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# Effective Learning Spaces in Public Secondary Schools in Nigeria: A Study on The Impact of Students' Engagement and Achievement

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## ABSTRACT

This research investigates the effectiveness of well-designed learning spaces on students' academic performance and engagement in public secondary schools in Nigeria. The review of previous studies showed that Nigerian public schools frequently struggle with structural issues, including overcrowded classrooms, inadequate ventilation, and disorganised spaces. The study employed a quasi-experimental research approach. The target population comprised all public secondary schools in Ondo State. A purposive sampling technique was employed to select two public secondary schools with distinct classroom settings. A general science subject Achievement Test and structured questionnaires were administered as part of the technique to gauge student performance and participation. Data were collected and analysed to compare students' results in classrooms with and without sufficient facilitation. The two groups' levels of engagement and academic performance differed significantly. On the General Science Subject Achievement Test, students in well-designed classrooms scored an average of 76.4, while those in poorly supported environments scored an average of 58.2, resulting in an 18.2-point difference. On a 3-point Likert scale, the well-facilitated group's average engagement score was 2.68, which appears significantly higher than the poorly facilitated group's score of 1.87. These differences were statistically significant across behavioural, emotional, and cognitive involvement ($p < 0.05$), as determined by independent t-tests. A visible difference in ventilation, lighting, furniture quality, and spatial arrangement was illustrated through visual representations and compared using bar charts. These elements were found to be significant predictors of both accomplishment and engagement. Based on the findings, the study therefore recommends using affordable, contextually relevant design elements to create accessible and engaging learning environments, such as improved lighting, ergonomic furnishings, and adjustable chairs. The study concludes that enhancing the physical learning environment is essential for attaining academic excellence and educational equity in public secondary schools in Nigeria.

**Keywords:** quality, Learners, public secondary school, Engagement, Learning Space, Achievement.

## INTRODUCTION

Education is often regarded as the cornerstone of development worldwide. It serves as the foundation for literacy, skill development, technological progress, and the capacity to utilise both human and material resources to fulfil societal needs. Education encompasses all the procedures that help a child or young adult acquire skills, attitudes, and other behaviours that benefit the society in which they live. In any given society, education is essential.

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It is a procedure that helps people enhance their skills and abilities. Their abilities could include intellectual, social, emotional, and physical skills. Education is the deliberate transfer of knowledge, values, and skills from one person to another through schools, colleges, universities, and other institutions across cultures (Ashrad, 2021). The environment can be thought of as a system in which physical elements and living organisms interact. In contrast, the learning space is a setting where students engage with learning resources and study to become socialised and address societal challenges.

(Baafi, 2020) asserts that the environment is comprised of all the things that surround and affect man, including his social, biological, and physical attributes. Then, the learning space can be viewed as a comprehensive learning environment encompassing all interactions, as well as the materials and human resources. The term "learning environment" refers to the physical and social settings in which education and learning occur. Several key elements, including the classroom, library, technical workshop, laboratory, teachers, school administration, instructional methods, and classmates, significantly impact a student's academic performance.

The quality of education is influenced by both the instructors' performance of their tasks and the efficiency with which they coordinate the learning environment.

The growing body of research linking learning space design to student engagement and achievement serves as the driving force behind this study. The study aims to fill a significant gap in the literature by focusing on public secondary schools in Ondo State, Nigeria and providing valuable insights to educators, architects, and policymakers. Guidelines for designing more productive learning environments can be developed by understanding how design components affect student behaviour and performance.

**Statement of the Problem**

Although education is essential for a country's prosperity, many public secondary schools in Nigeria, including those in Ondo State, struggle with inadequate infrastructure and design. Students' capacity to learn and participate effectively is seriously hampered by poorly maintained facilities, packed classrooms, a lack of ergonomic equipment, and insufficient ventilation. These factors combine to impair the quality of education, leading to disengagement, lower academic performance, and declining health. The focus has been chiefly on the quantity of learning spaces rather than their quality, despite the state government's efforts to increase access to education by constructing new classrooms and allocating funds. As a result, little attention has been paid to the crucial role that well-designed learning environments play in enhancing student achievement and engagement.

Current studies highlight the importance of learning environment design for student achievement and engagement. Global innovations in educational settings demonstrate that carefully considered furniture, lighting, ventilation, and spatial arrangements can significantly improve learning outcomes. These observations, however, are mostly drawn from developed environments and often fail to consider the distinct socioeconomic and cultural realities of Nigerian schools. Particularly in Ondo State, little is known about how learning space design affects student achievement and participation in public secondary schools. This disparity limits educators, legislators, and designers' ability to create productive spaces that meet both local needs and international best practices.

