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Research paper

ENHANCING THE LEARNING ENVIRONMENT AND USERS EXPERIENCE IN ARCHITECTURAL EDUCATION AT NILE UNIVERSITY OF NIGERIA

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Abstract

As architecture education requires more dynamic, collaborative, and technologically linked environments, many Nigerian institutions continue to rely on traditional pedagogical models and ineffective physical infrastructure, limiting innovation and engagement. This study seeks to critically examine and improve the learning environment and user experience in architectural education at Nile University in Nigeria. The objective is to investigate how spatial design, learning environments, and user-centred strategies might be combined to provide more successful educational experiences for students and faculty. Following the theoretical underpining of constructivist learning theory, environment-behavior studies, user-centred design, and educational ergonomics, the study used a quantitative approach to collect empirical data through questionnaires (N=158) and spatial analyses to assess the current state of the Department of Architecture's learning environment. Indicative findings indicate the necessity for a comprehensive design and policy framework adapted to Nile University architecture students' particular needs and the university educational approach. The paper made recommendations for a design modelled after a 21st-century architectural learning environment that fosters creativity, well-being, multidisciplinary collaboration, and academic excellence. The significant of the study is that the structure will serve as a model for architecture education reform in Nigeria.

Key words: *Architectural Education, Design Studio, Learning Environment, User's Experience, Nigeria.*

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1. INTRODUCTION

Architectural education is essentially dynamic, requiring students to acquire theoretical knowledge as well as practical design abilities through experiential learning. It is a discipline that flourishes in settings that encourage creativity, critical thinking, and collaborative participation. In the framework of the 21st-century learning paradigm, institutions of higher education are increasingly being evaluated not only by their academic curricula but also by the quality of their learning environments and how well they support students' total educational experience [1,2]. In Nigeria, architecture education is at a critical juncture, demanding environments that stimulate creativity, critical thinking, and practical skills while simultaneously imparting theoretical information. The learning environment has a tremendous impact on students' academic achievement and overall experiences.

At the heart of architectural education is the design studio, a physical and intellectual place in which students interact, explore, and develop ideas under the guidance of mentors. The quality of this setting has been demonstrated to have a considerable impact on students' academic performance, creativity, and mental health [3-5]. However, anecdotal reports and preliminary observations from several Nigerian universities indicate that contemporary architectural learning spaces do not fully meet the pedagogical needs of students. Limitations in spatial flexibility, indoor environmental quality (IEQ), availability to digital design tools, and poor student-centered pedagogical practices all have an impact on the entire learning experience.

There is limited empirical information to determine if present architectural learning settings are optimised for such results. While national literature has revealed comparable tendencies [6-8], there is a lack of context-specific studies focusing on the lived experiences of students and faculty in many private university settings. Furthermore, there is limited empirical information to determine if present architectural learning settings are optimised for such results. Meanwhile, there are potential to improve these environments to better serve architectural students. At Nile University of Nigeria, there is a strategic opportunity to review and improve the current architectural learning environment in order to comply with global best practices while also responding to local contextual factors.

This study aims to critically examine the nature and quality of the learning environment, as well as the experiences of its users—both students and faculty—in order to propose actionable design and pedagogical interventions that are consistent with current global practices while taking into account local institutional realities. In addressing this issue, the study posed crucial issues such as (i) what are the current spatial, environmental, and pedagogical restrictions in the architecture department at Nile University? (ii) How do students and faculty view and interact with the current learning environment? (iii) What techniques might be recommended to improve the physical, digital, and experiential aspects of architecture education at the university?

The study tackles the critical need to examine, evaluate, and improve the learning environment and user experience in architecture education at Nile University, with the goal of aligning it with current worldwide trends while taking into account local institutional constraints. This study seeks to investigate strategies for improving the learning environment and user experience in architectural education at Nile University, with the objective of generating competent and innovative architects.

