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INFLUENCE OF CLASSROOM INTERIOR DESIGN FEATURES ON ACADEMIC PERFORMANCE OF ENGINEERING TRADES STUDENTS IN TECHNICAL COLLEGES IN RIVERS STATE

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Abstract

The study examines the influence of classroom interior design features on the academic performance of engineering trades students in Rivers State Technical Colleges. Two research questions were answered in the study. The study employed descriptive research survey design and was carried out in all the four Rivers State Government Technical Colleges which include Government Technical College, Port Harcourt, Government Technical College, Eleogu, Government Technical College, Tombia and Government Technical College, Ahoada respectively. The population of the study was all the 38 teachers and 237 students of engineering trades in Rivers State Technical Colleges. Due to small population census study was used to select teachers while simple random sampling technique was employed to select 123 students. Hence, the sample size for the study was 161 respondents. The instrument used for data collection was a self-structure questionnaire tagged "Classroom Interior Design Features on the Academic Performance of Engineering Trades Questionnaire (CIDFAPETQ)" structured on a 4-point rating scale of agreement with numerical

values of Strongly Agree (SA - 4), Agree (A - 3), Disagree (D - 2) and Strongly Disagree (SD - 1). The instrument was validated and tested for reliability using the test-retest method. A reliability coefficient of 0.80 was established using Pearson Product Moment Correlation (PPMC) coefficient. The study found that, presence of visual aids in the classrooms and seating arrangement in the classrooms influence the academic performance of engineering trades students at Rivers State Technical Colleges. Based on the findings of the study, it was recommended among others that visual aids such as step-by-step diagrams and instructions should be installed in technical college classrooms designed for engineering trade students as it improves students' ability to perform technical tasks and practical assignments and that movable and adjustable seats should be installed in classrooms for engineering trades to enable students to adjust and seat in circular or U-shape as it enhances students' ability to work in groups and engage in hands-on activities.

Keywords: Classroom Interior Design, Academic Performance, Engineering Trades Students, Technical college.

Introduction

The physical environment of a classroom plays significant role in educational delivery to students. It contributes not only students' academic performance but also their overall well-being and engagement (Kassab, Rathan, Taylor & Hamdy, 2024). For technical colleges, where the focus is on skill acquisition and practical learning, the importance of well-designed classroom interiors cannot be overemphasized. Properly planned classroom spaces can foster better interactions among students, enhance teacher effectiveness, and contribute to the success of the teaching and learning process (Hanaysha, Shriedeh & In'airat, 2023). For stakeholders such as the Ministry of Education, prioritizing interior design in classrooms is essential to achieving educational goals, particularly in engineering trades, where precision and hands-on learning are critical (Akpan, 2018). Addressing these aspects benefits students, educators, institutions, and policymakers alike by creating an enabling environment conducive to quality education and skills development.

Classroom interior design features refer to specific physical elements within the learning environment that enhance functionality and aesthetics (Gad, Noor & Kamar, 2022). These features include the use of interior color schemes that create a

calming or stimulating atmosphere, movable partitions for flexible learning spaces, and movable furniture that supports varied teaching methods (Yildirim, Capanoglu & Cagatay, 2011). Display surfaces for showcasing students' work encourage creativity and recognition, while physical barriers and interior corridors ensure safe movement within the school (Anderson, 2020). Additionally, safe rooms and secure, operable entry processes foster a sense of security for learners and staff (Gundry, 2022). The availability and visibility of personal and social spaces further enhance collaboration, social interaction, and individual focus, making classrooms adaptable and inclusive environments for learning (Kariippanon, Cliff, Lancaster, Okely, & Parrish, 2019).

The incorporation of thoughtful interior design features is vital to achieving effective teaching and learning outcomes in technical colleges (Kaup, Kim & Dudek, 2013). For instance, appropriate classroom designs reduce distractions, improve concentration, and enable collaborative problem-solving, which is integral to engineering trade. A well-designed classroom can facilitate practical demonstrations, allow smooth transitions between activities, and support diverse teaching methodologies (Avery, 2024). Furthermore, enhanced aesthetics and functionality motivate students, positively

affecting their attitudes toward learning while also enabling teachers to deliver instruction more effectively and efficiently (Ahmadi, Fathabadi & Bakhtiarvand, 2020; Barraza, 2021).

Academic performance is a measure of students' achievements in their educational pursuits, often assessed through grades, project outcomes, and practical skill demonstrations. For students in technical colleges, particularly those in engineering trades, academic performance is critical as it reflects their readiness to meet industrial demands and achieve professional success (Oguguo, Ajuonuma, Azubuike, Ene, Atta & Oko, 2020). Moreover, academic performance serves as a benchmark for institutional growth, influencing school reputation, funding opportunities, and graduation rates. It also determines students' progression in their educational and career pathways, underscoring its importance to both learners and the broader educational system.