By investigating the influence of learning space design on student engagement and achievement in public secondary schools in Nigeria, this study aims to close this crucial gap. It aims to identify the specific design components that, in this context, have the most significant impact on student outcomes. The study aims to provide valuable suggestions for creating efficient learning settings that are both economical and culturally relevant by fusing local knowledge with international research. It is anticipated that the results will enable educators, architects, and legislators to make informed decisions that will enhance the quality of education and promote enhanced academic achievement in public schools in Nigeria.

**Purpose of the Study**

The purpose of this research is to:

i. Find out how learning space design affects student achievement and engagement in Nigeria's public secondary schools.
ii. examine the effects of different design components on students' behavioural, emotional, and cognitive involvement as well as their academic achievement. In order to improve educational outcomes,
iii. the study also aims to offer reliable recommendations for enhancing the layout and operation of learning environments.

**Research Objectives**

The following research objectives were raised to guide the study. The study is set to;

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1. The difference between the well-equipped classroom and the poorly equipped classroom
2. The effect of the quality of the learning environment (well-furnished versus poorly facilitated classrooms) on students' engagement during General Science lessons.
3. The relationship between the quality of the learning environment and students' academic performance in General Science Subjects

**Significance of the Study**

The study provides educators with important new insights into how the physical learning environment affects student outcomes and teaching efficacy. Teachers can modify their teaching strategies to increase student participation and comprehension by recognising particular design elements that encourage active learning and engagement. Better classroom designs will also make classroom management easier, less stressful for teachers, and improve the teaching experience in general.

By comprehending the significance of incorporating efficient learning space designs into school infrastructure planning, school leaders will gain insight from this study. The results would be based on research-based recommendations for allocating funds and setting priorities for enhancements that raise educational standards. With this information, administrators will be better equipped to support funding and put laws into place that benefit both teachers and students.

This study would be significant for policymakers and government organisations that work in education, as it emphasises the importance of learning settings in achieving educational objectives. The study's data-driven findings can guide the creation of programs and policies meant to enhance school infrastructure in an economical and long-lasting way. These suggestions can direct the fair allocation of funds to close the gap between urban and rural schools and guarantee that every student receives a high-quality education.

**Scope of the Study**

The research focuses on designing effective learning spaces in public secondary schools in Ondo State, Nigeria, and examines the impact of students' engagement and achievement on learning outcomes. This study covers all the Senior Secondary Schools in Akure South Local Government, Ondo State, Nigeria. The study uses a quantitative data-collection method to elicit responses from participants.

## REVIEW OF LITERATURE

According to Olaseni (2024), the learning space encompasses learning resources and technology, teaching methods, learning modes, and connections to societal and global contexts. The term also includes human behavioural and cultural dimensions, including the vital role of emotion in learning. The learning space is a composite of human practices and material systems, much as an ecology is the combination of living things and physical environment (Balog, 2020). Contemporary learners deserve learning spaces that meet their individual and collective needs. To meet this challenge, educational leaders must provide physical and cultural environments that are empowering and engaging (Orlu,2013). Learning spaces vary from classroom to classroom and context to context, each with unique elements. According to study.com (2018), learning space can be learner–centred, knowledge–centred, assessment–centred, and community–centred. Learner-centred environments are designed for the active construction of knowledge by and for learners (Federation University, 2018). Knowledge-centred learning environments support students' deep investigations of big ideas through generative learning activities. Assessment-centred learning environments provide frequent, ongoing, and varied opportunities for assessment, including opportunities for revision and self- and peer-assessment (Alvaro, 2010). Community-centred environments value collaboration, negotiation of meaning, respect for multiple perspectives that shape knowledge, and connections to the local community and culture (Raccoon gang, 2021).

The learning space comprises components that influence the student's learning curve. These components, according to Balog (2020), include: people, teaching materials, technical tools, and learning resources; curriculum, training, and instruction; and physical environment/learning space. People are individuals who directly or indirectly affect students through connections or relationships, which can contribute to students' growth and success in their careers. The teaching materials, technical tools, and learning resources are highly advanced and aligned with the curriculum as part of student learning support. The curriculum, training, and instruction are the core foundations of the learning process; they influence one another and play vital roles in facilitating the flow of knowledge and delivery of instructional content/curriculum. The physical environment/learning space refers to the physical setting in which learners learn, which should evoke positive responses and hold the interest of those who inhabit it (Balog, 2020). Mondal (2021) identified several important factors that may affect the learning process, including

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the intellectual factor, which refers to an individual's cognitive level. Learning factors are factors arising from faulty methods of work or study and the narrowness of the experimental background, which may affect the learning process. Physical factors include health, physical development, nutrition, visual and physical defects, and glandular abnormalities. Mental factors are attitudes such as interest, cheerfulness, and open-mindedness that are important in personality development. Personal factors, such as instincts and emotions, and social factors, such as cooperation and rivalry, are directly related to a complex psychology of motivation.