2. LITERATURE REVIEW

The effect of the learning environment on students' academic achievement has been extensively investigated. For example, Taylor [9] claimed that active learning activities can be adopted and supported in a conducive studio setting, hence improving the student's learning experience. In their study, Obeidat & Al-share [10] focused on the relevance of environmental variables such as the positive influence of lighting, noise management, and chair comfort while building the studio classroom. Meanwhile, Afara [11] explored how sitting design in the architectural studio influences creativity and productivity. This was regarded as the most significant for policy makers and educators. On the other hand, Alhusban et al., [12] highlighted important influential elements such as physical and administrative aspects that affect students' productivity in architectural design studios. The analysis revealed thermal comfort as the most prominent indices and most dominant among the numerous sub-factors of design.

Recent research in Nigeria have shown shortcomings in architectural education environments. These include restrictive studio layouts, poor interior environmental quality, outmoded teaching equipment, and inadequate digital integration [6,13,14]. Numerous writers [15-17] discovered that students' perceptions of their learning environment, such as participation in studies and perceived assistance, influenced their academic achievement. Furthermore, they discovered that the conducive and interactive nature of the learning environment has a significant impact on student satisfaction and academic success. Nonetheless, many architecture faculties continue to operate under old pedagogical models, with few changes to address the evolving demands of learners in a post-pandemic digital environment. Sen [6] researched architecture students' impressions of their learning environment in South-South Nigeria, and discovered that characteristics such as excellent teaching, collaborative learning, and academic organisation have a substantial impact on academic outcomes.

The integration of virtual learning environments has also been investigated and particularly accelerated by the covid-19 pandemic which brings about the transition toward blended learning. Owoseni et al. [7] and Mohammed et al., [8] investigated the impact of virtual learning during the covid-19 lockout, finding considerable gains in students' digital design capabilities and autonomous learning capacities.They discovered that, while virtual learning improved architectural students' autonomous learning and digital design skills, it also showed infrastructural and pedagogical deficiencies. The findings of their study imply the necessity to combine physical and virtual learning settings in order to improve architecture education; yet, this has added complexity.

In the domain of environments for increased learning in architecture, Akande et al. [5] contended that interactive spaces inside architectural departments have an important role in improving learning outcomes. In their research, they emphasised the significance of design studios in architecture education, advocating for environments that encourage immersion and collaboration. Because the design studio is central to architectural education while also serving as a hub for creativity, collaboration, and practical skill development, Owoseni et al., [3]; Gana & Akande [4] and Akande et al., [5] emphasise that well-designed studios improve student immersion and collaboration. They advocate for adaptable places that support a variety of learning activities and encourage connection. In addition, Al-Jokhadar et al., [13] and Asaju et al., [14] emphasise the importance of indoor environmental quality (IEQ) in studio settings to improve academic performance, pointing out that factors such as lighting, ventilation, and acoustics have a direct impact on students' well-being and productivity.

2.1. Theoretical Framework

This study is based on numerous hypotheses that revolve around the intersection of three key dimensions: the physical environment, pedagogical practices, and user experience, all of which interact to define the quality of architectural education. To frame the analysis, the study uses principles from constructivist learning theory, environment-behavior studies, and user-centred design. According to constructivist learning theorists [18, 1], learners actively construct knowledge through spatial immersion, contextual experiences, and social interactions with their surroundings. This highlights the necessity for architectural studios to be adaptable and interactive in order to facilitate experience and collaborative learning. In architecture education, this entails engaging students in active, collaborative, and reflective learning experiences. The design studio, as highlighted by Akande et al., [5] is an important venue in which students can engage in problem-based learning and gain practical skills.

The environment-behaviour theory [19,20] investigates how spatial configurations, environmental quality (lighting, ventilation, and acoustics), and built-environment affordances influence human behaviour and performance. This is important in determining how the studio environment influences students' focus, creativity, and involvement. Donald [21] introduced the user-centred design framework, which emphasises developing places and systems around users' requirements, capabilities, and experiences. Using this premise, the study looks into how architectural learning spaces at Nile University may be improved based on feedback from both students and teachers. These theories contribute to a comprehensive framework in which the architectural learning environment is viewed as an active participant in the educational process rather than a passive container.The integration of physical, digital, and social learning aspects will be assessed in terms of how they improve—or degrade—user experience and academic results.

