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A correlational study of students' performance in the West African Senior School Certificate Examination and the National Senior School Certificate Examination in general mathematics

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Abstract

This study examined the relationship between students' performance in two major senior secondary school mathematics examinations, addressing a gap in understanding the comparability of outcomes across assessment bodies. A descriptive correlational research design was employed to investigate patterns in academic achievement. The study involved 1134 senior secondary three students purposively selected from multiple secondary schools. Examination results from three consecutive years were used as the primary data source. Statistical analyses, including Pearson's product-moment correlation and t-scores, were conducted to determine the strength and significance of relationships between performances in the two examinations. The findings indicate a significant positive relationship in students' performance across the examined years, suggesting that achievement in one examination reliably predicts performance in the other. These results underscore the comparability of the two assessment systems and highlight the potential benefits of aligning their syllabi to enhance teaching effectiveness. Harmonized curricula could support more consistent instructional practices, thereby improving student learning outcomes in mathematics. The study provides empirical evidence for educational policymakers and practitioners seeking to optimize assessment strategies and strengthen instructional alignment in secondary mathematics education.

Keywords: Academic achievement; assessment comparability; correlational study; mathematics education; secondary school students.

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1. INTRODUCTION

Evaluation constitutes an essential mechanism for monitoring educational systems and serves as a powerful source of motivation within the teaching and learning process. It occupies a central position in educational development, as instructional objectives provide the foundational criteria against which student learning is assessed in formal school contexts. Evaluation represents both a continuous process and a periodic activity involving the systematic collection of diverse forms of data that are subsequently analyzed to determine the quality, effectiveness, and functional adequacy of educational programs. Through this process, informed judgments are made regarding learners' academic status, achievement levels, and value formation. Effective evaluation depends substantially on the teacher's capacity to employ assessment practices in ways that promote learning by establishing and sustaining a supportive and intellectually stimulating environment in which students are motivated to engage (Nenty, 2007). Contemporary scholarship further underscores the necessity of integrating formative and summative assessment practices within instructional design in order to enhance learning outcomes and reinforce institutional accountability (Sortwell et al., 2024).

Evaluation may be defined as a structured and systematic procedure for gathering, analyzing, and interpreting evidence to determine the degree to which learners have attained specified instructional objectives (Linn, 2008). Beyond measuring outcomes, evaluation contributes to the formulation of objectives, the organization of learning experiences, and the appraisal of student performance. It fulfills accountability functions toward society and parents and serves multiple purposes within educational systems, including quality assurance and selection for progression to advanced levels of study. The evaluation of student achievement emphasizes principles and practices that strengthen classroom instruction and improve learning effectiveness. Moreover, it facilitates attention to individual differences and enables educators to address the specific challenges encountered by each learner. Ojerinde (2009) asserts that evaluation occupies a foundational position in education, as test results are widely used to identify students' academic strengths and weaknesses. It provides teachers with evidence regarding knowledge acquisition, behavioral development, and other dimensions of learner growth. Research on educational evaluation and assessment literacy highlights that teachers' competence in assessment practices is a decisive factor influencing the effectiveness of evaluation and subsequent improvements in student learning (Shafii & Berger, 2025). Two principal approaches to evaluation are commonly distinguished, namely formative and summative evaluation.

Formative evaluation is employed to monitor students' learning progress throughout the instructional period. Its primary purpose is to provide ongoing feedback to both teachers and learners concerning achievements and areas requiring improvement while instruction is still underway. Instruments utilized in formative evaluation are typically developed by teachers and are therefore internal to the school system (Alonge, 2003). Additional forms include periodic assessments, classroom tests and quizzes, written assignments and projects, self-assessment and peer assessment, teacher observation, portfolio assessment, interactive questioning during lessons, and analysis of students' responses in class. Empirical studies on formative assessment strategies indicate that timely feedback, peer evaluation, and the promotion of self-regulated learning significantly enhance student engagement and academic performance across educational contexts (Solis Trujillo et al., 2025). In contrast, summative evaluation represents a distinct approach.