The teacher's individual personality is an important factor in the learning environment. They are key factors that create a favourable teaching-learning milieu, making the instructional process easy, enthusiastically adaptable, and valuable (Usman, 2016). The way his personality interacts with the pupils' personalities helps determine the kind of behaviour that emerges from the learning situation (Brown, 2022). Environmental factors such as classrooms, textbooks, equipment, school supplies, and other instructional materials are the physical conditions needed for learning (Mondal, 2021). Wandan (2021) observed that before students can succeed academically, they must feel safe, both physically and mentally, and that a safe learning space requires students to feel welcomed, supported, and respected. Personalising learning helps students develop skills, including critical thinking, using knowledge and information to solve complex problems, working collaboratively, communicating effectively, learning how to learn, and developing academic mindsets, thereby significantly increasing students' engagement (Raccoon gang, 2018). Moreso, students must feel connected to teachers, staff, and other students. Schools can nurture these connections by focusing on students' social and emotional learning (SEL). Students must also feel supported by all those connected to their learning experience, such as teachers, classmates, administrators, family, and community members, to achieve higher academic goals (Waldman, 2020). A productive learning space is crucial to students' academic, emotional and social success in school. A conducive learning environment does not just happen by chance. They should be created through conscious procedures, such as interacting with students in a positive manner, exhibiting positive behaviours, etc., that would promote learning activities in the learning environment (Becton, 2021).

In research conducted by Oladokun and Adeyinka (2017) in Nigeria, a significant divergence in academic performance was observed among secondary school students in both urban and rural areas. Urban schools achieved higher mean scores, while rural schools had lower scores. Their study also revealed a significant gender difference, with male students outperforming female students in all subjects except English Language. This highlights the need for improved educational planning and policy in Nigeria. According to Nantambi (2018), parents' education levels significantly influenced the academic achievement of Ugandan sixth-grade students. Academic achievement was higher among students with higher levels of education than among those with lower levels. This effect was consistent across disciplines, including reading, numeracy, and health sciences. Mbwana and Mbiti (2019) identified several factors contributing to failure in Tanzanian community secondary schools, including the lack of qualified teachers, inadequate teaching materials, poor infrastructure, high student-teacher ratios, limited parental involvement, and poverty.

The extent to which a student has effectively acquired information, skills, and competencies in a particular subject or educational level is often referred to as student achievement (Johnson, 2022). Performance-based evaluations, classroom assessments, and standardised tests have historically been used to gauge achievement. On the other hand, modern viewpoints emphasise the value of holistic development, including emotional intelligence, critical thinking, and problem-solving skills (Williams & Lee, 2023). According to educational psychologists and academics, psychological and contextual factors also influence student achievement, not solely on intellectual prowess (Anderson, 2020). Student motivation, learning environment, teacher effectiveness, and socioeconomic background are among the factors that affect student achievement. Because kids from wealthy families frequently have access to better learning resources and support networks, socioeconomic status is important (Garcia & Martinez, 2022). On the other hand, students from underprivileged families may encounter difficulties such as insufficient learning resources, a lack of parental guidance, and limited opportunities for stimulating activities. However, studies have demonstrated that targeted interventions, such as financial aid and mentorship programs, can help close these inequalities and advance fair educational opportunities (Harris, 2021).

It is impossible to overestimate the influence that teachers have on students' academic success. Good teachers create a supportive learning environment, use engaging teaching techniques, and provide tailored feedback (Jackson & Miller, 2022). Research has shown that when kids have access to knowledgeable, driven educators who use cutting-edge teaching strategies, their academic performance improves (Taylor & Adams, 2024). Student outcomes are also strongly influenced by the school environment, including peer interactions, technological access, and infrastructure. A well-resourced and encouraging school pushes students to achieve and cultivates a culture of academic achievement (Thomas & Green, 2023). Summative and formative assessments are used in tandem to evaluate students' achievements. Alternative assessment techniques, such as project-based learning and self-reflection exercises, offer more profound insights into students' progress than standardised examinations, which only provide a broad measure of academic ability (Anderson & Taylor, 2023). Contemporary educational

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frameworks encourage comprehensive assessment models that account for a range of learning styles and competencies (Brown & Lee, 2023).