3. METHODOLOGY

3.1. Study Location

The study was done at Nile University of Nigeria in Abuja. Abuja is located in the Federal Capital Territory (FCT), Nigeria having latitude and longitude 9° 10' 32" N / 7° 10' 50" E. Nile University is a private post-secondary institution noted for providing architectural education in a modern campus setting. The university's Department of Architecture was chosen as the focal point due to its connection to the research issue and accessibility to the target audience (students and faculty).

3.2. Study Location

This study used a descriptive cross-sectional survey research approach, which is ideal for gathering quantitative data from a specific population at a single point in time [22]. The design enables the detection of patterns, linkages, and areas for development in the architectural learning environment and the user experience.

3.3. Study Location

A systematic questionnaire was created using relevant literature on architectural education, learning settings, and user-centred design [1,23]. The instrument was divided into these five sections: (i) Section A: Respondent information (status, age, gender, level/designation, and years of experience). (ii) Section B: Studio environment: space adequacy, lighting, acoustics, furniture, and preferred layout. (iii) Section C: Workshop and practical spaces, including availability, frequency of usage, equipment, and safety. (iv) Section D: Digital facilities, including computer labs, software access, and internet quality. (v) Section E: Overall learning experience - perceptions of learning support and opportunities for development.The questionnaire used Likert-scale questions, rating scales, and multiple-choice items to assure uniformity and ease of quantitative analysis [24]. A pilot research was done with 15 respondents (students and staff) from the department who were not included in the main sample. The pilot intended to identify unclear questions, ensure clarity, and assess the time required to complete the survey [25]. Minor changes were made based on feedback to improve the language and flow of the questions. The questionnaire was transformed into a Google Form and delivered digitally via a variety of communication channels (emails and WhatsApp groups). This method was chosen because of its low cost, extensive reach, and safe administration, which ensures prompt responses from both staff and students [26].

3.4. Study Location

The target population consisted of students and academic personnel from Nile University's Department of Architecture in Nigeria. The sample population survey ranged from responses from 100level to 400level undergraduate students, as well as academic professionals such as lecturers, professors, and studio/workshop coordinators. A purposeful sample strategy was used to ensure that only those actively involved in architectural teaching and learning took part. This strategy enabled data gathering from persons with firsthand knowledge and educated perspectives regarding the learning environment [27]. The study included a sample size of 158 people, including students and staff. The sample size is statistically sufficient to generalise findings within the department using confidence intervals [28,29]. The ratio of student to staff respondents represented their proportional distribution within the department.

3.5. Study Location

Over the course of three weeks, data were collected utilising a Google Form questionnaire. Automated data export allowed replies to be sent directly into an Excel file, which could then be loaded into SPSS for cleaning and analysis. Participation was optional, and ethical considerations were followed in accordance with the university's research ethics committee. The data was analysed with SPSS version 25. Responses were summarised using descriptive statistics including frequencies, percentages, mean scores, and standard deviations. Likert-scale responses were treated as interval data when comparing means.

3.6. Study Location

Cronbach's Alpha was employed in SPSS to assess the internal consistency of the Likert-scale items in order to ensure questionnaire reliability. A threshold of $\alpha > 0.70$ was deemed appropriate [30]. The pilot investigation produced an alpha value of 0.866 (Table 1), indicating strong dependability.

Table 1. Reliability and Validity of the Questionnaire

Section	Cases	Reliability	Interpretation
Section B Q8	6	0.828	Strongly Reliable
Section B Q11	7	0.715	Strongly Reliable
Section C Q15	4	0.845	Strongly Reliable
Section C Q18	5	0.858	Strongly Reliable
Section E Q19	3	0.825	Strongly Reliable
Section E Q20	6	0.921	Highly Reliable
Overall	31	0.866	Strongly Reliable

For content validity, specialists in architecture education and research methodology assessed the questionnaire to verify that it included all essential features of the learning environment [31]. In terms of face validity, pilot study participants agreed that the questionnaire was clear, relevant, and representative of the domain under research.

