



Analysis of the Distractor Effectiveness of National Examination Council (NECO) Geography Examination Questions on Senior Secondary School Students' Academic Achievement in Adamawa State

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Abstract

This study was carried out to analyze the distractor effectiveness of National Examination Council (NECO) Geography Examination questions on students' academic achievement in Adamawa State, Nigeria. The study adopted a descriptive correlational survey research design. Two research questions and two research hypotheses were raised and formulated for the study. The study was conducted on a total of 211 students answering multiple-choice geography 2023 and 2024 NECO examination questions. The instrument for data collection was titled 'Geography Achievement Test (GAT) I and II which was adopted from National Examination Council (NECO) 2023 and 2024 multiple-choice past questions which was used for the collection of data. The data collected was analyzed using descriptive statistics of mean and standard deviation and distractor index analysis while the hypotheses formulated were tested using linear regression analysis. Findings from research questions shows that the distractors used in NECO 2023 and 2024 geography examination questions were functional. The findings from hypothesis one reveals a significant relationship between distractors index of NECO 2023 and 2024 and senior secondary school students' academic achievement ($p < 0.05$); The study therefore recommends among others that, examination bodies such as NECO should strive to maintain a balanced mix of distractors to ensure fairness and comprehensive assessment of students' abilities; regular psychometric analysis of examination items should be institutionalized to ensure that test items remain valid, reliable, and capable of distracting among students; geography teachers should be trained in test construction and item analysis to enable them to design classroom assessments that align with standardized examination practices.

Keywords: Assessment, NECO, Distractor index, Academic achievement.

Introduction

Assessment occupies a central position in the educational process because it provides evidence of the extent to which learning objectives have been achieved. Educational assessment serves as a mechanism for measuring students' knowledge, skills, competencies, and academic achievement. In secondary schools, multiple-choice tests are among the most widely used assessment formats because they allow for objective scoring, broad content coverage, and efficient administration to large populations of students (Nitko & Brookhart, 2014).

A multiple-choice test consists of two major components: the stem and a set of response alternatives. Among the response alternatives, one option is the correct answer, while the remaining options, known as distractors, are intentionally designed to attract students who do not possess the required knowledge or understanding of the tested content (Haladyna & Rodriguez, 2013). The effectiveness of these distractors is crucial because they contribute significantly to the validity, reliability, and discriminatory power of test items.

Distractor effectiveness refers to the extent to which incorrect alternatives in a multiple-choice item successfully attract low-achieving students while being avoided by high-achieving students (Tarrant et al, 2009). Effective distractors increase the quality of test items by enhancing their ability to discriminate between students of varying ability levels (Rejeki et al 2023; Chauhan et al, 2023; Oribhaor & Adeosun 2020). Conversely, ineffective distractors, often referred to as non-functioning distractors, fail to attract examinees and may compromise the psychometric quality of the test (Gierl, Bulut, Guo, & Zhang, 2017).

Research in educational measurement has shown that distractor effectiveness influences several psychometric properties of test items, including item difficulty, discrimination index, and test reliability (Rodriguez, 2005). When distractors are plausible and attractive to less knowledgeable students, they increase the likelihood that students with higher achievement levels will perform better than those with lower achievement levels (Amakiri & Omale 2025). Such items are considered more effective in measuring differences in students' academic performance. On the other hand, poorly constructed distractors can make items too easy, reduce discrimination, and lead to inaccurate conclusions regarding students' achievement (Haladyna & Rodriguez, 2013; Obon & Rey 2019; Ansari et al, 2023; Sajjad et al, 2020; Butako, 2022).

Academic achievement is commonly regarded as the extent to which students attain educational goals and learning outcomes. It is often measured through examination scores, grades, and standardized test results (Adeyemi, 2008). Students' achievement levels are influenced by various factors, including instructional quality, learning environment, motivation, study habits, assessment practices, and test construction techniques (Abdullahi, 2024; Kojigili & Alex, 2020; Filgona & Sababa, 2017). Among these factors, the quality of examination items, particularly the effectiveness of distractors in multiple-choice tests, has received increasing attention from educational researchers due to its role in ensuring accurate measurement of students' abilities (Mahjabeen et al 2017; Uddin et al, 2020; Puthiaparampil & Rahman, 2021).

