Axis Journal of Mathematical Statistics and Modelling

PRIME OPEN ACCESS

Volume 2, Issue 1

Research Article

Date of Submission: 28 Nov, 2025
Date of Acceptance: 22 Dec, 2025
Date of Publication: 6 Feb, 2026

Mathematics Achievement in Primary and Junior Secondary Schools of Kenema District, Sierra Leone

Edward Lamin Monya Junior[1*] and Kenneth Maaada Lansana[2]

[1]Edward Lamin Monya Junior, Lecturer, Mathematics Deparment, Eastern Technical University of Sierra Leone, Kenema

[2]Kenneth Maaada Lansana, Department of Basic & Applied Sciences, Eastern Technical University of Sierra Leone, Kenema

***Corresponding Author:**
Edward Lamin Monya Junior, Lecturer, Mathematics Deparment, Eastern Technical University of Sierra Leone, Kenema.

Citation: Junior, E. L. M., Lansana, K. M. (2026). Mathematics Achievement in Primary and Junior Secondary Schools of Kenema District, Sierra Leone. *Axis J Math Stat Model, 2*(1), 01-04.

Abstract

Background: Mathematics achievement is a critical indicator of educational quality and a predictor of future academic success. Despite educational reforms in Sierra Leone, concerns persist about mathematics learning outcomes, particularly in rural districts.

Objective: This study assessed the level of mathematics achievement among primary and junior secondary school students in Kenema District and identified key factors influencing performance.

Methods: A cross-sectional mixed-methods design was employed. Standardized mathematics tests were administered to 1,200 students from 30 randomly selected schools. Surveys with 150 mathematics teachers, classroom observations, and focus group discussions were also conducted.

Results: Overall mathematics achievement was low, with a mean score of 42.3% (SD=18.7). Primary students averaged 38.4% (SD=16.2), while junior secondary school (JSS) students averaged 46.2% (SD=20.1). Multivariate analysis revealed significant predictors of achievement included teacher qualifications ($\beta=0.28$, $p<0.001$), availability of learning resources ($\beta=0.22$, $p<0.01$), and parental education level ($\beta=0.19$, $p<0.05$). Qualitative data identified inadequate teaching methods, limited instructional time, and socioeconomic challenges as major barriers.

Conclusion: Mathematics achievement in Kenema District falls below expected standards, with systemic factors significantly influencing outcomes. Urgent interventions focusing on teacher capacity building, resource provision, and community engagement are recommended to improve mathematics education quality.

Keywords: Mathematics Achievement, Educational Assessment, Primary Education, Junior Secondary School, Sierra Leone, Learning Outcomes, Factors

Abbreviations

JSS: Junior Secondary School
MBSSE: Ministry of Basic and Senior Secondary Education
TSC: Teaching Service Commission

Introduction

Mathematics proficiency is fundamental to national development, scientific progress, and individual economic mobility [1]. In Sierra Leone, mathematics education has been prioritized in post-conflict educational reforms, with the Ministry of Basic and Senior Secondary Education (MBSSE) implementing various initiatives to improve learning outcomes. However, national assessments continue to reveal concerning performance gaps, particularly in rural districts like Kenema [2].

Kenema District, the third most populous district in Sierra Leone, represents a significant portion of the country's educational landscape. Preliminary evidence from district education offices and anecdotal reports suggest persistently low mathematics achievement, yet comprehensive empirical data documenting the exact levels and specific contributing factors remains scarce [3]. This research gap hinders the development of evidence-based interventions.

This study was therefore conducted to: (1) determine the overall level of mathematics achievement among primary and junior secondary school students in Kenema District; (2) compare achievement across grade levels and school types; (3) identify student, teacher, school, and home factors associated with mathematics achievement; and (4) propose evidence-based recommendations for improvement.

Materials and Methods

Research Design and Sampling

A convergent parallel mixed-methods design was employed. A multi-stage stratified random sampling approach was used to select 30 schools (15 primary, 15 JSS) by location (urban/rural) and type (public/private). Forty students were randomly selected from each school, resulting in a total sample of 1,200 students. Additionally, 150 teachers, 30 administrators, and 120 parents participated.

Category	Number	Percentage
Total Students	1,200	100%
Primary (P4-P6)	600	50%
JSS (JSS1-JSS3)	600	50%
Urban	720	60%
Rural	480	40%
Teachers	150	-
School Administrators	30	-

Table 2.1: Sample Distribution

Data Collection

Quantitative Instruments: A standardized mathematics achievement test was developed based on the national curriculum, pilot-tested (Cronbach's α = 0.84), and covered number operations, algebra, geometry, and data handling. Surveys were administered to collect data on student background, teacher qualifications, and school resources.

Qualitative Instruments: These included a classroom observation protocol (20 lessons), focus group discussions with students (8 groups), and semi-structured interviews with teachers and administrators (45 interviews).

Data Analysis

Quantitative data were analyzed using descriptive statistics, t-tests, ANOVA, and multiple regression in SPSS. Qualitative data were analyzed thematically using NVivo software. Integration was achieved through joint displays comparing quantitative and qualitative findings.

Ethical Considerations

Informed consent was obtained from parents/guardians and school authorities. Student assent was obtained. Confidentiality was maintained through anonymization. Ethical approval was granted by the Institutional Review Board of the Eastern Technical University of Sierra Leone.