4. RESULTS

4.1. Demographic information of the respondents

Table 2 shows the demographics of the respondents. The following findings are extracted from the table (i). The user composition revealed that 96.2% of responders are students, with only 3.8% being instructional personnel. This clearly demonstrates a student-centric feedback pool, implying that any changes to the learning environment should prioritise student requirements, perceptions, and learning styles. (ii) Gender representation is 50% male and 50% female. This equal gender representation enables the findings to be regarded as gender-neutral, resulting in inclusive design recommendations. This finding is consistent with that of Dovey and Fisher [32] who found that gender equity in educational contexts had a favourable effect on engagement and satisfaction. As a result, design interventions must take into account both genders' spatial, ergonomic, and social preferences. (iii) The age distribution shows that 80.4% of respondents are under the age of 20, 15.8% are between the ages of 21 and 30, 1.3% are between the ages of 31 and 40, and 2.5% are 41 and older. The age profile suggests a largely young student population, most likely in their early academic years. Jamieson et al. [33] and Jelić et al. [34] found that younger architecture students require more direction, flexible learning spaces, and engaging studio experiences to stimulate creativity and collaboration.

Table 2. Reliability and Validity of the Questionnaire

Demography	Frequency	Percentage
Status		
Student	152	96.2
Teaching Staff	6	3.8
Gender		
Male	79	50
Female	79	50
Age		
Under 20	127	80.4
21-30 Years	25	15.8
31- 40 Years	2	1.3
41 And Above	4	2.5
Academic Level		
100l	68	43
200l	45	28.5
300l	21	13.3
400l	24	15.2

(iv) Academic level distribution: 43% at 100 level, 28.5% at 200 level, 13.3% at 300 level, and 15.2% at 400 level. This means that a sizable proportion of responses are first-year (100 level) students, implying that first impressions and foundational experiences in studio settings are critical. According to Zeisel [20] physical learning settings have a substantial impact on newcomers' comfort and involvement. As a result, the design studio should be carefully constructed to help early-stage students transition into architectural thinking and practice.

4.2. Suitability and Functionality of the Architectural Design Studio Environment

To evaluate the suitability and functionality of the architectural design studio environment in terms of space, lighting, ventilation, furniture, acoustics, and technical infrastructure, a 5-point Likert scale was used with ratings of 'excellence', 'good', 'fair', 'poor', and 'very poor'. The ratings were assigned weights of 5, 4, 3, 2, and 1, respectively. Table 3 displays the functionality of the architectural design studio setting as reported by respondents. The judgement for each scale is presented as (5. $\leq x \leq$ 4.51) as excellence, (4.45 $\leq x \leq$ 3.51) as good, fair as (3.45 $\leq x \leq$ 2.51), bad as (2.45 $\leq x \leq$ 1.51), and very poor as (1.44 $\leq x \leq$ 0), where x is the variable of interest. As seen in Table 3, the lighting (mean = 4.20 - good). The vast majority (84.8%) assessed the illumination, both natural and artificial, as good or excellent. According to Jamieson *et al.,* [33] well-lit learning spaces boost concentration and mental health. The findings imply that the architectural studios at Nile University are visually conducive to design activities, which is vital in architectural education where visual clarity is important. The ventilation component (mean = 3.47 - fair) had the lowest average assessment, with just 53.2% rating it as good or excellent and more than 30% expressing displeasure.

Table 3. Adequacy and functionality of the architectural design studio environment

Feature	Excellent	Good	Fair	Poor	Very Poor	Mean value	Decision
Natural and artificial lighting	62 (39.2)	72 (45.6)	19 (12)	3 (1.3)	2 (1.2)	4.2	Good
Ventilation	26 (16.5)	58 (36.7)	48 (30.4)	17 (10.8)	9 (5.7)	3.47	Fair
Acoustics	19 (12)	91 (57.6)	37 (23.4)	7 (4.4)	4 (2.5)	3.72	Good
Furniture (tables/chairs/desks)	25 (15.8)	69 (43.7)	48 (30.4)	11 (7)	5 (3.2)	3.62	Good
Power outlets and Wi-Fi access	23 (14.6)	48 (30.4)	45 (28.5)	23 (14.6)	19 (12)	3.21	Fair
Cleanliness and maintenance	37 (23.4)	76 (46.1)	33 (20.9)	8 (5.1)	4 (2.5)	3.85	Good