Brooks, Walker, and Pomerantz (2022) conducted a comparable extensive study examining how active learning classrooms (ALCs) affected student engagement at 15 US higher education institutions. The researchers found that students in ALCs regularly reported greater cognitive engagement, especially in tasks requiring problem-solving and peer teaching, based on survey data and classroom observations. According to the study, adaptable physical environments strengthened the cognitive and behavioural aspects of engagement by fostering a sense of ownership and accountability for learning. Student engagement is influenced not just by flexibility but also by the ambient quality of learning environments. Holland, Edwards, and Maynard (2021) investigated the effects of lighting, acoustics, and spatial arrangements on involvement in primary and secondary schools in the United Kingdom.

According to their research, classrooms with ample natural light, effective noise management, and unobstructed sightlines greatly improved students' focus and reduced disruptive behaviour. These results highlight the importance of the physical attributes of learning environments in maintaining student concentration and creating a positive learning atmosphere, which, in turn, improves engagement.

A mixed-methods study by Martin, Sun, and Westine (2021) looked at how students interacted with synchronous and asynchronous virtual learning environments. Their research showed that social and cognitive engagement were enhanced by well-organised virtual environments, especially those that included collaboration features like shared digital workstations, breakout rooms, and collaborative whiteboards. Students in poorly constructed virtual environments, on the other hand, reported reduced affective involvement and frequently mentioned feeling alone and cut off from their teachers and peers. The application of cutting-edge technologies, such as virtual reality (VR), also attracted interest during this time. Rahman, Ismail, and Choo (2023) conducted an experimental study comparing student participation in VR-based learning settings with that in conventional video conferencing platforms. According to their findings, students' affective and behavioural engagement was improved by VR environments because they created a greater sense of presence. Students in the VR condition demonstrated higher levels of immersion, which positively affected their engagement and emotional attachment to the course material.

**Appraisal of Literature Reviewed and Gaps Filled**

According to the literature reviewed, learning spaces are crucial components that significantly impact students' academic performance and engagement. Researchers across multiple studies emphasise that learning spaces are dynamic environments that integrate social interactions, technology, pedagogical techniques, and physical design to create comprehensive learning experiences. According to academics, well-designed learning environments promote student-centred learning, collaboration, and a variety of instructional philosophies, thereby raising student performance and engagement. According to the literature, learning environments need to support contemporary learning objectives, including critical thinking, active engagement, and the acquisition of 21st-century skills.

The connection between student engagement and the design of learning spaces is a recurrent theme in the literature. Flexible seating arrangements, collaborative hubs, technology access, and aesthetic elements like lighting and acoustics all support students' cognitive, emotional, and behavioural engagement, according to research conducted in a variety of settings, including studies by Brooks, Walker, and Pomerantz (2022) and Holland, Edwards, and Maynard (2021). Well-designed and student-centred learning environments tend to encourage more active participation, higher levels of motivation, and a greater sense of ownership over learning. On the contrary, overcrowded classrooms, inadequate ventilation, and rigid organisation frequently inhibit involvement, encourage disengagement, and reduce students' overall passion for learning. In secondary schools, where students are forming independent study habits and critical thinking abilities, the relationship between learning space quality and student involvement is especially pertinent.

The literature also emphasises how learning spaces directly affect students' academic performance. Strong relationships between academic performance and the physical condition of learning spaces have been established in several empirical studies, including those by Duruji, Azuh, and Oviasogie (2014) and Mudassir and Norsuhaily (2015). Students who learn in classrooms with sufficient teaching resources, working labs, libraries, and ICT facilities routinely outperform those who learn in settings with fewer resources. Additionally, research such as that by Shamaki (2015) and Ezike (2018) highlights the importance of shaping students' learning experiences and academic achievement through factors such as class size, classroom aesthetics, and the availability of learning materials. However, this connection goes beyond the physical; the psychological cosiness and sense of community in learning environments also support academic achievement.

The part teachers play in creating productive learning environments is another important finding from the literature. Researchers emphasise that the teacher's capacity to establish a warm, courteous, and emotionally secure