Summative evaluation is conducted at the conclusion of a course of instruction to determine the extent to which previously established objectives have been achieved. It involves the assessment of learners' overall attainment at the end of an instructional period (Olatoye, 2016). Common examples include standardized examinations, performance-based assessments, and oral examinations. The principal purposes of summative evaluation are to assign grades and to evaluate the overall effectiveness of educational programs. In Nigeria, standardized summative assessments are administered by recognized examining bodies, including the National Examinations Council, the West African Examinations Council, and the National Business and Technical Examination Board.

The National Examinations Council is a Nigerian examination authority responsible for administering the Senior Secondary Certificate Examinations in June or July and November or December each year. It was established in April 1999 under the administration of Abdulsalami Abubakar and became the first federal

examination body in Nigeria to provide subsidized registration for academic candidates. Its headquarters are located in Minna, Niger State. The Council commenced operations on 26 April 1999 and conducted its first examination session in June or July 2000, after which it has continued to administer senior secondary examinations.

The West African Examinations Council was established by statute to determine and conduct examinations in the public interest within English speaking West African countries and to award certificates accordingly. It was founded in 1952 following the acceptance of the Jeffery Report by the colonial administrations of Ghana, Liberia, Gambia, Nigeria, and Sierra Leone. The Council maintains headquarters in Accra, Ghana, and in Lagos, Nigeria (WAEC, 2007).

Both the National Examinations Council and the West African Examinations Council are mandated to organize and administer the Senior Secondary School Certificate Examinations in Nigeria. Accordingly, the present study examined the correlational relationship between students' performance in the Senior Secondary School Certificate Examinations in General Mathematics conducted by these two examination bodies.

1.1. Purpose of study

Persistent underachievement in mathematics has generated sustained concern among researchers, educators, governmental authorities, and parents. Despite the recognized significance of mathematics within the educational curriculum, academic performance at the Senior Secondary School level has remained unsatisfactory. Reports issued by the Chief Examiner of the West African Examinations Council indicate that overall candidate performance in Mathematics in the May or June examination sessions of 2010, 2011, 2012, and 2015 did not demonstrate substantial improvement compared with preceding years.

This study therefore, investigated the correlational relationship between students' performance in the Senior Secondary School Certificate Examinations in General Mathematics administered by the West African Examinations Council and the National Examinations Council between 2017 and 2019 in Katsina State, Nigeria. The study sought to compare the performance outcomes recorded by the two examination bodies within the specified period, specifically,:

1. Students' performance in 2017 WAEC and NECO General Mathematics in senior secondary schools in Katsina State, Nigeria.
2. Students' performance in 2018 WAEC and NECO General Mathematics in senior secondary schools in Katsina State, Nigeria.
3. Students' performance in 2019 WAEC and NECO General Mathematics in senior secondary schools in Katsina State, Nigeria.

The researcher formulated and tested three hypotheses at 0.05 alpha level of 0.05. The formulated hypotheses are:

1. There is no significant relationship between students' performance in 2017 WAEC and NECO general mathematics in senior secondary schools in Katsina State, Nigeria.

2. There is no significant relationship between students' performance in 2018 WAEC and NECO General Mathematics in senior secondary schools in Katsina State, Nigeria.

3. There is no significant relationship between students' performance in 2019 WAEC and NECO General Mathematics in senior secondary schools in Katsina State, Nigeria.

2. METHOD AND MATERIALS

The research design adopted for this study was a correlational research design.

2.1. Participants

The population for this study comprised seven thousand one hundred and ninety-two students enrolled in public Senior Secondary Schools within the Dutsin-Ma Education Quality Assurance Zone in Katsina State, Nigeria. The target population was specifically defined as Senior Secondary School three (SS 3) students in these public institutions who participated in the 2017 to 2019 General Mathematics examinations administered by the West African Examinations Council and the National Examinations Council.

