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INVESTIGATING DETERMINANTS OF MATHEMATICS ACADEMIC PERFORMANCE: A COMPREHENSIVE STUDY OF SECONDARY SCHOOLS IN GWALE LOCAL GOVERNMENT AREA, KANO STATE, NIGERIA

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Abstract

Mathematics education continues to be a critical challenge in Nigerian secondary schools, particularly in Kano State. This study was necessitated due to persistence poor performance in secondary schools in Gwale Local Government Area, Kano State. This descriptive research investigates the multifaceted factors contributing to poor mathematics achievement in Gwale Local Government Area. Through a comprehensive survey of 100 students and 22 mathematics teachers, the study employs mixed-method research techniques to explore systemic challenges in mathematics education. The findings reveal significant impediments including inadequate professional teaching qualifications, insufficient instructional resources, overcrowded classrooms, and negative student attitudes towards mathematics. Key factors identified include 54.5% of mathematics teachers lacking specialized educational qualifications, 59.1% reporting inadequate instructional materials, and 45.5% observing poor student engagement in mathematics lessons. The research recommended that for educational policymakers, school administrators, and stakeholders to develop targeted interventions aimed at improving mathematics education quality and student performance.

Keywords: Mathematics Education, Academic Achievement, Secondary Schools, Educational Challenges, Kano State.

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INTRODUCTION

Mathematics, often referred to as the "queen of sciences," plays a pivotal role in human development and technological advancement. Its significance extends beyond academic boundaries, encompassing critical applications in various domains such as science, technology, economics, and daily problem-solving (Adamu & Jiya, 2016). Despite its crucial importance, mathematics education in Nigeria continues to face significant challenges, characterized by consistently low student performance and systemic educational barriers.

Existing research has consistently highlighted multiple factors influencing mathematics education quality. Previous studies in neighboring local government areas, such as Henry's (2006) research in Kazaure, have identified similar challenges including: negative attitudes of teachers and students; inadequate teaching methodologies; limited professional development opportunities; insufficient educational resources; and cultural perceptions surrounding mathematics education.

Problem Statement

Despite the critical importance of mathematics in academic and professional success, secondary schools in Gwale Local Government Area of Kano State have consistently demonstrated poor academic performance in mathematics. Thus, this persistent challenge necessitates a comprehensive investigation into the multifaceted factors contributing to this academic deficit. In this regard, the persistent underachievement in mathematics represents a critical educational concern in Nigerian secondary schools. While mathematics serves as a fundamental gateway to scientific and technological progress, students consistently demonstrate poor performance, indicating deep-rooted structural and pedagogical issues within the educational system (Iwok& Sampson, 2006), hence the need for this study.

Research Objectives

The main aim of the study is to comprehensively identify and analyze the key factors responsible for poor mathematics achievement among secondary school students in Gwale Local Government Area of Kano State.

The objectives of this study were to:

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i. Find out the socio-economic factors influencing students' mathematics performance;

ii. Ascertain the impact of teaching methodologies and classroom environment on mathematics learning;

iii. Determine the role of students' psychological and motivational factors in mathematics achievement;

iv. Find out the influence of parental education and home learning environment on students' mathematical skills;

v. Ascertain the availability and quality of educational resources and infrastructure in secondary schools.

Research Questions

The following research questions were raised for the study:

i. What are the primary socio-economic factors that significantly influence mathematics academic performance in secondary schools within Gwale Local Government Area?
ii. How do current teaching methodologies and classroom environments impact students' mathematics learning and achievement?
iii. What psychological and motivational factors contribute to students' performance in mathematics?
iv. To what extent does the home learning environment and parental educational background affect students' mathematics achievements?
v. How do the availability and quality of educational resources correlate with mathematics academic performance?

Descriptive statistics inform of percentage was used. The results are presented in Table1-4.

Significance of the Study

This research offers valuable insights/benefits to/for:

i. Provide empirical insights into the challenges of mathematics education in Gwale Local Government Area;
ii. Offer evidence-based recommendations for educational policymakers;
iii. Support targeted interventions to improve mathematics education;

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iv. Contribute to the broader understanding of educational performance in resource-constrained settings;
v. Educational policymakers in developing targeted intervention strategies;
vi. School administrators in restructuring mathematics education approaches;
vii. Teacher training institutions in curriculum design; and,
viii. Researchers exploring educational challenges in mathematics education.

Methodology

A descriptive survey research design was employed, utilizing both quantitative and qualitative data collection techniques. The study comprises of total Population of 122 participants (100 students, 22 teachers)and using simple random sampling technique. Instruments used for data collection were three; namely: Closed-ended questionnaires for teachers; Closed-ended questionnaires for students; and Comprehensive data analysis using percentage calculations

Results and Discussion

Table 1: Teacher Educational Qualifications

S/N	Items	Response	Percentage (%)
1.	NCE	02	9.1
2.	B.SC (Ed)	02	9.1
3.	B.Ed	01	4.5
4.	B.Sc/PGDE	01	4.5
5.	B.Sc	04	18.2
6.	M. Ed/M.sc(Ed)	Nil	-
7.	Others	12	54.5
	Total	22	100

Table 1 shows that over half of the mathematics teachers lack specialised mathematics education qualifications, potentially compromising instructional quality.

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Table 2: Availability of Instructional Materials

S/N	Availability	Status	Response	Percentage (%)
1.	Adequately	Available	01	4.5
2.	Fairly	Available	08	36.4
3.	Not Adequate		13	59.1
	Total		22	100

Table 2 shows that significant resource limitations exist, with nearly 60% of schools reporting inadequate instructional materials.

Table 3: Student Attitudes

S/N	Attitude Level	Response	Percentage (%)
1.	Excellent	Nil -	
2.	Very Good	03	13.6
3.	Good	04	18.2
4.	Fair	05	22.7
5.	Poor	10	45.5
	Total	22	100

Table 3 shows that a substantial proportion of students demonstrate poor engagement (attitudes) with/towards mathematics.

Table 4:Availability of Mathematics Laboratory

S/N	Laboratory Availability	Response	Percentage (%)
1.	Yes	01	4.5
2.	No	21	95.5
	Total	22	100

Table 4 shows that acritical practical learning infrastructure is severely lacking.

Discussion

The findings reveal a complex ecosystem of challenges in mathematics education within Gwale Local Government Area. The interconnected issues of underqualified teaching staff, resource scarcity, infrastructural limitations, and negative student attitudes collectively contribute to

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suboptimal mathematics learning outcomes (performance). The finding is in agreement with that of Henry (2006), Sirajo and Iggi (2006).

Conclusion

This research substantiates the multifaceted nature of mathematics education challenges in the region. However, the identified factors - ranging from teacher qualifications to classroom resources - demand comprehensive and systemic interventions.

Recommendations

In line with the findings of this study, the following recommendations were made:

i. The need to implement mandatory professional development programs for mathematics teachers;
ii. Increase investment in mathematics instructional resources to yield effective performance;
iii. Establish well-equipped mathematics laboratories across the schools;
iv. Develop targeted student engagement strategies to provide better outcomes/performance;
v. Enhance teacher recruitment criteria for effectiveness and efficiency;
vi. Promote mathematics career guidance initiatives across the schools; and,
vii. Develop supportive home and community learning environments across the state;

Limitations and Future Research

While this study provides critical insights, future research could:

i. Expand geographical scope
ii. Implement longitudinal tracking
iii. Explore comparative studies across different educational contexts

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