In Nigeria, public examinations conducted by examination bodies such as the National Examinations Council and the West African Examinations Council rely heavily on multiple-choice items for assessing students' achievement. The quality of these items is critical because examination results are often used for certification, placement, and admission purposes. However, studies have reported the presence of non-functioning distractors in many standardized examinations, suggesting weaknesses in item construction and raising concerns about the accuracy of achievement measurement (Kolawole, 2018; Gierl et al., 2017).

Furthermore, effective distractors contribute to fair and valid assessment by reducing the probability of guessing and ensuring that students' scores reflect their actual knowledge and abilities. Poor distractor construction may inflate scores, distort achievement outcomes, and undermine confidence in examination results (Oribhaor & Adeosun 2020). Consequently, investigating the influence of distractor effectiveness on senior secondary school students' academic achievement has become necessary to improve test quality and promote more accurate educational assessment.

Given the importance of multiple-choice testing in secondary school education and the need for valid measurement of students' learning outcomes, this study seeks to examine the influence of distractor effectiveness on senior secondary school students' academic achievement. The findings are expected to provide useful information for examination bodies, test developers, curriculum planners, teachers, and educational researchers regarding the role of distractor quality in enhancing assessment effectiveness and improving students' academic performance.

Statement of the Problem

The quality of educational assessment depends largely on the quality of test items used to measure students' achievement. In multiple-choice examinations, distractors play a vital role in determining whether test items can accurately distinguish between high-achieving and low-achieving students. Ideally, distractors should be plausible enough to attract less knowledgeable students while allowing knowledgeable students to identify the correct answer. However, evidence from educational measurement studies indicates that many examination items contain ineffective or non-functioning distractors that fail to perform their intended role.

The presence of ineffective distractors may adversely affect the psychometric quality of test items by reducing item discrimination, altering difficulty levels, and increasing the likelihood of guessing. As a result, examination scores may not accurately reflect students' true academic abilities. This situation is particularly concerning in senior secondary school examinations where results are used for certification, selection, and progression into higher levels of education.

Despite the widespread use of multiple-choice tests in secondary school assessments, limited attention has been given to the extent to which distractor effectiveness influences students' academic achievement. Many studies have focused on item difficulty, discrimination indices, and reliability coefficients, while the specific contribution of distractor effectiveness to students' achievement outcomes has received comparatively less empirical investigation, particularly within the Nigerian educational context.

Furthermore, persistent variations in students' achievement in public examinations have raised concerns among educators, policymakers, and examination bodies. While these variations are often attributed to factors such as teaching quality, learning resources, and student motivation, the role of test construction variables, especially distractor effectiveness, remains insufficiently explored. Consequently, it is unclear whether ineffective distractors contribute significantly to the observed patterns of students' achievement in senior secondary school examinations.

The problem of this study, therefore, is to determine the extent to which distractor effectiveness influences senior secondary school students' academic achievement in Adamawa State. Specifically, the study seeks to investigate whether effective distractors contribute to improved measurement of students' achievement and whether variations in distractor effectiveness are associated with differences in students' academic performance. Addressing this problem will provide empirical evidence that can guide test developers, teachers, and examination bodies in improving the quality of multiple-choice items and enhancing the validity and reliability of educational assessments. This study therefore is aimed at examining the influence of distractors in National Examination Council (NECO) geography examination questions on senior secondary school students' academic achievement in Adamawa State.

Research Question

1. How effective are the distractor index of National Examination Council (NECO) Geography examination questions of 2023 on senior secondary school students' academic achievement in Adamawa State, Nigeria?
2. How effective are the distractor index of National Examination Council (NECO) Geography examination questions of 2024 on senior secondary school students' academic achievement in Adamawa State, Nigeria?