Indicators of academic performance for engineering trade students encompass various domains, including cognitive, psychomotor, and affective learning outcomes. For example, cognitive performance can be assessed through tests and examinations, while psychomotor skills are evaluated through practical tasks and project work. Affective learning indicators

may include teamwork, communication, and leadership abilities observed during group activities. These indicators provide a comprehensive picture of student achievement, reflecting their mastery of both theoretical knowledge and practical skills essential for success in technical and engineering disciplines (Mulhall, Flowers & Mertens, 2002).

Interior design features significantly impact students' academic performance by creating environments that stimulate focus, innovation, and comfort. For example, well-lit and properly ventilated classrooms improve concentration and reduce fatigue, while ergonomic furniture minimizes physical strain during long learning hours (Lewinski, 2015). Similarly, interactive spaces, such as areas for group work or project displays, encourage active participation and critical thinking. Safe and secure environments alleviate stress, allowing students to focus fully on their studies (Zoubi, Rashidi, AL-Alawneh, Issa & Alqamaz, 2024). These features collectively create a positive learning atmosphere that nurtures academic excellence.

Empirical studies have highlighted the link between classroom environments and student performance. Research indicates that factors such as lighting, noise levels, and spatial arrangement significantly affect

students' learning outcomes (Hesham, 2022). However, while several studies focus on general classroom design, there is a lack of research specifically addressing interior design features in technical colleges and their influence on engineering trade students. This gap highlights the need for further exploration to understand how specialized classroom environments contribute to technical education success.

Given the critical role of interior design in enhancing educational outcomes and the unique demands of technical education, this study is justified in its focus on the influence of classroom interior design features on the academic performance of engineering trade students in technical colleges in Rivers State. Such research will provide actionable insights for policymakers, school administrators, and educators, enabling them to design classrooms that foster skill development and academic performance, thereby addressing a critical need in the education sector.

Statement of the Problem

The academic performance of students in technical colleges, particularly in engineering trades, has long been a topic of research in educational environments. However, despite the increasing focus on the importance of pedagogical strategies, there remains a significant gap in understanding how physical learning environments,

specifically classroom interior design, influence students' academic performance. The role of classroom features such as lighting, seating arrangement, ventilation, color schemes, and the presence of visual aids, remains under-explored in the context of technical education.

In Rivers State, Nigeria, technical colleges face unique challenges, including overcrowded classrooms, poorly designed learning spaces, and lack of adequate resources, all of which could directly or indirectly influence the academic performance of engineering trades students. With engineering education requiring a high level of hands-on engagement and focus, the design of the classroom could significantly affect students' ability to engage with the material, concentrate, and absorb complex technical concepts (Nwineh, 2013).

Studies have suggested that the physical environment can affect cognitive functions and academic performance. For instance, Barrett et al. (2015) found that classroom design elements such as lighting and seating affect students' concentration and learning outcomes. Similarly, a study by Ammar and Mahmoud (2015) highlighted that a well-ventilated classroom with adequate natural light positively impacted students' motivation and academic performance. On the other hand, poor classroom design has been linked to issues such as lack of focus,

fatigue, and diminished learning outcomes (Taner, 2019).

The issue becomes even more pertinent in technical colleges where engineering students are often required to spend significant amounts of time engaged in both theoretical and practical learning. The design of classrooms could therefore have a more pronounced impact on their academic performance due to the intensive nature of the courses and the need for clear visibility, adequate space for practical sessions, and overall comfort. Hence, this study seeks to examine the influence of classroom interior design features such as lighting, layout, ventilation, furniture arrangement, and acoustics influence the academic performance of engineering trades students in technical colleges in Rivers State.

Purpose of the Study

The purpose of the study is to investigate the influence of classroom interior design features on the academic performance of engineering trades students in technical colleges in Rivers State. The specific objectives are to:

1. Determine how the presence of visual aids in the classrooms influences the academic performance of engineering trades students in technical colleges in Rivers State.
2. Determine how seating arrangements in the classroom influence the

academic performance of engineering trades students in technical colleges in Rivers State.

Research Questions

The study was guided by the following questions.

1. How does the presence of visual aids in the classrooms influence the academic performance of engineering trades students in technical colleges in Rivers State?
2. How do seating arrangements in the classroom influence the academic performance of engineering trades students in technical colleges in Rivers State?