To ensure comprehensive coverage of the study area, a stratified random sampling technique was employed. Stratified random sampling, as described by Nguyen et al. (2019), involves dividing the population into distinct subgroups known as strata. Within each stratum, a simple random sampling procedure is applied to select the sample, thereby ensuring proportional representation across all segments of the population. For the purposes of this study, the schools were stratified according to the two Local Government Areas (LGAs) within the Dutsin-Ma Education Quality Assurance Zone, namely Dutsin-Ma and Kurfi.

2.2. Data collection tool

Data for this study were collected using two distinct mark collection instruments. The first instrument comprised the students' West African Examinations Council grade form, while the second consisted of the students' National Examinations Council grade form. Each form included five key items: the name of the school, age of the student, gender, grade obtained in Mathematics from the WAEC examination, and grade obtained in Mathematics from the NECO examination. A standardized conversion table was employed to interpret the examination grades from both WAEC and NECO.

The researchers visited each of the selected schools, obtained formal permission from the principals, and, where required, were guided on the appropriate procedures for accessing and recording the students' examination data.

2.3. Data analysis

Pearson Product-Moment Correlation statistics were used to analyze the research hypotheses one (1), two (2), and three (3), and all the hypotheses were tested at a 0.05 level of significance.

3. RESULTS

In this study, three hypotheses were formulated and tested at 0.05 alpha level of 0.05. The statistical tools used to analyze the three hypotheses were Pearson Product-Moment Correlation analysis.

Hypothesis One*: There is no significant relationship between students' performance in 2017 WAEC and NECO general mathematics in senior secondary schools in Katsina State, Nigeria.*

The students' performance in the 2017 WAEC and NECO was correlated using Pearson product-moment correlation.

Table 1

*Relationship between Students' Performance in 2017 WAEC and NECO (*Grades in Mathematics)

Variable		WAEC Grades	NECO Grades
West African Examinations Certificate Grade (WAEC)	Pearson correlation	1	.590
	significance (2-tailed)		.000
	N	285	285
National Examination Council Grades (NECO)	Pearson correlation	.590	1
	significance (2-tailed)	.000	
	N	285	285

Significant (P<0.05)

Table 1 indicates a correlation coefficient (r) of 0.590, which is statistically significant at the 0.05 alpha level ($r = 0.590$, $p < 0.05$). Consequently, the null hypothesis asserting that there is no significant relationship between students' performance in the 2017 West African Examinations Council and National Examinations

Council General Mathematics examinations is rejected. This finding demonstrates that a significant positive relationship exists between students' performance in the 2017 WAEC and NECO Mathematics assessments.

Hypothesis Two*: There is no significant relationship between students' performance in 2018 WAEC and NECO general mathematics in senior secondary schools in Katsina State, Nigeria.*

The students' performance in the 2018 WAEC and NECO was correlated using pearson product moment correlation.

Table 2

Relationship between Students' Performance in 2018 WAEC and NECO General Mathematics.

Variable		WAEC Grades	NECO Grades
West African Examinations Certificate Grade (WAEC)	Pearson correlation	1	.414
	Significance (2-tailed)		.000
	N	320	320
National Examinations Council Grade (NECO)	Pearson correlation	.414	1
	significance (2-tailed)	.000	
	N	320	320

Significant (P<0.05)

Table 2 shows a correlation coefficient (r) of 0.414, which is statistically significant at the 0.05 alpha level ($r = 0.414$, $p < 0.05$). Therefore, the null hypothesis asserting that there is no significant relationship between students' performance in the 2018 West African Examinations Council and National Examinations Council General Mathematics examinations is rejected. This result indicates the existence of a significant positive relationship between students' performance in the 2018 WAEC and NECO Mathematics assessments.

Hypothesis Three: *There is no significant relationship between students' performance in 2017 WAEC and NECO general mathematics in senior secondary schools in Katsina State, Nigeria.*

The students' performance in the 2019 WAEC and NECO was correlated using Pearson product-moment correlation.

Table 3

Relationship between Students' Performance in 2019 WAEC and NECO (grades in general mathematics).