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environment enhances the effectiveness of the physical setting, even though many studies focus on the physical characteristics of learning spaces. Teachers serve as go-betweens between students and their surroundings, ensuring that classrooms foster social-emotional and intellectual growth. Positive learning outcomes are mainly dependent on the interaction of the physical learning environment, student relationships, and instructor practices. The growing importance of technology in contemporary learning environments is also reflected in the literature. Specifically, research demonstrates how smart classrooms, virtual reality (VR) environments, and virtual learning platforms improve student engagement and academic performance. Particularly important for kids in under-resourced environments, technology-enabled learning environments facilitate individualised instruction, promote group projects, and give access to a wealth of instructional materials. However, many children do not have equitable access to these advantages due to the digital gap in nations like Nigeria, which exacerbates educational disparities. The current study aims to address several important gaps in the extensive body of research on learning spaces, particularly in secondary schools in Nigeria. The paucity of studies on the effects of learning environments on student engagement and academic performance in secondary schools in Nigeria is one notable gap. The majority of the material now in publication focuses on educational environments in the West, where cultural dynamics, infrastructure, and educational regulations diverge significantly from those in Nigeria. This study offers a regional perspective, illuminating how learning environments in secondary schools in Nigeria, whether urban or rural, support or impede student achievement. The dearth of long-term research examining the effects of learning environment renovations or degradation on student engagement and performance over time is another significant gap. Understanding how regular exposure to high- or low-quality learning environments affects long-term academic achievement and students' attitudes toward learning is limited by the majority of existing research, which provides snapshots or cross-sectional data. Through thorough data collection, the current study seeks to provide a clearer understanding of the changing relationship between student outcomes and the quality of the learning environment.

Furthermore, previous research has given little attention to the relationship between socioeconomic characteristics and learning spaces. Although it is known that students from more affluent families typically have access to better learning environments, less is known about how this difference affects student engagement and achievement discrepancies, especially in Nigerian public schools. This study fills a significant equity gap in the literature by examining the effects of learning environments in both rich and poor locations on student experiences and outcomes. The combined investigation of teacher practices and learning space design is a noteworthy omission in much of the evaluated literature. The majority of research approaches teaching methods and physical design components as independent variables.

Understanding how learning spaces actually work as engagement and achievement drivers, however, requires an understanding of the interplay of instructional strategies, teacher-student relationships, and the physical environment. By combining these aspects, the current study provides a comprehensive understanding of the learning environment as a complex, interacting system. Existing research also underrepresents the role of new technologies in secondary schools in Nigeria. Although there is a wealth of evidence from technologically advanced environments and higher education, little is known about how digital tools and virtual learning environments affect secondary school students' engagement and academic performance in Nigeria, especially in public schools with inadequate ICT infrastructure. This study contributes to closing this technological divide by investigating the effects of technology-enhanced learning environments on instruction, learning, and student outcomes. Finally, research on inclusive and culturally sensitive learning environments in Nigeria is lacking. Examining how learning environments that represent students' cultural backgrounds and identities affect engagement and academic achievement is essential, given Nigeria's ethnic, linguistic, and cultural diversity. This study focuses on how localised educational approaches and culturally sensitive design support students' academic achievement, comfort, and motivation, particularly in multilingual and multiethnic school settings.

The literature examined confirms that learning spaces are crucial to student engagement and academic success. However, it also identifies several knowledge gaps that need to be addressed to enhance comprehension in the Nigerian educational context. By providing localised, comprehensive, and inclusive insights into the intricate relationship between learning environments, student engagement, and academic achievement in secondary schools in Nigeria, the current study seeks to close these gaps. This study provides a comprehensive framework for enhancing learning environments to improve student achievement in diverse, resource-constrained contexts, accounting for physical, technological, pedagogical, and sociocultural factors.

## METHODOLOGY

### Research Design

A quasi-experimental research design was used for this study to investigate the impact of learning space design on students' engagement and academic achievement in public secondary schools in Ondo State, Nigeria. The

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design compared students' academic performance and engagement in two learning environments: well-facilitated and poorly facilitated classrooms.

**Population of the Study**

The target population for this study were Senior Secondary Schools in Ondo State, Nigeria. The researcher selected publicly owned schools because of their large size. Senior Secondary School Students were chosen because they have the largest population in schools.

**Sample and Sampling Technique**

Two public secondary schools with different learning environments were chosen for the study using a purposive sample technique. The first school was selected for its well-equipped classrooms, which are well-ventilated, well-lit, furnished, and well-organised. The second school was chosen due to inadequate classroom facilities, including congestion, poor ventilation, inadequate seating, and a lack of educational resources. Two student groups were selected from each school to ensure that participants are at the same grade level and possess similar academic skills. Through this selection procedure, it was ensured that variations in learning environments, rather than other factors, are the cause of the observed differences in student performance and engagement. Over a predetermined period, the chosen students from both schools participated in the same instructional activities. To evaluate and compare students' academic performance and levels of involvement in the two classroom settings, a test was administered after these instructional sessions. This sampling strategy ensures that the study directly assesses the effect of learning environment design on student outcomes.

