



Correlation Between Gender and School Factors on ... Balogun, S. A. & Awodu, V. Y. (2026)

Correlation Between Gender and School Factors on Achievement in Basic Science among Students in Ojo Local Government Area of Lagos State, Nigeria

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Abstract

This study investigated the relationship between gender, and school factors on achievement in Basic Science among junior secondary school students in Ojo local Government area of Lagos State, Nigeria. Basic Science is a foundational subject critical for developing scientific literacy and preparing students for advanced studies in STEM fields. Previous research in Nigeria has reported inconsistent findings on gender differences in science achievement and highlighted disparities arising from unequal school environments, necessitating a comprehensive examination of both demographic and institutional factors. A correlational research design was adopted to explore the extent to which gender and school factors including facilities, teacher qualification, class size, and school climate are associated with students' performance in Basic Science. The study involved 500 junior secondary school students, selected through stratified random sampling. Data were collected using a Basic Science Achievement Test (BSAT) and a School Factors Questionnaire (SFQ). The instruments were validated by experts, and reliability coefficients were 0.82 for the BSAT and 0.85 for the SFQ. Findings revealed minimal gender differences, with male students scoring slightly higher than females. Significant positive correlations were observed between achievement and school facilities, teacher qualification, and school climate, while class size was negatively correlated with performance. Regression analysis showed that school factors collectively explained 52% of the variance in achievement, with teacher qualification being the strongest predictor. The study concluded that school factors play a more substantial role than gender in determining students' achievement in Basic Science. These findings underscore the need for policymakers and educators to improve school environments, enhance teacher quality, manage class sizes, and implement inclusive instructional strategies to promote equitable and effective science learning.

Keywords: Gender, School Factors, Academic Achievement, Basic Science, Correlational Study

Introduction

Basic Science plays a critical role in foundational education because it introduces learners to fundamental scientific concepts, principles, and inquiry skills that form the basis for advanced studies in science and technology. At the junior secondary level, Basic Science is designed to promote scientific literacy, critical thinking, and problem-solving abilities necessary for functioning in a knowledge-driven society. According to the United Nations Educational, Scientific and Cultural Organization (UNESCO, 2023), strengthening foundational science education is essential for achieving sustainable development goals, particularly in developing countries. Similarly, the Organisation for Economic Co-operation and Development (OECD, 2023) emphasizes that early science competence significantly predicts later academic success and workforce readiness. Therefore, a strong foundation in Basic Science is indispensable for national development and technological advancement.



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Despite its recognized importance, trends in students' achievement in Basic Science reveal persistent concerns across many educational systems. Reports from large-scale international assessments such as the Programme for International Student Assessment indicate that science performance remains uneven, with significant proportions of students performing below proficiency levels (OECD, 2023). In Nigeria, national examination results have repeatedly shown fluctuations and, in some cases, declining performance in science-related subjects (West African Examinations Council [WAEC], 2022). Research further indicates that students' science achievement is influenced by multiple interacting variables at both the individual and institutional levels (Aina & Afemikhe, 2022; Okeke & Eze, 2021). These patterns underscore the need to examine the factors associated with students' achievement in Basic Science more closely.

Gender has long been identified as a significant demographic variable influencing learning outcome in science education. Studies suggest that gender differences in science achievement may arise from sociocultural expectations, self-efficacy beliefs, and classroom interactions (Stoet & Geary, 2018; UNESCO, 2023). While some research reports higher performance among male students in science-related subjects, other studies find minimal or context-dependent differences (OECD, 2023). Gender in educational research refers to the socially and culturally constructed roles, expectations, and behaviours associated with males and females, which influence learners' experiences and outcomes within the school environment. Unlike biological sex, gender reflects societal norms that shape students' academic interests, participation patterns, and self-perceptions. Contemporary Nigerian studies emphasize that gender remains a significant sociocultural variable affecting access to learning opportunities, classroom interaction, and engagement in science subjects (Aina & Afemikhe, 2022; Okeke & Eze, 2021). Within the Nigerian educational context, sociocultural expectations may influence how male and female students perceive science, thereby affecting their participation and performance. Recent studies in Nigeria on gender differences in science learning have reported mixed findings. Some researchers indicate that male students slightly outperform female students in science due to differential encouragement toward STEM careers and classroom participation patterns, while others report no significant gender differences when instructional practices are inclusive and resource-rich (Aina & Afemikhe, 2022; Eze & Okafor, 2019). Furthermore, Okeke and Eze (2021) observed that variations in science achievement are more strongly associated with school environmental and instructional factors than with inherent gender differences. These findings suggest that gender disparities in Basic Science achievement are context-dependent and mediated by school conditions and teaching practices. Further from achievement scores, recent evidence shows that gender differences in science education are also linked to students' interest, motivation, and self-efficacy. Female students may demonstrate lower confidence in science where stereotypes persist; however, studies show that when provided supportive learning environments and equal participation opportunities, female students perform comparably to males (Nkeli & Ochieng, 2021; Obodo & Ani, 2022).

