



Educational Infrastructure Planning and Students' Academic Performance in Public Secondary School in Edo South Senatorial District of Edo State, Nigeria

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Abstract. This study examined the relationship between educational infrastructure planning and students' academic performance in public secondary schools in Edo South Senatorial District, Edo State. The study adopted a descriptive survey research design with a sample of 684 students and 132 teachers selected from 26 public secondary schools across the seven Local Government Areas in the district. Data were collected using a structured questionnaire and analysed using descriptive statistics and Pearson Product Moment Correlation at 0.05 level of significance. The findings revealed that there is a significant positive relationship between classroom facilities and students' academic performance, library facilities and students' academic performance, laboratory facilities and students' academic performance, and electricity facilities and students' academic performance. The study concluded that educational infrastructure planning is a critical determinant of students' academic performance in public secondary schools. It was recommended that school administrators and the government should prioritise the provision and maintenance of classroom facilities, library facilities, laboratory facilities, and electricity facilities to enhance students' academic performance.

Keywords: Educational infrastructure planning, classroom facilities, library facilities, laboratory facilities, electricity facilities, academic performance, educational planning, Edo South Senatorial District.

1. Introduction

Education is widely recognised as a fundamental driver of national development. In Nigeria, secondary schools play a critical role in preparing students for higher education and for life beyond the classroom. However, the quality of

secondary education in Nigeria has been a subject of concern for many years, with stakeholders expressing worries about declining standards, inadequate infrastructure, and poor student performance (John & Umar, 2024; Itedjere, 2025). Educational infrastructure planning refers to the process of identifying, providing, and maintaining the physical facilities and resources needed to support effective teaching and learning. These facilities include classrooms, libraries, laboratories, electricity supply, water supply, and other amenities that create a conducive learning environment (Chukwuma & Sokare, 2024). According to John and Umar (2024), the availability and quality of amenities provided in educational institutions have a direct relationship with students' academic performance.

The relationship between educational infrastructure and students' academic performance is well established. Adequate and well-maintained facilities provide a conducive learning environment that enhances students' concentration, engagement, and academic achievement (Itedjere, 2025; Chukwuma & Sokare, 2024). Conversely, inadequate or poorly maintained facilities create barriers to learning, leading to poor academic performance. Chukwuma and Sokare (2024) found that library facility planning and laboratory facility planning enhance academic performance.

This study is anchored on the Input-Output Model, which is widely used in educational planning and economics. The model posits that the quality of educational outcomes (outputs) is determined by the quality and quantity of inputs provided to the educational system. In the context of this study, inputs include educational infrastructure such as classroom facilities, library facilities, laboratory facilities, and electricity facilities, while outputs include

students' academic performance. The model suggests that when inputs are adequate and of good quality, outputs will also be of good quality. Conversely, when inputs are inadequate, outputs will be compromised. Chukwuma and Sokare (2024) applied this framework to examine educational facility planning and found that library and laboratory facility planning enhance academic performance.

The model is relevant to this study because it provides a framework for understanding how educational infrastructure (input) affects students' academic performance (output). When schools provide adequate and well-maintained classroom facilities, library facilities, laboratory facilities, and electricity facilities, students are better able to learn and achieve academic success. The Input-Output Model also highlights the importance of the learning environment in the educational process, as the physical environment in which learning takes place can either facilitate or hinder learning. Adequate and well-maintained infrastructure creates a conducive learning environment that enhances students' concentration, engagement, and academic achievement (Mando, 2025).

Several empirical studies have examined the relationship between educational infrastructure and students' academic performance in Nigerian secondary schools and other educational institutions. John and Umar (2024) examined how school facilities affect student performance in Nigeria, focusing on the importance of physical resources such as classrooms, libraries, and laboratories. The study used data from surveys and interviews in various states and showed differences in infrastructure between urban and rural schools and how these differences impact learning. The results highlighted the need for policy changes to improve facilities, especially in areas that lack funding, in order to help students perform better and have more educational opportunities.

Itedjere (2025) investigated the relationship between school infrastructure and student academic performance in Nigeria, highlighting the critical role that physical learning environments play in educational outcomes. Utilising a mixed-methods approach, the study analysed quantitative data from a diverse sample of schools alongside qualitative insights from educators and administrators. Key infrastructure components including classroom conditions, availability of learning materials, and access to technology were assessed to determine their influence on student achievement. The findings revealed significant correlations between high-quality infrastructure and improved academic performance. Chukwuma and Sokare (2024) examined educational facility planning for enhanced academic performance of

public senior secondary school students in Rivers State. The study adopted a descriptive survey design with a population of 8,452 students and a sample size of 382 students. A self-designed instrument titled "Educational Facility Planning for Enhanced Academic Performance of Students Questionnaire (EFPEAPSQ)" was used for data collection, with a reliability index of 0.69. The findings revealed that library facility planning and laboratory facility planning enhance academic performance.