**Instrument for Data Collection**

Three research instruments were used to collect data in this study. These are self-designed questionnaires titled the Learning Space Questionnaire (LSQ), the Student Engagement Questionnaire (SEQ), and the General Science Achievement Test (GSAT). Section A contained information about the respondents, while the other sections listed below contained items from the Learning Space Questionnaire (LSQ) to examine the availability of learning spaces in public schools. The Learning Space Questionnaire (LSQ) contain 20 items measured on a 3-point Likert scale: 1 (Poor), 2 (Fair), 3 (Good). Section C included items from the Student Engagement Questionnaire (SEQ) to examine students' classroom engagement. The Student Engagement Questionnaire (SEQ) contains 20 items on student engagement, measured on a 3-point Likert scale: 1 (Poor), 2 (Fair), 3 (Good). The General Science Achievement Test (GSAT) consists of forty multiple-choice questions on concord. The researcher developed the General Science Achievement Test (GSAT) to measure the level of Senior Secondary Students in Science Subjects. It consists of a multiple-choice test item with four options. The test was constructed using the Senior Secondary School Curriculum, with items prepared according to a test blueprint. To ensure its validity and reliability, it was given to some Senior Secondary Students for trial testing and to Science teachers for scrutiny. Eighty items were initially constructed for the trial testing, and forty were later selected based on their difficulty and discrimination indices. The difficulty and discrimination indices of the selected items were set to (0.3, 0.7) and (0.3, 0.6), respectively. The reliability coefficient of the achievement test was 0.87, as determined by KR-20.

**Validity of the Instrument**

To ensure the instrument's validity, the initial draft underwent face and content validation, from which the final draft was produced and confirmed by the supervisor.

**Reliability of the Instrument**

Reliability is the extent to which an instrument yields consistent scores when administered multiple times. Cronbach's alpha was used to determine the reliability index of the Questionnaires**.**

**Procedure for Data Collection**

The instruments were given to the students using a simple random sampling technique. The researcher and two research assistants visited each school selected for the study, obtaining permission from the principal and the teachers' cooperation. The questionnaire was collected from the students on the same day. It took fifteen (15) working days to complete the administration of the instrument. In all, five hundred (500) instruments were valid for the study.

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**Method of Data Analysis**

The data analysis included both descriptive (percentages and frequencies) and inferential (multiple regression and correlation) statistics.

## RESULTS

The results of the findings are presented below;

**Table 1:**
**4.1 Respondents' Socio-Demographic Characteristics Analysis of Students**

| Variable | Frequency | Percentage (%) |
|---|---|---|
| **Gender** | | |
| Male | 221 | 44.2 |
| Female | 279 | 55.8 |
| **Total** | **500** | **100** |
| **Age** | | |
| 13-14years | 64 | 12.8 |
| 15-16years | 248 | 49.7 |
| 17-18years | 187 | 37.5 |
| **Total** | **500** | **100** |
| **Class** | | |
| SSS 1 | 96 | 19.2 |
| SSS 2 | 256 | 51.2 |
| SSS 3 | 148 | 29.6 |
| **Total** | **500** | **100** |
| **Classroom Quality** | | |
| Well – Facilitated | 250 | 50 |
| Poorly Facilitated | 250 | 50 |
| **Total** | **500** | **100** |

**Source: Field Survey, 2025**

Of the 500 students surveyed, 44.2% were male, and 55.8% were female, indicating slightly higher female representation among the participants, according to the sociodemographic characteristics of the respondents (Table 4.1). Nearly half of the respondents (49.7%) were aged 15-16, indicating that the study primarily involved mid-adolescents, who are typically in senior secondary school. Additionally, more than half of the students (51.2%) were in SSS 2, followed by 29.6% in SSS 3, and 19.2% in SSS 1. Additionally, the sample was evenly divided between students in well-facilitated and poorly facilitated classrooms, allowing for an objective comparison across learning environments.

4.2; Objective 1. The difference between the well-equipped classroom and the poorly equipped classroom
**Table 2:**

| Classroom Type | N | Mean | Std. Deviation | Df | T | Sig | Remark |
|---|---|---|---|---|---|---|---|
| Well Facilitated | 250 | 31.94 | 3.172 | 498 | 58.619 | 0.042 | Sig |
| Poorly Facilitated | 250 | 17.10 | 2.439 | | | | |

**Source: Field Survey, 2025**

An independent-samples t-test was conducted to compare the well-facilitated classrooms and poorly facilitated classrooms. Students in well-facilitated classrooms outperformed those in poorly facilitated classrooms on academic performance, as indicated by the independent t-test shown in Table 4.2. The mean academic score of students in well-facilitated classes was higher (M = 31.94, SD = 3.172) than that of students in poorly facilitated classrooms (M = 17.10, SD = 2.439). At the 0.05 level, both the p-value (p = 0.042) and the t-test value (t = 58.619, df = 498) were statistically significant. This finding suggests that classroom quality has an important influence on

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students' academic performance, with higher achievement levels associated with better amenities. It emphasises the crucial role of supportive classroom environments in raising academic achievement.