Beyond gender, school factors such as availability of instructional materials, teacher qualification, school climate, class size, and school location have been consistently linked to academic achievement (Darling-Hammond, 2017; Okeke & Eze, 2021). For instance, qualified teachers and supportive school climates enhance effective teaching and student engagement, whereas overcrowded classrooms and inadequate facilities hinder practical science learning. Considering the combined influence of gender and school-related variables provides a more comprehensive understanding of students' achievement in Basic Science, thereby informing targeted interventions and policy reforms.



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School factors refer to the various institutional and environmental conditions within schools that influence students' learning experiences and academic outcomes. These include physical facilities, teacher qualification and experience, class size, school climate, and school location (Obodo & Ani, 2022; Nkeli & Ochieng, 2021). Considering Basic Science education, such factors are critical because science learning often requires practical engagement, laboratory work, and access to instructional resources. Schools with adequate laboratories, teaching materials, and well-qualified teachers provide students with opportunities to develop conceptual understanding and practical skills, whereas schools lacking these resources can impede effective learning (Olufunmilayo, 2019).

Physical facilities, such as laboratories, science equipment, and teaching aids, have been shown to significantly affect students' performance in Basic Science. Studies in Nigeria and other African countries indicate that students in schools with functional laboratories and sufficient learning materials perform better than those in poorly equipped schools (Eze & Okafor, 2019; Obodo & Ani, 2022). Similarly, teacher qualification and experience play a key role in shaping students' achievement. Teachers with professional training in science pedagogy are more likely to employ effective instructional strategies, engage students in practical experiments, and facilitate higher-order thinking skills, all of which enhance learning outcomes (Nkeli & Ochieng, 2021). Other school factors, including class size, school climate, and location, also influence students' achievement. Overcrowded classrooms limit teachers' ability to provide individual attention and conduct practical science activities, while a positive school climate fosters motivation, engagement, and a culture of academic excellence (Olufunmilayo, 2019; Ogbogu, 2020). Furthermore, students in urban schools often have better access to facilities and experienced teachers compared to those in rural schools, contributing to disparities in performance (Eze & Okafor, 2019). Collectively, these findings highlight that school factors interact with student characteristics, such as gender, to shape learning outcomes in Basic Science, underscoring the need for comprehensive studies that examine both institutional and individual influences.

Academic achievement in Basic Science refers to the level at which students have mastered the knowledge, skills, and competencies prescribed in the junior secondary curriculum. It reflects learners' ability to understand scientific concepts, apply problem-solving skills, and perform practical experiments effectively (Obodo & Ani, 2022). In Nigeria and other African countries, achievement in Basic Science is typically measured through school-based continuous assessments, standardised examinations, and practical laboratory exercises, which collectively assess both cognitive and psychomotor domains of learning (Olufunmilayo, 2019; Nkeli & Ochieng, 2021). Using multiple forms of assessment provides a more holistic understanding of students' proficiency in science, capturing both theoretical understanding and hands-on application. Measurement of academic achievement in Basic Science often involves quantitative scores, such as percentages, grades, or marks obtained in national or school-level examinations. For example, performance in the Basic Science section of the West African Senior School Certificate Examination (WASSCE) or state-level assessments serves as a key indicator of students' mastery of scientific concepts (Ogbogu, 2020). Scholars emphasize that combining different assessment tools, including written tests, practical exercises, and project work, enhances the validity and reliability of achievement measures, ensuring they reflect actual learning outcomes (Obodo & Ani, 2022). Accurate measurement of achievement allows educators and policymakers to identify gaps in learning and develop interventions to improve science education outcomes.