Mando (2025) examined educational administration and planning as correlates of quality education in Nigeria. The study examined concepts including educational administration, educational planning, and correlates of quality education, such as teacher quality, student achievement, infrastructure and learning environment. Findings revealed the interconnection between educational administration, educational planning and quality education. The study also delineated challenges facing educational administration and planning in Nigeria, including inadequate funding, poor leadership, corruption and policy implementation gap. Anang and Udik (2020) examined the influence of school infrastructure on student learning activeness. The study found that school infrastructure significantly influences student learning activeness. The study recommended that schools should provide adequate infrastructure to enhance student learning.

Ekaette, Ameh and Owan (2020) evaluated statistical trends of school size, location, and enrolment in public junior secondary schools for sustainable development. The study found that school location and enrolment significantly affect school infrastructure provision and utilisation. Ihebom and Uko (2020) examined challenges and prospects of secondary education in Nigeria. The study found that inadequate infrastructure is a major challenge facing secondary education in Nigeria. Monity and Abam (2024) examined library facilities and classroom environment as viable tools for instructional efficiency toward better academic performance of primary school pupils. The study found that library facilities and classroom environment significantly influence academic performance.

Umar et al. (2024) conducted a theoretical review of the problems of Nigerian educational system from 2010 to 2020. The study found that inadequate infrastructure is one of the major problems facing the Nigerian educational system.

In Edo South Senatorial District, the challenges of educational infrastructure planning are significant. The district comprises seven Local Government Areas: Egor,

Ikpoba-Okha, Oredo, Orhionmwon, Ovia North-East, Ovia South-West, and Uhunmwode. According to the Post Primary Education Board, Benin City (2024), there are 135 public secondary schools in the district with 22,799 students and 1,318 teachers. Many of these schools lack adequate classrooms, libraries, laboratories, and electricity supply, which negatively affects students' academic performance. Studies have shown that amenities such as electricity supply, classrooms, libraries, and laboratories have a direct and significant effect on students' academic performance (Mando, 2025; John & Umar, 2024). This study, therefore, seeks to examine the relationship between educational infrastructure planning and students' academic performance in public secondary schools in Edo South Senatorial District, Edo State.

1.1 Statement of the Problem

The ideal situation in any well-functioning secondary school system is that educational infrastructure is adequately planned, provided, and maintained to support effective teaching and learning, with students having access to well-equipped classrooms, libraries, laboratories, and a stable electricity supply that create a conducive learning environment enhancing their concentration, engagement, and academic achievement.

The actual situation in public secondary schools in Edo South Senatorial District, however, falls far short of this ideal. Many schools lack adequate classroom facilities with overcrowded classrooms, broken furniture, poor lighting, and inadequate ventilation (Chukwuma & Sokare, 2024; Itedjere, 2025). Library facilities are often inadequate with limited books, journals, and electronic resources, laboratory facilities are insufficient with outdated equipment and inadequate space, and electricity supply is erratic and unreliable, making it difficult for students to study, conduct research, and complete assignments (Mando, 2025; John & Umar, 2024). Several factors contribute to this problem, including inadequate funding for infrastructure development and maintenance, poor planning and management of educational infrastructure, limited capacity for effective infrastructure planning in many schools, and lack of regular maintenance of existing facilities. The consequences are significant, as students in overcrowded and poorly equipped classrooms cannot concentrate and learn effectively, those lacking access to library resources cannot conduct research and complete assignments, those without laboratory facilities cannot develop practical skills, and those experiencing erratic electricity supply cannot study, conduct research, or complete assignments, all contributing to poor academic performance. Despite the severity of this problem, there is limited empirical

evidence on the specific relationship between educational infrastructure planning and students' academic performance in Edo South Senatorial District. This study, therefore, seeks to fill this gap by examining the relationship between educational infrastructure planning and students' academic performance in public secondary schools in Edo South Senatorial District.

1.2 Objectives of the Study

The main objective of this study is to examine the relationship between educational infrastructure planning and students' academic performance in public secondary schools in Edo South Senatorial District, Edo State. The specific objectives are to:

- Examine the relationship between classroom facilities and students' academic performance in public secondary schools in Edo South Senatorial District.
- Determine the relationship between library facilities and students' academic performance in public secondary schools in Edo South Senatorial District.
- Examine the relationship between laboratory facilities and students' academic performance in public secondary schools in Edo South Senatorial District.
- Determine the relationship between electricity facilities and students' academic performance in public secondary schools in Edo South Senatorial District.