Research Hypotheses

H₀₁: There is no significant relationship between the distractor index of National Examination Council (NECO) Geography examination questions of 2023 on senior secondary school students' academic achievement in Adamawa State.

H₀₂: There is no significant relationship between the distractor index of National Examination Council (NECO) Geography examination questions of 2024 on senior secondary school students' academic achievement in Adamawa State.

Methodology

This study adopted a descriptive correlational research survey design. The population comprised of all students offering geography at public senior secondary schools in Adamawa State. sample size of 211 senior secondary (SS 3) geography students participated in the study. This was obtained through a multistage sampling technique. Adopted Past 2023 and 2024 National Examination Council (NECO) Geography examination multiple-choice questions were used as instrument for data collection. The instrument was made up of 60 items. Each item has five response options: A, B, C, D, and E in which four options are distractors with one key answer for each item. The instruments were subjected to validation by experts and were trial tested on some sample of students and was found reliable with a reliability coefficient of 0.84. The data collected were analyzed using mean, standard deviation, distractor analysis and regression analysis all tested at 0.05 level of significant.

Results

Research question one: How effective are the distractor index of National Examination Council (NECO) Geography examination questions of 2023 on senior secondary school students' academic achievement in Adamawa State, Nigeria?

Table 1. Summary of Distractors of National Examination Council (NECO) Geography Examination Questions of 2023

Examination Year	Functional distractors (>5 %)	Non-functional distractors (<5 %)	Total
NECO 2023	96%	4%	100%

Result presented in Table 1 shows that questions 14(option E), 15(option E), 45(option B) and 60(option E) of National Examination Council (NECO) of geography questions 2023 are not functional distractors while the other once are functional. This result therefore indicated that less than five percent (<5%) of the students that sat for the examination

choose the options. This means that these options are not effective enough to distract the students from choosing the correct option.

Research Question Two: How effective are the distractor index of National Examination Council (NECO) Geography examination questions of 2024 on senior secondary school students' academic achievement in Adamawa State, Nigeria?

Table 2. Summary of Distractors of National Examination Council (NECO) Geography Examination Questions of 2024

Examination Year	Functional distractors (%)	Non-functional distractors (%)	Total
NECO 2024	97%	3%	100%

Results shown in Table 2 reveals that the distractors used in National Examination Council (NECO) of geography questions 2024 are functional except questions 11(option E), 16(option A) and 21(option B) are not functional distractors. This result reveals the distractors are functional enough to distract the examinees from choosing the right option.

H₀₁: There is no significant relationship between the distractor index of National Examination Council (NECO) Geography examination questions of 2023 on senior secondary school students' academic achievement in Adamawa State.

Table 3. Summary of Regression Analysis of Distractor Index of National Examination Council (NECO) Geography Examination Questions of 2023

Variable	N	Mean	Std	df	Beta Coefficient	R ²	t	P-value	Decision
Distractor Index of NECO 2023	60	99.15	3.35						
				153	-.382	.146	4.185	0.000	Significant
NECO Performance 2023	95	40.40	10.83						

The result in Table 3 indicates that probability value of 0.00 is less than 0.05 level of significance ($p < 0.05$). Therefore, the null hypothesis is stand to be rejected and conclude that there is significant relationship between distractor index of National Examination Council (NECO) 2023 of geography questions and students' academic achievement in Adamawa State. This means that the distractor index of 2023 had a strong and significant negative influence on students' academic achievement. The beta coefficient (-0.382) indicates that ineffective or highly attractive distractors substantially reduced students' performance. The R^2 value of 0.146 suggests that distractor effectiveness explained 14.6% of the variance in academic achievement, representing a moderate practical effect. This implies that distractor quality played a critical role in shaping student outcomes in the 2023 examination.

H₀₂: There is no significant relationship between the distractor index of National Examination Council (NECO) Geography examination questions of 2024 on senior secondary school students' academic achievement in Adamawa State.