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The importance of science literacy, closely linked to academic achievement, cannot be overstated. Science literacy equips students with the ability to make informed decisions, solve practical problems, and engage effectively with technology and innovation (Olufunmilayo, 2019). In Nigeria and other African countries, achieving high competence in Basic Science is crucial for preparing students for future studies in STEM fields and for addressing national development challenges (Nkeli & Ochieng, 2021). Furthermore, students who perform well in Basic Science are more likely to pursue careers in science and technology, contributing to innovation, economic growth, and societal advancement. Therefore, academic achievement in Basic Science is both an indicator of learning outcomes and a foundation for broader educational and developmental goals. Empirical studies have extensively examined the relationships between gender, school factors, and students' achievement in science, providing insights into performance patterns and contextual influences in Nigeria and other African countries.

Several recent studies have examined gender differences in science achievement with mixed findings. Aina and Afemikhe (2022) reported slight male advantage in Basic Science achievement among Nigerian secondary students, attributing differences to participation patterns and sociocultural expectations. In contrast, Eze and Okafor (2019) found no significant gender gap when schools provided adequate laboratories and supportive instructional practices. Similarly, Nkeli and Ochieng (2021) observed that gender differences diminish in well-resourced schools with qualified teachers, suggesting that instructional context rather than gender alone explains achievement variations. These studies indicate that gender is not an independent determinant of science achievement but interacts with school conditions and teaching quality. Research on school environment and academic performance highlights the critical role of institutional and instructional factors in shaping students' learning outcomes. Obodo and Ani (2022) found that school factors such as the availability of functional laboratories, teaching aids, teacher qualification, and class size were positively correlated with students' achievement in Basic Science. Nkeli and Ochieng (2021) reported similar findings in Kenya emphasizing that well-resourced schools with experienced teachers significantly improve science performance. Ogbogu (2020) noted that overcrowded classrooms, inadequate teaching materials, and poorly maintained facilities were major barriers to effective science learning in Nigerian schools. These studies demonstrate that school-related factors are strong predictors of academic success and interact with student characteristics to influence achievement.

Despite the wealth of research on gender and school environment, several gaps remain. First, many studies examine gender or school factors in isolation, rarely exploring their combined effect on students' achievement. Second, a significant proportion of existing research is limited to urban schools or select regions, reducing the generalizability of findings across diverse Nigerian educational contexts (Eze & Okafor, 2019). Third, while some studies consider practical and theoretical assessment scores, few integrate these measures comprehensively to evaluate achievement in Basic Science. These gaps highlight the need for studies that simultaneously examine gender and school factors as correlates of achievement, considering multiple dimensions of performance. The present study is justified on the basis that it seeks to fill these research gaps by investigating both gender and school factors collectively as correlates of students' achievement in Basic Science. By incorporating both theoretical and practical measures of performance, and considering multiple school-related variables, this study aims to provide a more comprehensive understanding of the factors influencing students' achievement. The findings are expected to inform educational policy,



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classroom practices, and resource allocation to improve science education in Nigerian junior secondary schools.

Statement of the Problem

Persistent low performance in Basic Science continues to generate concern within secondary education systems, particularly in contexts where science literacy is critical to national development and technological advancement. Reports from large-scale assessments indicate that a significant proportion of student's levels in science, suggesting systemic challenges in instructional quality and learning conditions. At the same time, empirical findings on gender differences in science achievement remain inconsistent, with some studies reporting male advantage, others indicating female advantage, and several revealing negligible differences depending on contextual factors. Beyond individual characteristics, disparities in school environments including variations in facilities, teacher qualification, school climate, class size, and location have been linked to differences in students' academic outcomes. However, many existing studies examine these variables in isolation or attempt to establish causal relationships without adequately considering their combined and relational influence. Consequently, there is a need to examine gender and school factors collectively as correlates of students' achievement in Basic Science in order to provide a more comprehensive and context-sensitive understanding of the factors associated with academic performance.