1.3 Research Hypotheses

The following null hypotheses were tested at 0.05 level of significance:

H₀₁: There is no significant relationship between classroom facilities and students' academic performance in public secondary schools in Edo South Senatorial District.

H₀₂: There is no significant relationship between library facilities and students' academic performance in public secondary schools in Edo South Senatorial District.

H₀₃: There is no significant relationship between laboratory facilities and students' academic performance in public secondary schools in Edo South Senatorial District.

H₀₄: There is no significant relationship between electricity facilities and students' academic performance in public secondary schools in Edo South Senatorial District.

2. Research Methodology

This study adopted a descriptive survey research design, which allows for the systematic collection of data from a sample of respondents to describe their characteristics, attitudes, and experiences without manipulating any variables. The study was carried out in Edo South Senatorial District, Edo State, Nigeria, which covers seven Local Government Areas: Egor, Ikpoba-Okha, Oredo, Orhionmwon, Ovia North-East, Ovia South-West, and Uhunmwode. According to the Post Primary Education Board, Benin City (2026), there are 129 public secondary schools in the district with 22,799 students and 1,318 teachers.

The population comprised all students and teachers in public secondary schools in Edo South Senatorial District, totalling 22,799 students and 1,318 teachers. The sample consisted of 684 students (representing 3% of the student population) and 132 teachers (representing 10% of the teacher population) selected from 26 schools across the seven Local Government Areas using multi-stage sampling technique involving stratification by LGA, random selection of schools, systematic random sampling of students from SS1-SS3, and proportionate stratified

random sampling of teachers. The instrument used was a structured questionnaire titled "Educational Infrastructure and Students' Academic Performance Questionnaire (EISAPQ)", designed to elicit information on classroom, library, laboratory, and electricity facilities and their relationship with students' academic performance, measured on a four-point Likert scale.

The validity of the instrument was established through content and face validity by three experts in educational management and measurement and evaluation. The reliability was established through a pilot test administered to 30 students and teachers, with Cronbach's alpha coefficients ranging from 0.78 to 0.86 across sections, consistent with Chukwuma and Sokare (2024) who reported a reliability index of 0.69. Data were collected through direct administration of the questionnaire over six weeks, with 650 completed questionnaires returned from students (95% response rate) and 125 from teachers (94.7% response rate). Data were analysed using based of formulated hypotheses using inferential statistics including Pearson Product Moment Correlation were used to test hypotheses at 0.05 level of significance using SPSS version 27.0.

3. Results

Hypothesis Testing

Hypothesis One: There is no significant relationship between classroom facilities and students' academic performance in public secondary schools in Edo South Senatorial District.

Table 1: Correlation Analysis of Classroom Facilities and Students' Academic Performance

Variable	N	Mean	Std. Deviation	r	p-value
Classroom Facilities	650	3.65	0.52	0.64	0.000
Academic Performance	650	3.58	0.56		

Source: Field Survey, 2026

Results in Table 1 show a correlation analysis of the relationship between classroom facilities and students' academic performance. The $r = 0.64$, with a $p\text{-value} = 0.000$. Testing at 0.05 alpha level of significance, the $p\text{-value}$ is less than alpha level. Hence, the hypothesis is rejected at $P < 0.05$. Therefore, there is a significant positive relationship between classroom facilities and students' academic performance in public secondary schools in Edo South Senatorial District.

Hypothesis Two: There is no significant relationship between library facilities and students' academic performance in public secondary schools in Edo South Senatorial District.

Table 2: Correlation Analysis of Library Facilities and Students' Academic Performance

Variable	N	Mean	Std. Deviation	r	p-value
Library Facilities	650	3.68	0.54	0.68	0.000
Academic Performance	650	3.58	0.56		

Source: Field Survey, 2026

Results in Table 7 show a correlation analysis of the relationship between library facilities and students' academic performance. The $r = 0.68$, with a $p\text{-value} = 0.000$. Testing at 0.05 alpha level of significance, the $p\text{-value}$ is less than

alpha level. Hence, the hypothesis is rejected at $P < 0.05$. Therefore, there is a significant positive relationship between library facilities and students' academic performance in public secondary schools in Edo South Senatorial District.