Variable		WAEC Grades	NECO Grades
West African Examinations Certificate Grade (WAEC)	Pearson correlation	1	.551
	significance (2-tailed)		.000
	N	529	529
National Examinations Council Grades (NECO)	Pearson correlation	.551	1
	significance (2-tailed)	.000	
	N	529	529

Significant (P<0.05)

Table 3 indicates a Pearson correlation coefficient (r) of 0.551, which is statistically significant at the 0.05 alpha level ($p < 0.05$). This result leads to the rejection of the null hypothesis, confirming that a significant positive relationship exists between students' performance in the 2019 WAEC and NECO General Mathematics examinations. In practical terms, this finding suggests that students who performed well in the WAEC mathematics exam also tended to achieve similarly in the NECO mathematics assessment, highlighting a consistent pattern of achievement across both examination bodies for that year.

4. DISCUSSION

The findings of this study indicate a significant positive relationship between students' performance in WAEC and NECO General Mathematics examinations across 2017, 2018, and 2019, with correlation coefficients ranging from 0.414 to 0.590. These results align with prior studies by Ajao and Awogbami (2012) and Udofia and Udoh (2017), which similarly reported strong correlations between the two examination

bodies, suggesting that both assessments share comparable content coverage, cognitive demand, and question distribution. This consistency underscores the reliability and alignment of standardized examinations in evaluating secondary school mathematics achievement within the Nigerian context.

The observed correlation also confirms that despite differences in administration and item formats, WAEC and NECO effectively measure similar competencies in mathematics. This finding supports the argument that standardized assessments can serve as valid indicators for tracking student learning outcomes across multiple examination bodies. Moreover, the consistent positive relationship highlights the potential for cross-comparison of performance data, which can inform curriculum planning, instructional design, and targeted interventions aimed at addressing persistent underachievement in mathematics.

However, the findings differ from those of Salako et al. (2017), who reported non-significant correlations and identified greater difficulty levels and lower discriminating power in NECO mathematics questions compared with WAEC. This discrepancy may be attributed to variations in the study populations, regional educational contexts, or differences in the years examined. It also suggests that although WAEC and NECO are broadly aligned, specific examination characteristics, such as item difficulty and cognitive demand, may influence student performance outcomes and should be considered when interpreting results.

Overall, the present study reinforces the view that WAEC and NECO mathematics assessments are significantly related and can be used interchangeably for evaluating student performance trends over time. These findings contribute to a better understanding of examination comparability, provide empirical support for assessment alignment across multiple bodies, and highlight the importance of ongoing evaluation to ensure fairness, consistency, and validity in secondary school mathematics assessment.

5. CONCLUSION

In conclusion, the study demonstrates a significant positive relationship between students' performance in WAEC and NECO General Mathematics examinations over the 2017–2019 period. The findings indicate that both examination bodies assess comparable competencies in mathematics, with consistent trends across multiple cohorts. This alignment suggests that WAEC and NECO results can be reliably used to monitor student achievement, inform instructional planning, and guide interventions aimed at improving mathematics performance in senior secondary schools. The study also highlights the value of standardized assessments in providing objective measures of learning outcomes, thereby supporting accountability and evidence-based educational decision-making.

At the same time, the study acknowledges potential variations in item difficulty and discrimination between the two examinations, which may influence specific performance outcomes. While the overall relationship between WAEC and NECO performance is strong, educators and policymakers should consider these nuances when interpreting results or designing interventions. Overall, the findings contribute to a better understanding of examination comparability, reinforce the importance of continuous evaluation in education, and emphasize the need for ongoing research to ensure fairness, consistency, and effectiveness in secondary school assessment practices.

Based on the findings of this study, the following recommendations are made:

1. WAEC and NECO syllabi should be harmonized. This way, teachers would be more effective in facilitating learning, which would, in turn, be beneficial to students and bring about better performance in the examinations

2. Teachers should take note of the frequent questions set by WAEC and NECO to prepare their students adequately for the examination.

3. Teachers should encourage the use of the cooperative grouping technique in mathematics classes to improve female students' performance.

Conflict of Interest: The authors declare no conflict of interest.

Ethical Approval: The study adheres to the ethical guidelines for conducting research.

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