administered to final year students selected each selected from schools in Zaria, Sabon Tasha and Kafanchan educational zones of Kaduna state for the two examination bodies (WAEC and NECO). The instruments were administered to the 322 sampled students in 12 public secondary schools selected for the study under similar conditions as given by the two examination bodies. Fifty objective questions were assessed for WAEC while 60 questions were assessed for NECO. The scores were graded for item difficulty index and subjected to statistical analysis using the Statistical Package for the Social Sciences (SPSS, IBM version 26. The scores were then categorized into simple (0.7 – 0.9), moderate (0.4-0.6) and difficult (0.0 – 0.3). The chi-square procedure was used to determine differences in difficulty index associated with the different examination bodies. The procedure used by the researcher for analysis of the computer studies multiple choice items conducted by WAEC and NECO 2019 are supported by Anikweze, (2013), Babatimehin, Deborah and Peter (2019) and Ezugwu (2015) where lower and upper ability groups are considered to determine the difficulty indices of items.

Result and Discussions

The result of the chi-square used to determine differences in the scores distribution associated with the two examination bodies is summarized in Table 1.

Table 1: Chi-square test on difference in difficulty index on examination items by WAEC and NECO

Difficulty index	WAEC		NECO				
	Freq.	Percent	Freq.	Percent	Chi-square	Df	p-value
0.0-0.3 (Difficult)	2	4.0	2	3.3	0.162	2	.922
0.4-0.6 (Moderate)	29	58.0	37	61.7			
0.7-0.9 (Simple)	19	38.0	21	35.0			
Total	50	100.0	60	100.0			

Gamma =-0.049, p-value = 0.795

Findings from the test revealed WAEC had relatively higher percentage of difficulty index in her examination questions than was obtained for NECO papers. In Table 1, the percentage of items in difficulty level was 4.0 compared with 3.3% for NECO. Of the total items involved in the assessment, 61.7% of NECO items were of moderate level. The items that were of moderate level in the WAEC examination questionnaire were 58.0%. WAEC had a relatively higher number (38.0%) than NECO with 35.0% of the items that were in simple level of the difficulty index. In terms of comparison, the observed variability in the distribution was not significant. The chi-square obtained was 0.162 with a p-value of 0.922 ($p > 0.05$). From these observations, the two examination bodies could not be said to differ significantly in the items contained in their objective examination questions. For effectiveness of distraction index of the items, Table 2 showed a comparison of the two examination bodies.

Table 2: Comparison of distraction index for items in the examination papers

Distraction index	WAEC		NECO		Chi-square	df	p-value
	Freq.	Percent	Freq.	Percent			
Effective	126	84.0	198	82.5	1.544	2	.462
Not effective	17	11.3	35	14.6			
Not functioning	7	4.7	7	2.9			
Total	150	100.0	240	100.0			

The result of the test revealed that the two examinations were not significantly different in terms of associated distraction index of the items contained in the question papers. The observed chi-square was 1.544 with a p-value of 0.462 ($p > 0.05$). It was however observed from the distribution that some of the distracters of the items had positive values, which showed that the distracters attracted upper ability groups than lower ability groups in both examinations. The observed variability obtained as showed in the summary in Table 2 was not statistically significant. The finding here showed that final examinations conducted by WAEC and NECO are not significantly different in their difficulty index which in other words implied that they could be regarded as equivalent in terms of their standard.

Conclusion

This study revealed that 58% and 61.7% of the items in computer studies multiple choice test items conducted by WAEC and NECO in 2019 had moderate difficulty indices. This implies that some were either too easy or too difficult for the students. The study revealed that 84% and 82.5% of the items' distractive indices of WAEC and NECO 2019 computer studies past questions were effective. Therefore, the reasons for poor performance of candidates of students in Kaduna state in computer studies multiple choice examinations conducted by WAEC and NECO in 2019 can be attributed to poor items psychometric properties and there is no superiority of the test items of WAEC examinations over NECO examinations.

Recommendations

Based on the findings of the study the following recommendations were made:

1. The present standard of the examinations conducted by the Public Examination Bodies in Nigeria should be sustained and improved upon by subjecting the test items to more regular and rigorous item analysis procedures

2. Selection of items that fall within the acceptable range of psychometric characteristics for administration on candidates.

3. WAEC and NECO Bodies should continue to ensure that difficulty of items as well as functionality of computer studies multiple choice test options fall within the acceptable limits for certification at the school certificate level both within the urban and the rural areas.

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