Methodology

The study employed descriptive research survey design and was carried out in all the four Rivers State technical colleges which include Government Technical College, Port Harcourt, Government Technical College, Eleogu, Government Technical College, Tombia and Government Technical College, Ahoada respectively. The population of the study was all the engineering trades teachers and students in all the four Rivers State Technical Colleges. At the time of this study, there were 38 teachers and 237 students of engineering trades. Due to small population census study was used to select teachers while simple random sampling technique was employed to select 123 students. Hence,

the sample size for the study was 161 respondents consisting of 38 teachers and 123 students. The instrument that was used for collection of data was a self-structure questionnaire tagged “Classroom Interior Design Features on the Academic Performance of Engineering Trades Questionnaire (CIDFAPETQ)” which was structured on a 4-point rating scale of agreement with numerical values of Strongly Agree (SA - 4), Agree (A - 3), Disagree (D - 2) and Strongly Disagree (SD - 1). The instrument was designed in line with objectives and research questions. The instrument was subjected to content validity by two experts: one in Technical Education from Rivers State University and another teacher in Electrical Installation and

Maintenance Works in Government Technical College, Port Harcourt. The instrument was tested for reliability using test-retest method. A reliability coefficient of 0.80 was established using Pearson Product Moment Correlation (PPMC) coefficient. The instrument was administered to all the 38 teachers and 123 students. Out of these, only 144 copies (Teachers = 34; Students = 110) were completely filled and successfully retrieved and used for the study. Mean and standard deviation were used to answer the research questions. Item with mean score ranges between 2.50 – 3.49 was taken as “Agree (A)” while item with mean score of 3.50 and above was considered as “Strongly Agree (SA)”.

Result

Research Question 1: How does the presence of visual aids in the classrooms influence the academic performance of engineering trades students in technical colleges in Rivers State?

Table 1: Mean Response on How the Presence of Visual Aids in the Classrooms Influence Academic Performance of Engineering Trades Students

S/N	Influence of Presence of Visual Aids in the Classrooms on Academic Performance of Students.	Teachers			Students		
		$\bar{X}_1$	SD ₁	RMK	$\bar{X}_2$	SD ₂	RMK
1	The use of visual aids in classrooms improves students' understanding of complex technical concepts.	3.14	0.63	A	3.74	0.60	SA
2	Classrooms that regularly use visual aids help students retain information more effectively.	3.58	0.75	SA	3.68	0.81	SA
3	Visual aids in the classroom make learning more interactive and engaging for students.	3.63	1.01	SA	3.55	0.62	SA
4	The use of visual aids makes it easier for students to follow technical instructions and procedures.	3.47	0.66	A	2.94	0.71	A
5	The presence of visual aids in the classroom helps students focus better during lessons.	2.96	0.71	A	2.80	0.58	A
6	Visual aids reduce distractions in the classroom and help students concentrate on the task at hand.	3.02	1.01	A	3.71	0.77	SA
7	Visual aids such as step-by-step diagrams and instructions improve my ability to perform technical tasks and practical assignments.	3.58	0.66	SA	3.06	0.81	A
8	In technical courses, visual aids such as diagrams and charts make it easier for students to grasp practical skills.	3.67	0.49	SA	2.94	0.64	A
9	The use of 3D models and hands-on visual aids help students better understand engineering concepts and technical drawings.	3.50	0.84	SA	3.10	1.01	A
10	Videos and animations used in class improve my understanding of complex machinery and technical processes.	2.67	0.57	A	3.33	0.76	A
Average Mean/SD		3.32	0.73	A	3.29	0.70	A

Source: *Researcher's Field Result; 2025*

A – Agree SA – Strongly Agree

The result in Table 1 shows the response of teachers and students on how the presence of visual aids in the classrooms influence the academic performance of engineering trades students in technical colleges in Rivers State as well as the level of decision on each item. The result revealed that teachers and students' responses show that all the items 1 – 10 are influence of presence of visual aids in the classrooms on the academic

performance of engineering trades students in technical colleges in Rivers State with an average mean value of 3.32 and 3.29 with standard deviation values of 0.73 and 0.70 for teachers and students of engineering trades. Item with mean value greater than 2.50 but less than 3.50 was considered as “Agree” while item with mean value of 3.50 and above was considered as “Strongly Agree”. The standard deviation values ranging from 0.00

to 0.99 indicates that the respondents were close in their response while standard deviation values of 1.00 and above implies that the respondents (teachers and students) were far apart in their responses.

Research Question 2: How do seating arrangements in the classroom influence the academic performance of engineering trades students in technical colleges in Rivers State?