Hypothesis Three: There is no significant relationship between laboratory facilities and students' academic performance in public secondary schools in Edo South Senatorial District.

Table 8: Correlation Analysis of Laboratory Facilities and Students' Academic Performance

Variable	N	Mean	Std. Deviation	r	p-value
Laboratory Facilities	650	3.68	0.54	0.62	0.000
Academic Performance	650	3.58	0.56		

Source: Field Survey, 2026

Results in Table 8 show a correlation analysis of the relationship between laboratory facilities and students' academic performance. The $r = 0.62$, with a $p\text{-value} = 0.000$. Testing at 0.05 alpha level of significance, the $p\text{-value}$ is less than alpha level. Hence, the hypothesis is rejected at $P < 0.05$. Therefore, there is a significant positive relationship between laboratory facilities and students' academic performance in public secondary schools in Edo South Senatorial District.

Hypothesis Four: There is no significant relationship between electricity facilities and students' academic performance in public secondary schools in Edo South Senatorial District.

Table 4: Correlation Analysis of Electricity Facilities and Students' Academic Performance

Variable	N	Mean	Std. Deviation	r	p-value
Electricity Facilities	650	3.70	0.50	0.70	0.000
Academic Performance	650	3.58	0.56		

Source: Field Survey, 2026

Results in Table 4 show a correlation analysis of the relationship between electricity facilities and students' academic performance. The $r = 0.70$, with a $p\text{-value} = 0.000$. Testing at 0.05 alpha level of significance, the $p\text{-value}$ is less than alpha level. Hence, the hypothesis is rejected at $P < 0.05$. Therefore, there is a significant positive relationship between electricity facilities and students' academic performance in public secondary schools in Edo South Senatorial District.

4. Discussion of Findings

The first finding of this study revealed that there is a significant positive relationship between classroom facilities and students' academic performance in public secondary schools in Edo South Senatorial District. The majority of respondents agreed that adequate classroom facilities enhance academic performance, that well-ventilated classrooms improve concentration, and that adequate lighting in classrooms enhances learning. These findings are consistent with Itedjere (2025), who found that classroom conditions significantly influence student achievement, and Chukwuma and Sokare (2024), who found that educational facility planning enhances academic performance. The finding that adequate lighting

in classrooms enhances learning is particularly significant. Studies have shown that poor lighting, broken furniture, and inadequate ventilation disrupt concentration and reduce instructional quality (Mando, 2025). When classrooms are well-lit, well-ventilated, and comfortable, students are better able to concentrate and learn effectively.

The second finding revealed that there is a significant positive relationship between library facilities and students' academic performance in public secondary schools in Edo South Senatorial District. The majority of respondents agreed that library facilities enhance academic performance, that the availability of textbooks in the library improves learning, and that access to journals and e-resources enhances academic achievement. These findings are consistent with Monity and Abam (2024), who found that library facilities significantly influence academic performance, and Chukwuma and Sokare (2024), who found that library facility planning enhances academic performance. The finding that a well-equipped library supports research and learning is particularly important. Libraries play a critical role in supporting students' academic success by providing access to diverse learning resources (Monity & Abam,

2024). When libraries are well-equipped with textbooks, journals, and e-resources, students are better able to conduct research, complete assignments, and achieve academic success.

The third finding revealed that there is a significant positive relationship between laboratory facilities and students' academic performance in public secondary schools in Edo South Senatorial District. The majority of respondents agreed that laboratory facilities enhance practical learning, that well-equipped laboratories improve academic performance, and that access to laboratory equipment enhances understanding. These findings are consistent with Chukwuma and Sokare (2024), who found that laboratory facility planning enhances academic performance. The finding that laboratory facilities support research and experimentation is particularly significant. Laboratory facilities are essential for practical learning, particularly in science-based disciplines. When laboratories are well-equipped and accessible, students are able to develop practical skills, conduct experiments, and enhance their understanding of theoretical concepts.

The fourth finding revealed that there is a significant positive relationship between electricity facilities and students' academic performance in public secondary schools in Edo South Senatorial District. The majority of respondents agreed that stable electricity supply enhances academic performance, that electricity facilitates studying and research, and that erratic power supply negatively affects academic performance. These findings are consistent with John and Umar (2024), who found that electricity supply has a significant effect on students' academic performance. The finding that electricity enables access to e-resources and online learning is particularly significant. In today's digital age, access to electricity is essential for students to access online learning resources, conduct research, and complete assignments. When electricity supply is reliable, students are better able to engage in learning activities and achieve academic success.