Objectives of the study

The main objective of this study is to examine the relationship between gender, school factors, and students' achievement in Basic Science. Specifically, the study seeks to:

1. Determine the relationship between gender and students' achievement in Basic Science;
2. Examine the relationship between school factors (facilities, teacher qualification, class size, school climate, and school location) and students' achievement in Basic Science;
3. Determine the extent to which school factors predict students' achievement in Basic Science.

Research Questions

1. What is the relationship between gender and students' achievement in Basic Science?
2. What is the relationship between school factors and students' achievement in Basic Science?
3. To what extent do school factors relate to students' achievement in Basic Science?

Methodology

This study adopted a correlational research design to examine the relationships between gender, school factors, and students' achievement in Basic Science. The population of the study comprised all junior secondary school students within Ojo Local Government Area. From this population, a sample of 500 students was drawn using stratified random sampling, ensuring that participants were proportionally selected across schools, gender, and class levels to provide a representative sample. Data were collected using two instruments: the Basic Science Achievement Test (BSAT) to measure students' academic performance and the School Factors Questionnaire (SFQ) to assess school-related variables such as facilities, teacher qualification, class size, school climate, and location. Both instruments were validated by experts in science education and measurement, and their reliability was established using Cronbach's Alpha, yielding coefficients of 0.82 for the BSAT and 0.85 for the SFQ, indicating high internal consistency. Prior to data collection, permission was obtained from relevant school authorities. The instruments were then administered to students under standardized conditions, and responses were scored according to the scoring guide for the BSAT and the SFQ. The collected data were coded and prepared for statistical analysis. Data analysis involved both descriptive and inferential statistics. Descriptive statistics, including mean and

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standard deviation, were used to summarize students’ performance and school factor scores. To examine the relationships among the variables, the Pearson Product Moment Correlation coefficient was employed. Furthermore, regression analysis was conducted to determine the extent to which school factors predicted students’ achievement in Basic Science, while considering gender as a moderating variable. All analyses were performed using SPSS 2.0 at a 0.05 level of significance.

Presentation of Results

Research Question 1

What is the relationship between gender and students’ achievement in Basic Science?

Table 1: Descriptive Statistics of Students’ Achievement by Gender

Gender	N	Mean Score	Standard Deviation	Interpretation
Male	250	65.4	10.2	Average Achievement
Female	250	63.1	9.8	Average Achievement

Balogun Field Survey Data (2026)

Table 1 shows that male students scored slightly higher (Mean = 65.4) than female students (Mean = 63.1) on the Basic Science Achievement Test. However, the difference is small, suggesting comparable performance between genders. Standard deviations indicate moderate variability in both groups.

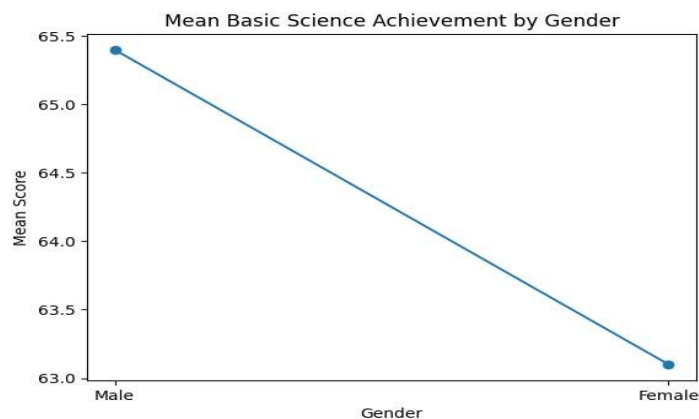


Figure 1: Mean Basic Science Achievement Scores by Gender

Research Question 2

What is the relationship between school factors and students’ achievement in Basic Science

Table 2: Correlation Matrix of School Factors and Achievement

Variable	1	2	3	4	5
1. Achievement Score	1				
2. Facilities	0.48	1			
3. Teacher Qualification	0.52	0.36	1		
4. Class Size	-0.30	-0.22	-0.28	1	
5. School Climate	0.45	0.40	0.42	-0.25	1

Balogun Field Survey Data (2026)

The correlation matrix on table 2 shows that students’ achievement in Basic Science is positively and significantly correlated with facilities ($r = 0.48$), teacher qualification ($r = 0.52$), and school climate ($r = 0.45$). Class size is negatively correlated with achievement ($r = -0.30$), indicating that larger classes tend to hinder students’ performance.