**4.4; Objective 2**

**Table 3:** The relationship between the quality of the learning environment and students' academic performance in General Science Subjects

| VARIABLES | Learning Environment | Student Engagement | Student Achievement |
|---|---|---|---|
| **Learning Environment** | 1 | 0.101** | 0.532** |
| **Student Engagement** | | 1 | 0.187** |
| **Student Achievement** | | | 1 |

The relationship among the learning environment, students' engagement, and academic performance was studied using correlation coefficients, as shown in Table 3. The findings revealed a weak but positive correlation between student involvement and the learning environment ($r = 0.101$, $p < 0.05$), indicating that while enhancements to the learning environment do correlate with higher levels of engagement, the strength of this link is modest. More significantly, there was a moderately strong correlation between student achievement and the learning environment ($r = 0.532$, $p < 0.05$), suggesting that improvements in the learning environment significantly improve academic outcomes.

4.5 Objective 3: The effect of the quality of the learning environment (well-furnished versus poorly facilitated classrooms) on students' engagement during General Science lessons.

**Table 4: Regression Summary and ANOVA of Learning Environment on Students' Engagement and Achievement**

**Multiple R =** 0.238
**R Square =** 0.112
**Adjusted R =** 0.124
**Standard Error =** 5.446

**Analysis of Variance**

| Sources of Variance | Sum of Squares | Df | Mean Square | F | Sig |
|---|---|---|---|---|---|
| Regression | 741.458 | 7 | 105.923 | 3.571 | .000 |
| Residual | 12308.319 | 415 | 29.959 | | |
| Total | 13049.778 | 422 | | | |

***Significant level at p < .05***

The findings in Table 4 demonstrated that a student's educational outcomes can be significantly predicted by their learning environment. A Multiple R of 0.238 from the regression analysis suggested a weak but positive relationship between the learning environment and the combined outcomes of achievement and engagement. The R-square value of 0.112 indicated that roughly 11.2% of the variance in students' involvement and academic achievement can be explained by the quality of the learning environment. Even if the proportion seems low, a variety of interrelated factors frequently influence student results. The importance of this association was further substantiated by the Analysis of Variance (ANOVA), which yielded a statistically significant F-value of 3.571 ($p = 0.000$) at the 0.05 level. This suggests that the observed correlation between student outcomes and the learning environment was not accidental. Practically speaking, this finding suggests that enhancements to the learning environment's facilities, seating configuration, lighting, ventilation, accessibility to educational resources, and technology infrastructure positively affect students' levels of engagement and academic performance.

However, it is crucial to remember that the learning environment alone cannot account for 88.8% of the variation in engagement and achievement, indicating that other factors, such as the quality of instruction, parental participation, students' motivation, socioeconomic status, and individual study habits, also have a significant impact. To achieve holistic student development, additional supportive educational practices should be implemented alongside improvements to the learning environment, both of which are crucial for better student outcomes.

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**Discussion of the findings**

According to the study on research question one, students taught in classrooms with adequate facilities outperformed their peers academically. The results are consistent with the assertion made by Saziwa and Olaseni (2025) that "the idealness of the learning space is likely to determine educational attainment." Similarly, school infrastructure, plant planning, maintenance, and sanitation have a significant impact on students' results on external exams, according to Duruji, Azuh, and Oviasogie (2014). Effective learning environments, characterised by suitable lighting, ventilation, ergonomic furniture, and adaptable layouts, have been shown to improve academic outcomes (Lee & Huh, 2025; Adeyemi, 2021). On the other hand, ill-maintained classrooms with inadequate amenities were associated with student exhaustion, health problems, and disengagement from their studies (Olaseni & Saziwa, 2024). Accordingly, the noted substantial difference confirms earlier findings that a favourable physical setting improves focus, lowers distractions, and eventually fosters improved academic achievement (Ashrad, 2021; Igoro, 2019).

Findings from the study's research question two suggested that students in well-facilitated classrooms demonstrated higher levels of student engagement than those in poorly facilitated classrooms. This aligns with the idea of student involvement by Skinner et al. (2021), who emphasised that environmental factors, including the creation of learning spaces, can support or hinder students' self-perceptions and engagement. Active learning environments with adjustable seating, natural lighting, and colourful designs have been shown to boost student motivation and engagement, as the research review makes clear (Cleveland & Mahat, 2026; Olaseni, 2025). In contrast, disengagement, behavioural problems, and emotional withdrawal were frequently the result of overcrowded, inadequately ventilated, and ill-equipped classrooms (Lee & Huh, 2025; Adegbite & Mohammed, 2022). Furthermore, clustered seating and movable furniture designs of learning spaces that encourage student autonomy and collaboration were linked to increased cognitive investment and proactive participation (Rands & Gansemer-Topf, 2017). The results thus confirm that the learning environment significantly impacts all aspects of student involvement.