Results and Discussion

Overall Mathematics Achievement Levels

Overall mathematics achievement was low (Mean = 42.3%, SD =18.7). Primary students (Mean = 38.4%, SD = 16.2) performed significantly lower than JSS students (Mean = 46.2%, SD = 20.1). Only 25% of all students reached the proficiency level (≥60%).

Level	Mean Score (%)	Standard Deviation	Proficiency Levels
Primary	38.4	16.2	22% Proficient, 45% Basic, 33% Below Basic
JSS	46.2	20.1	28% Proficient, 48% Basic, 24% Below Basic
Overall	42.3	18.7	25% Proficient, 47% Basic, 28% Below Basic

Table 3.1: Mathematics Achievement by Educational Level

The finding that only a quarter of students are proficient underscores a significant crisis in foundational skills, which aligns with national assessment data but provides a more granular, district-level perspective [2]. This low proficiency threatens future academic and economic prospects for a generation of students.

Factors Influencing Mathematics Achievement

Multiple regression analysis ($R^2 = 0.58$) identified key predictors of achievement.

Predictor Variable	β Coefficient	p-value
Teacher Qualification	0.28	0.001
Resource Availability	0.22	0.005
Parental Education	0.19	0.018
Student Attendance	0.23	0.008
Class Size	-0.18	0.022

Table 3.2: Multiple Regression Analysis of Achievement Predictors

Teacher qualifications emerged as the strongest predictor ($\beta = 0.28$, $p<0.001$), a finding consistent with global literature on the paramount importance of teacher quality [4]. This is particularly critical in our context, as only 35% of the teachers in our sample held mathematics-specific qualifications. The significant impact of resource availability ($\beta=0.22$, $p<0.01$) highlights issues of equity, especially pronounced in rural schools, mirroring patterns observed across Sub-Saharan Africa [5].

Qualitative findings contextualized these results, revealing predominant use of lecture methods with limited student engagement and a lack of basic teaching aids in 75% of observed classrooms. Furthermore, 68% of students reported lacking calculators, linking the quantitative finding on parental education and resources to the tangible socioeconomic barriers faced by families.

Conclusion

This study provides empirical evidence that mathematics achievement in Kenema District is critically low, driven by a confluence of factors related to teacher quality, resource allocation, and socioeconomic context. The findings elucidate how these systemic issues interact to constrain learning outcomes. The allegations of these findings are clear: without targeted intervention, the cycle of educational underachievement will persist. A coordinated, multi-stakeholder approach focusing on building teacher capacity, ensuring equitable resources, and fostering community engagement is not just recommended but essential for improving mathematics education quality and, ultimately, the life chances of students in Kenema District.

References

1. National Mathematics Advisory Panel. (2008). Foundations for success: The final report of the National Mathematics Advisory Panel. US Department of Education.
2. Ministry of Basic and Senior Secondary Education [MBSSE]. (2022). Sierra Leone national learning assessment report. Government of Sierra Leone.
3. Jalloh, M. B. (2021). Teacher quality and student achievement in Sierra Leone's basic education. African Educational Research Journal, 9(2), 45-58.
4. Hattie, J. (2009). Visible learning: A synthesis of over 800 meta-analyses relating to achievement. Routledge.
5. UNESCO. (2020). Global education monitoring report: Inclusion and education. United Nations Educational, Scientific and Cultural Organization.

Table Legends

Table 2.1: Sample Distribution of Study Participants
This table details the composition of the study sample, including the number and percentage of students, teachers, and school administrators, stratified by educational level (Primary/JSS) and location (Urban/Rural).

Table 3.1: Mathematics Achievement by Educational Level
This table presents the mean percentage scores, standard deviations, and proficiency levels for primary, junior secondary school (JSS), and all students combined. Proficiency is defined as ≥60%, Basic as 40-59%, and Below Basic as <40%.

Table 3.2: Multiple Regression Analysis of Factors Influencing Mathematics Achievement
This table summarizes the results of a multivariate regression analysis, showing the standardized beta coefficients (β) and p-values for various student, teacher, and school-level predictors of mathematics test scores. The model explains 58% of the variance in achievement ($R^2 = 0.58$).

The Editor
Axis Journal of Mathematical Statistics and Modelling
Subject: Submission of Original Research Article for Consideration
Dear Editor,
Please find enclosed our manuscript entitled "Mathematics Achievement in Primary and Junior Secondary Schools of Kenema District, Sierra Leone" by Edward Lamin Monya Junior, which we would like to submit for consideration for publication as an Original Research Article in your esteemed journal.
We confirm that this manuscript is our original work, has not been published previously, and is not currently under consideration for publication elsewhere. All authors have read and approved the final version.
The main point of this article is to present a comprehensive, evidence-based assessment of the critically low levels of mathematics achievement among students in Kenema District. Our study identifies the key predictors of performance—namely, teacher qualifications, resource availability, and parental education—and provides a multi-tiered framework of interventions to address this urgent educational challenge. The findings are significant for policymakers and educators in Sierra Leone and similar developing contexts.
We suggest the following potential referees for our manuscript:
Dr. Alhaji Mohamed Hamza Conteh, Njala University
2. Prof. Juana P Moiwo, Njala University
3. Dr. Brima Gegbe, Njala University.

Thank you for your time and consideration. We look forward to hearing from you.
Sincerely,
Edward Lamin Monya Junior
(Corresponding Author)
Eastern Technical University of Sierra Leone, Kenema