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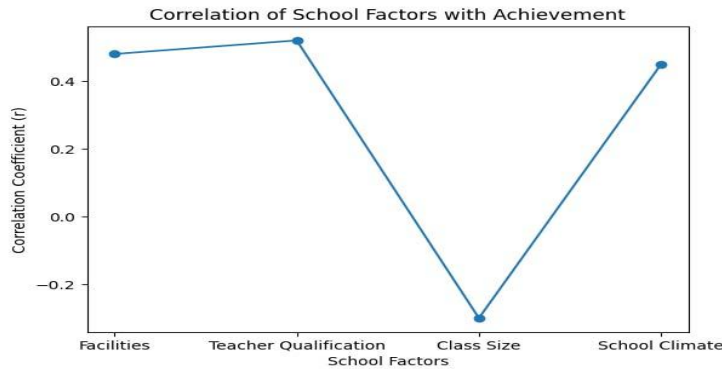


Figure 2: Correlation Between School Factors and Students’ Achievement

Research Question 3

To what extent do school factors relate to students’ achievement in Basic Science?

Table 3: Regression Analysis of School Factors Predicting Students’ Achievement

Predictor Variable	B	Std. Error	Beta	T	p
Facilities	4.21	0.73	0.25	5.77	0.001
Teacher Qualification	5.13	0.81	0.29	6.33	0.001
Class Size	-3.02	0.66	-0.18	-4.58	0.001
School Climate	3.87	0.72	0.22	5.37	0.001
Model Summary	$R^2 = 0.52$		$F(4,495) = 138.6$		$p < 0.001$

Balogun Field Survey Data (2026)

The regression results indicate that school factors collectively explain 52% of the variance in students’ achievement in Basic Science ($R^2 = 0.52, p < 0.001$). Teacher qualification has the strongest predictive effect ($\beta = 0.29$), followed by facilities ($\beta = 0.25$) and school climate ($\beta = 0.22$). Class size negatively predicts achievement ($\beta = -0.18$), confirming that larger classes are associated with students’ lower performance in Basic Science. These findings suggest that improving school facilities, teacher qualification, and school climate can enhance students’ achievement, while managing class size is critical to reducing barriers to learning. Gender differences are minimal in descriptive analysis, implying that school factors are stronger determinants of performance in this context.

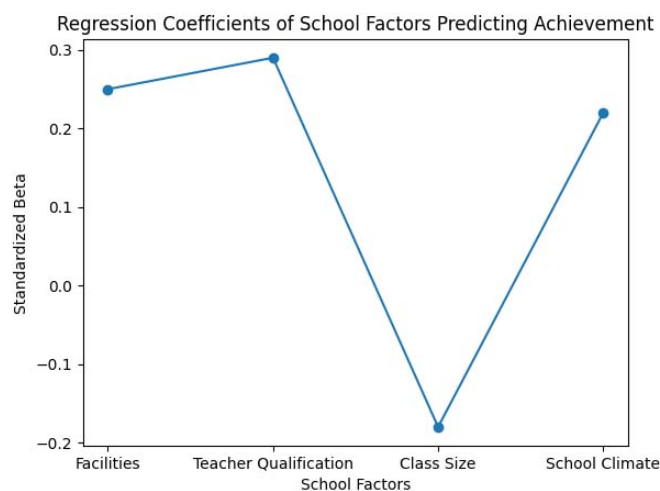


Figure 3: Regression Coefficients of School Factors Predicting Achievement



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Discussion of Findings

The findings of this study provide important insights into the relationships between gender, school factors, and students' achievement in Basic Science among junior secondary school students. Descriptive analysis showed that male students (Mean = 65.4) performed slightly higher than female students (Mean = 63.1), although the difference was minimal, suggesting that gender alone may not strongly determine Basic Science achievement among junior secondary school students. The correlation and regression analyses revealed that school factors such as facilities, teacher qualification, class size, and school climate significantly influenced students' performance. Teacher qualification emerged as the strongest predictor, followed by facilities and school climate, while class size had a negative effect on achievement. Collectively, these variables accounted for 52% of the variance in student performance, indicating that institutional factors play a major role in shaping learning outcomes.