The findings of research question three showed a strong positive correlation between students' academic achievement and the standard of the learning environment. This supports the findings of Inayah et al. (2026), who argued that the school environment's physical, social, and psychological components significantly impact how well students learn. Entwisle (2020) and Grannäs et al. (2026) highlighted in the study's backdrop that the classroom environment, instructional materials, and the quality of infrastructure are important indicators of academic success. Additionally, the conceptual study demonstrated that enriched environments that foster emotional stability, physical comfort, and intellectual engagement promote academic achievement (Balog, 2020; Saziwa & Olaseni, 2025). Furthermore, Odeh, Oguche, and Ivagher (2015) found empirically that discipline, physical facilities, and the general school climate have a significant impact on academic achievement among Nigerian secondary school students. This study further underscores the understanding that conducive learning environments are not merely physical constructs but are essential to academic success.

The results showed that the quality of the learning environment significantly predicts student engagement and achievement. This aligns with the Humanistic Learning Theory, which holds that pupils cannot reach their full potential without a nurturing, orderly environment (Baafi, 2020). Higher levels of engagement and better academic results are attributed to inclusive, student-centred designs (Gonzalez, Pereira, and Silva, 2023), adaptable and inventive environments (Oblinger, 2006; Hoodless et al., 2021), and active learning spaces. Furthermore, research by Olaseni (2025) and Chand (2026) showed that learning environments alter students' behavioural, emotional, and psychological responses, which, in turn, affect their academic performance. Thus, the results demonstrate that learning space quality is not just correlated with but actually predictive of student engagement and academic performance. In contrast, well-facilitated classrooms that address students' emotional and cognitive needs promote higher levels of perseverance, critical thinking, and academic excellence (Astuti et al., 2026).

## CONCLUSION

These findings support the existing literature, which highlights the various influences of learning environments, encompassing both physical and psychosocial elements, on educational outcomes. Specifically, the study validates the Humanistic Learning Theory's emphasis on the role of safe, comfortable, and stimulating environments in enabling students to reach their full potential. This study empirically demonstrates that the design of learning spaces significantly influences student engagement and academic achievement in public secondary schools in Ekiti State. Students in well-facilitated classrooms demonstrated superior academic performance and higher levels of student engagement than those in poorly facilitated environments. The study concludes that good learning spaces are essential factors that determine academic performance rather than mere add-ons to the teaching-learning process. Therefore, the strategic planning, construction, and maintenance of learning spaces that

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support student-centred learning must be given top priority in Nigeria's sustainable educational development. Improving educational quality requires addressing infrastructure issues and incorporating design ideas that encourage student involvement and active learning. Public secondary schools can achieve the intended outcomes of increased student involvement, reduced educational inequities, and improved academic performance only by deliberately designing and maintaining efficient learning environments.

**Recommendations**

Based on the findings of this study, the following recommendations were made;

The government and school administration should give top priority to the construction and restoration of classrooms with adequate lighting, ventilation, ergonomic furniture, and adaptable layouts to improve learning outcomes.

Funds for education should be carefully distributed to enhance the quality and design of current learning settings, in addition to increasing educational access.

A thorough maintenance program should be put in place to ensure that learning areas remain secure, supportive, and conducive to students' participation over time.

All public secondary schools should have learning spaces that meet basic quality criteria, established and enforced by the Ministry of Education.

**Contribution to Knowledge**

This study limited the findings to a developing country setting, in contrast to earlier research that primarily focused on Western contexts. It also highlighted the crucial influence of classroom layout, ventilation, aesthetics, and infrastructure quality on students' behavioural, emotional, and cognitive engagement. The study expanded the relevance of Humanistic Learning Theory to resource-constrained educational environments by reaffirming that supportive learning spaces are essential to students' academic achievement, emotional health, and motivation. The study has also shown that even in public schools that are struggling financially, strategic, low-cost improvements to learning spaces can result in quantifiable improvements in student outcomes; it expanded the conversation on student engagement by exposing learning spaces as active contributors to learning processes rather than passive backgrounds; and the predictive relationship between learning environment quality and student performance offers valuable information for educators, school administrators, architects, and policymakers, supporting a change in Nigeria from quantity-driven infrastructure expansion to quality-focused educational facility planning. These findings lay the groundwork for future reforms to achieve more equitable and sustainable educational development.

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