Table 2: Mean Response on How Seating Arrangements in the Classrooms Influence Academic Performance of Engineering Trades Students

S/N	Influence of Seating Arrangements in the Classrooms on Academic Performance of Students.	Teachers			Students		
		$\bar{X}_1$	SD ₁	RMK	$\bar{X}_2$	SD ₂	RMK
11	Seating arrangements that allow students to face the front of the classroom improve their concentration and focus.	3.41	0.71	A	3.03	1.01	A
12	Flexible seating arrangements (e.g., movable desks) enhance students' ability to work in groups and engage in hands-on activities.	3.63	1.01	SA	2.64	0.84	A
13	When seating arrangements are organized to allow face-to-face interaction, students are more likely to ask questions and seek clarification during lessons.	3.85	0.73	SA	3.70	0.63	SA
14	Seating arrangements that limit visual distractions in the classroom (e.g., students sitting far from windows) help students focus on learning tasks.	3.50	0.47	SA	2.70	0.71	A
15	In practical classes, seating arrangements that allow easy access to equipment and tools improve students' ability to complete hands-on tasks.	3.17	0.63	A	3.82	1.01	SA
16	Seating arrangements that allow for adequate space between students during practical sessions help students perform tasks more efficiently and safely.	2.68	1.01	A	3.66	0.55	SA
17	Seating arrangements that provide students with clear lines of sight to the instructor and visual aids enhance their understanding of course material.	2.70	0.68	A	3.74	0.59	SA
18	Seating arrangements that allow students to face each other encourage peer learning and academic motivation.	3.67	0.55	SA	2.98	0.64	A
19	When students are seated in a circular or U-shape arrangement, it is easier to concentrate on the teacher's demonstrations and explanations.	3.05	0.71	A	3.14	0.71	A
20	Seating arrangements that allow students to work together in groups or pairs improve engagement and motivation in the classroom.	3.11	0.84	A	3.67	0.63	SA
Average Mean/SD		3.28	0.68	A	3.31	0.60	A

Source: Researcher's Field Result; 2025 A – Agree SA – Strongly Agree

The result in Table 2 shows the response of teachers and students on how seating arrangements in the classrooms influence the academic performance of engineering trades students in technical colleges in Rivers State as well as the level of decision on each item. The result revealed that teachers and students' responses show that all the items 11 – 20 are influence of seating arrangements in the classrooms on the academic performance of engineering trades students in technical colleges in Rivers State with an average mean value of 3.28 and 3.31 with standard

deviation values of 0.68 and 0.60 for teachers and students of engineering trades. Item with mean value greater than 2.50 but less than 3.50 was considered as “Agree” while item with mean value of 3.50 and above was considered as “Strongly Agree”. The standard deviation values ranging from 0.00 to 0.99 indicates that the respondents were close in their response while standard deviation values of 1.00 and above implies that the respondents (teachers and students) were far apart in their responses.

Discussion of Findings

The research question one sought to find out the mean responses of teachers and students on how the presence of visual aids in the classrooms influence the academic performance of engineering trades students in technical colleges in Rivers State. The result revealed that presence of visual aids in the classrooms influence the academic performance of engineering trades students in technical colleges in Rivers State as use of visual aids makes it easier for students to follow technical instructions and procedures, visual aids reduce distractions in the classroom and help students concentrate on the task at hand, visual aids such as diagrams and charts make it easier for students to grasp practical skills and, videos and animations use as visual aids in the classrooms improve my understanding of complex machinery and

technical processes among others. The findings of this study are in line with the result by Kaswa (2015) who found that visual aids promote learning among students

Research question two sought to find out the mean responses of teachers and students on how seating arrangements in the classrooms influence the academic performance of engineering trades students in technical colleges in Rivers State. The result revealed that seating arrangements in the classrooms influence the academic performance of engineering trades students in technical colleges in Rivers State as when students are seated in a circular or U-shape arrangement, it is easier to concentrate on the teacher's demonstrations and explanations, seating arrangements that allow students to work together in groups or pairs improve

engagement and motivation in the classroom, seating arrangements that allow for adequate space between students during practical sessions help students perform tasks more efficiently and safely, seating arrangements that allow students to face the front of the classroom improve their concentration and focus and when seating arrangements are organized to allow face-to-face interaction, students are more likely to ask questions and seek clarification during lessons among others. These findings corroborate that of Meeks, Knotts, James, Williams, Vassar and Wren (2013) that seating arrangement in the classroom contributes to students' learning outcome.

Conclusion

The study concludes that classroom interior design features influence the academic performance of engineering trades students in technical colleges in Rivers State. This is shown in the findings of the study that seating arrangements in the classrooms, lighting features of classrooms and presence of visual aids in the classrooms influence performance of engineering trades students in technical colleges in Rivers State.

Recommendations

Based on the findings from the study, the following recommendations were made.

1. Visual aids such as step-by-step diagrams and instructions should be installed in technical college classrooms design for

engineering trade students as it improves students' ability to perform technical tasks and practical assignments.

2. Movable and adjustable seats should be installed in classrooms for engineering trades to enable students to adjust and seat in circular or U-shape as it enhances students' ability to work in groups and engage in hands-on activities.

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