According to environmental behaviour theory [35], insufficient ventilation can cause pain, weariness, and limited creativity, particularly during protracted studio sessions common in architecture education. Acoustics (mean = 3.72 - good): Almost 70% of respondents assessed acoustic functionality as good or outstanding. This is consistent with Salama's [1] argument that favourable acoustic settings promote focused work, effective communication, and collaborative learning, particularly in studio-based courses. However, acoustic concerns may still exist for the remaining 30%, particularly in open-plan studios. Furniture (mean = 3.62 - good) was rated "good," but only 15.8% rated it excellent, and 10% rated it bad or extremely poor. This is consistent with Vygotsky's Constructivist learning theory (1978), which states that adaptive and ergonomic furniture promotes peer interaction and active learning. Inadequate or stiff furniture may impede creative development and prolonged studio use. Power outlets and Wi-Fi (mean = 3.62 - decent) Only 45% ranked this as good or excellent, but more than 26.6% rated it bad or very poor, indicating widespread unhappiness. In the digital age of architectural education with software like AutoCAD, Revit, Rhino, and cloud-based tools, access to reliable electricity and internet is crucial (Jelić et al., 2016). These low ratings point to a serious deficit in technological infrastructure. Cleanliness and maintenance (mean = 3.85 - good): Nearly 70% of respondents rated this component good or outstanding. According to Zeisel [20] clean and well-maintained rooms generate a sense of ownership and professionalism among architecture students, increasing productivity and learning pleasure.

To examine how the functioning of the design studio setting affects students' academic productivity, creativity, and collaborative learning experience. Kendall's Tau-b correlation results were conducted, and the results are shown in Table 4. Kendall's Tau-b correlation analysis demonstrates statistically significant links between numerous physical qualities of the design studio setting and important components of students' learning experiences, such as academic productivity, creativity, and collaborative learning. Significant positive relationships were discovered between natural and artificial lighting, collaborative learning ($\tau = .212$, $p = .003$), and access to online tools ($\tau = .186$, $p = .007$). This shows that well-lit spaces promote better peer interaction and provide digital learning assistance. Ventilation significantly correlated with academic productivity and creativity ($\tau = .178$, $p = .009$), collaborative learning (τ =.249, p <.001), and online tool availability (τ =.233, p <.001). These findings demonstrate that thermal comfort and air quality have a substantial impact on cognitive function and social engagement in studio environments. Acoustics had a positive correlation with academic productivity and creativity (τ =.160, p =.023), collaborative learning (τ =.299, p <.001), open-plan layout preference (τ =.146, p =.037), and access to online tools (τ =.166, p =.016). This emphasises the requirement for well-balanced soundscapes that promote focus and communication.

Cleanliness and maintenance were significantly associated with academic output (τ =.245, p <.001), collaborative learning (τ =.181, p =.009), and access to internet tools (τ =.182, p =.007). Thus, a clean, well-maintained environment promotes physical well-being and long-term involvement. The results can be understood through multiple theoretical lenses: (i) Maslow's Hierarchy of Needs (1943), which states that physiological comfort and safety—facilitated by sufficient ventilation, lighting, cleanliness, and ergonomics—are requirements for cognitive and creative endeavours in education [36]. (ii) These findings confirm Kolb's Experiential Learning Theory of 1984, which states that physical contextual elements promote active, reflective, and collaborative learning processes that are essential to architecture education [37]. (iii) Piaget and Vygotsky's Constructivist Learning Theories are also consistent with these findings, as the physical learning environment influences how students interact, co-create knowledge, and learn socially in the design studio [38-39].