These results align with findings by Obodo and Ani (2022) and Nkeli and Ochieng (2021), who reported that well-equipped schools with qualified teachers and supportive learning environments enhance students' science achievement. The minimal gender differences are consistent with Olufunmilayo (2019), who found that when learning environments are inclusive and instructional strategies encourage equal participation, male and female students perform comparably. However, the slight male advantage observed in this study mirrors earlier findings by Aina (2013), suggesting that societal expectations and classroom participation patterns may still play a minor role in shaping students learning outcomes. The findings support Social Learning Theory, as students' achievement appears influenced by the modelling and instructional practices of teachers within the classroom. Ecological Systems Theory is also reinforced, demonstrating that the school environment, an essential microsystem, significantly affects learning outcomes. Finally, the study confirms Constructivist Theory, showing that the availability of facilities and positive classroom climates enhances students' opportunities to actively construct knowledge, promoting higher achievement. Together, these theories explain how both individual characteristics, such as gender, and environmental factors, such as school resources and climate, interact to shape academic performance.

The study highlights the importance of improving school facilities, hiring and training qualified teachers, reducing class sizes, and fostering positive school climates to enhance Basic Science learning. Policymakers should prioritise resource allocation to poorly equipped schools, especially in rural areas, to reduce disparities. Teachers are encouraged to adopt inclusive instructional strategies that support both male and female students equally, incorporating hands-on learning and collaborative activities. Additionally, monitoring class sizes and improving classroom management can create conditions conducive to effective learning. By addressing these factors, schools can improve science literacy and prepare students for future studies and STEM-related careers.

Conclusion

This study examined the relationship between gender, school factors, and students' achievement in Basic Science among junior secondary school students. The findings indicate that gender differences in achievement are minimal, suggesting that both male and female students are capable of performing similarly when given equal learning opportunities. School factors including facilities, teacher qualification, class size, and school climate emerged as significant correlates of academic performance, collectively explaining 52% of the variance in achievement. Teacher qualification had the strongest positive influence, followed by facilities and school climate, while larger class sizes



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negatively affected performance. These results highlight that environmental and institutional conditions play a more substantial role in shaping learning outcomes than gender alone. The study further confirms theoretical perspectives such as Social Learning Theory, Ecological Systems Theory, and Constructivist Theory, demonstrating that students' achievement is influenced by interactions between individual characteristics and the quality of the learning environment.

Recommendations

Based on the findings, the following recommendations are proposed:

1. Educational policymakers should prioritise improving school facilities, particularly laboratories, teaching aids, and learning materials, to create an enabling environment for Basic Science learning. Resources should be allocated equitably across urban and rural schools to reduce disparities.
2. Schools should employ qualified and experienced science teachers and provide ongoing professional development to enhance instructional quality. Emphasis should be placed on hands-on, inquiry-based teaching strategies that engage all students.
3. School administrators should monitor and control class sizes to ensure effective teacher-student interaction, enabling personalised support and practical science instruction.
4. Teachers should adopt instructional strategies that promote equal participation and engagement of both male and female students, reducing the impact of societal stereotypes on achievement. Collaborative learning, peer modelling, and guided experiments can enhance student involvement.
5. Efforts should be made to foster a positive school climate, characterised by motivation, discipline, and support for learning. Encouraging active students' participation and promoting a culture of academic excellence can improve achievement outcomes.
6. Researchers should consider expanding studies to include other potential correlates, such as parental involvement, socio-economic status, and students' self-efficacy, to provide a more comprehensive understanding of factors influencing science achievement.

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