5. Conclusion

This study examined the relationship between educational infrastructure planning and students' academic performance in public secondary schools in Edo South Senatorial District, Edo State. The study found significant positive relationships between all four types of infrastructure facilities examined and students' academic performance. Adequate and well-maintained classrooms with proper lighting, ventilation, and comfortable seating create a conducive learning environment that enhances

concentration and achievement. Well-equipped libraries with textbooks, journals, and e-resources support research and learning, with frequent library use associated with better performance. Well-equipped laboratories enhance practical learning, support experimentation, and improve understanding of theoretical concepts, while stable electricity supply facilitates studying, research, and access to e-resources and online learning. The study concluded that educational infrastructure planning is a critical determinant of students' academic performance. When educational infrastructure is adequately planned, provided, and maintained, students are better able to learn and achieve academic success. However, when infrastructure is inadequate or poorly maintained, students face significant barriers to learning, leading to poor academic performance.

6. Recommendations

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

School administrators and the Edo State Government should prioritise the provision and maintenance of classroom facilities, including adequate lighting, ventilation, comfortable seating, and adequate space. This will create a conducive learning environment that enhances students' concentration and academic achievement.

School administrators and the government should invest in library facilities and resources, including textbooks, journals, and e-resources. This will support research and learning and enhance students' academic performance. School administrators should equip laboratories with modern equipment and ensure that they are well-maintained and accessible to students. This will enhance practical learning and improve students' understanding of theoretical concepts.

The Edo State Government and school administrators should ensure stable electricity supply in public secondary schools. This may involve investing in alternative energy sources such as solar power, generators, and energy-efficient technologies. Stable electricity supply will enhance academic performance, facilitate studying and research, and enable access to e-resources and online learning.

References

Adebisi, S. (2017). The role of school facilities in promoting quality education: A case study of

- Nigeria. *International Journal of Educational Research*, 20(2), 48-58.
- Adesina, J. (2017). Educational infrastructure in Nigeria: Urban and rural challenges. *Journal of Educational Planning*, 25(1), 33-45.
- Anang, A. N., & Udik, B. W. (2020). The influence of school infrastructure on student learning activeness: A research study. In *Proceedings of the 3rd International Conference on Learning Innovation and Quality Education (ICLIQE 2019)*. Atlantis Press.
- Bertalanffy, L. von. (1968). *General system theory: Foundations, development, applications*. George Braziller.
- Chukwuma, C. M., & Sokare, B. I. (2024). Educational facility planning for enhanced academic performance of public senior secondary school students in Rivers State. *Nigerian Journal of Educational Administration and Planning (NJEAP)*, 24(1).
- Ekaette, S. O., Ameh, E., & Owan, V. J. (2020). Statistical trends of school size, location, and enrolment: An evaluation of public junior secondary schools for sustainable development. *World Journal of Vocational Education and Training*, 2(2), 76-88.
- Ihebom, B., & Uko, J. O. (2020). Challenges and prospects of secondary education in Nigeria. *International Journal of Scientific Research in Education*, 13(4), 670-688.
- Itedjere, E. C. (2025). Assessing the relationship between school infrastructure and student academic performance in Nigeria. *Global Educational Research Journal*, 13(2), 45-53.
- John, M. O., & Umar, A. (2024). Educational infrastructure and its impact on academic performance in Nigerian schools. *IRE Journals*, 8(6), 497-502.
- Kuwornu, J. K. M., Baffour-Awuah, W., & Yang, J. (2018). The impact of school facilities on students' performance in Ghana: A case study of selected secondary schools in the Volta Region. *Journal of Educational Psychology*, 110(4), 529-548.
- Mando, P. N. (2025). Educational administration and planning as correlates of quality education in Nigeria. *Education Letters*, 1(3), 37-44.
- Ministry of Education, Nigeria. (2023). *Annual report on school infrastructure and academic performance*. Abuja: Ministry of Education.
- Monity, F. M., & Abam, O-G. T. (2024). Library facilities and classroom environment: Viable tools for instructional efficiency toward better academic performance of primary school pupils in Akamkpalga, Cross River State-Nigeria. *Global Journal of Educational Research*, 23, 23-29.
- Post Primary Education Board, Benin City. (2024). Data on public secondary schools in Edo South Senatorial District.
- Umar, T., et al. (2024). A theoretical review of the problems of Nigerian educational system from 2010-2020. Retrieved from <https://www.researchgate.net/publication/377231252>
- UNESCO. (2022). School infrastructure. *International Institute for Educational Planning*. Retrieved from <https://policytoolbox.iiep.unesco.org/policy-option/school-infrastructure/>