Table 4. Summary of Regression Analysis of Distractor Index of National Examination Council (NECO) Geography Examination Questions of 2024

Variable	N	Mean	Std	df	Beta Coefficient	R ²	t	P-value	Decision
Distractor Index of NECO 2024	60	101.60	11.05						
				164	-.158	.025	4.884	0.000	Significant
NECO Performance 2024	106	41.53	9.44						

From Table 4, the results indicated that the probability value of 0.00 is less than 0.05 level of significance ($p < 0.05$). Therefore, the null hypothesis is stand to be rejected and conclude that there is significant relationship between distractor index of National Examination Council (NECO) 2024 of geography questions and students' academic achievement in Adamawa State. This result implies that the distractor index for 2024 also significantly predicted students' academic achievement. The negative beta coefficient indicates that as distractors became more misleading or attractive, students' achievement declined. However, the R^2 value of 0.025 shows that distractors explained only 2.5% of the variance in achievement.

Discussion

This study analyzed the distractor effectiveness of National Examination Council (NECO) Geography examination questions on senior secondary school students' academic achievement in Adamawa State. The findings of Findings from research question one and two revealed that the distractors used in 2023 and 2024 NECO Geography examination questions were functional. This indicates that the incorrect alternatives were sufficiently plausible to attract candidates who lacked adequate knowledge of the correct answers. Functional distractors are an essential characteristic of quality multiple-choice items because they minimize random guessing and improve item discrimination. Research on distractor efficiency has demonstrated that plausible distractors contribute significantly to item quality and increase the effectiveness of multiple-choice examinations. When distractors function effectively, students with limited understanding are more likely to select incorrect alternatives, thereby enhancing the discriminatory power of the test items. The finding of this study is in line with the findings of Ansari et al (2023), Sajjad et al (2020), Butako (2022), Mahjabeen et al (2017), Uddin et al (2020), and Puthiaparampil and Rahman (2021). This study therefore suggests that NECO examination developers were successful in constructing plausible distractors even though many items exhibited poor discrimination.

Findings from research hypotheses one and two shows a significant relationship between NECO 2023 and 2024 distractors and senior secondary school students' academic achievement in Adamawa State. This finding is consistent with other studies showing that effective distractors can influence item difficulty and overall test performance by reducing guessing and increasing the measurement precision of examination items. In relation to psychometric quality standard, poorly functioning distractors can inflate or deflate item difficulty and reduce discrimination, making achievement scores less representative of actual student understanding but functional distractors do. Therefore, the result of this study is line with the findings of Amakiri and Omale (2025) who compared test versions with more functional distractors versus fewer functional distractors found out that both tests produced comparable mean achievement scores, indicating that the presence of more functional distractors did not significantly elevate overall academic performance. The result also concurs with the findings of Rejeki et al (2023) and Chauhan et al (2023). Their study reveals that higher proportion of functioning distractors better reflected student academic achievement. But the findings of Oribhaor and Adeosun (2020) disagree with the result of this study.

Conclusion

This study analyzed the distractor effectiveness of National Examination Council (NECO) Geography examination questions on senior secondary school students' academic achievement in Adamawa State. Based on the findings of this study, it can be concluded that the NECO Geography examination questions of 2023 and 2024 possess acceptable distractor effectiveness affirming their usefulness in measuring students' academic achievement at the senior secondary school level in Adamawa State. The rigorous analysis of distractor efficiency has demonstrated that the distractors were systematically constructed and capable of producing meaningful and interpretable assessment outcomes. The functionality of distractors observed in the examination years strengthens that the items were well designed. Functional distractors reduce random guessing and increase the diagnostic value of multiple-choice tests. They also performed effectively across both years suggests that item writers adhered to best practices in test construction. Therefore, the study concludes that distractor efficiency significantly contributed to the overall quality and robustness of the Geography examinations under review.

Recommendation

The following recommendations were made;

1. Examination bodies such as NECO should strive to maintain a balanced mix of distractors to ensure fairness and comprehensive assessment of students' abilities.
2. Regular psychometric analysis of examination items should be institutionalized to ensure that test items remain valid, reliable, and capable of distracting among students.
3. Geography teachers should be trained in test construction and item analysis to enable them to design classroom assessments that align with standardized examination practices.

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