4.3. Availability, Suitability, and Effectiveness of Workshop and Practical Spaces

To assess the availability, suitability, and effectiveness of workshop and practical spaces (e.g., modelling studios, 3D printing, wood/furniture workshops) in facilitating hands-on learning and architectural model creation. Respondents were asked to list the practical and workshop facilities accessible to them. As shown in Table 5, the analysis indicated that all key workshop and practical spaces were allegedly available and in active use, indicating that Nile University's architecture curriculum has adequate infrastructure. The breakdown of usage patterns demonstrates a diverse interaction throughout the available facilities. The Modelling Workshop Studio was identified as the most frequently used space, with 20.67% (117) of replies indicating its use. This emphasises the ongoing necessity of physical model-making in developing spatial reasoning, creativity, and architectural conceptualisation. Following that, 16.96% (96) of respondents reported using 3D Printing/Fabrication Labs, indicating a rising integration of digital fabrication technologies within the curriculum, which is consistent with global movements towards computational design and digital production. The Photographic Studio was responsible for 13.07% (74) of consumption. Its significance in visual recording and presentation promotes reflective practice and the creation of professional portfolios.

Table 4. Influences students' academic productivity, creativity, and collaborative learning experience

Functionality of the design studio environment			The current studio environment impacts my academic productivity and creativity	The current design studios adequately support collaborative learning and peer interaction	Open-plan collaborative workspaces types of studio layout best enhance my learning, creativity and productivity	Individual enclosed workspaces type of studio layout best enhances my learning, creativity and productivity	A combination of open and enclosed spaces types of studio layout best enhances my learning, creativity and productivity	I prefer the design studio should integrate outdoor learning spaces	Student have access to online architecture learning tools
Kendall's Tau_B	Natural and Artificial Lighting	Correlation Coefficient	.131	.212**	.113	.093	.121	-.008	.186**
	Studio Space Per User	Sig. (2-Tailed)	.066	.003	.109	.179	.084	.911	.007
	Ventilation	Correlation Coefficient.	.178**	.249**	.128	.174**	.130	.039	.233**
		Sig.	.009	.000	.059	.009	.053	.567	.000
	Acoustics	Correlation Coefficient.	.160*	.299**	.146*	.064	.102	.101	.166*
		Sig.	.023	.000	.037	.354	.143	.146	.016
	Furniture	Correlation Coefficient.	.205**	.229**	.140*	-.018	.139*	.026	.136*
		Sig.	.003	.001	.041	.790	.042	.708	.044
	Power Outlets and	Correlation Coefficient.	.148*	.227**	.198**	.097	.132*	.118	.178**
	Wi-Fi Access	Sig.	.029	.001	.003	.139	.048	.077	.007
	Cleanliness and	Correlation Coefficient.	.245**	.181**	.080	.075	.132	.113	.182**
	Maintenance	Sig.	.000	.009	.245	.267	.054	.099	.007
		N	158	158	158	158	158	158	158

**. Correlation is significant at the 0.01 level (2-tailed); *. Correlation is significant at the 0.05 level (2-tailed).

Furthermore, 12.72% (72) of students used Virtual Reality (VR)/Augmented Reality (AR) studios, demonstrating that immersive technologies are increasing popularity as powerful tools for spatial visualisation, user experience simulation, and participatory design.

Table 5. Availability, Adequacy, And Use of Workshop and Practical Spaces

Workshop and Practical Spaces	Frequency	Percentage
Modelling Workshop Studio	117	20.67
Photographic Studio	74	13.07
Wood/Furniture Workshop	59	10.42
3D Printing/Fabrication	96	16.96
Masonry Workshop	26	4.59
Building Material/Systems Lab.	56	9.89
Exhibition Workshop Space/Room	62	10.95
Virtual Reality/Augmented Reality Studio	72	12.72
Others	4	0.71

The Exhibition Workshop Space was used by 10.95% (62%) of respondents, demonstrating the importance of design critiques, public participation, and peer-to-peer learning through exhibitions. The Wood/Furniture Workshop (10.42%, 59 respondents) and Building Materials/Systems Laboratory (9.89%, 56 respondents) were also moderately used, highlighting the importance of tactile learning settings that allow for material experimentation and building detailing. The Masonry Workshop, albeit the least used (4.59%, 26 responders), demonstrates an ongoing desire for traditional and structural material handling procedures, albeit on a lesser scale.

4.4. Assessment of Priority Areas for Urgent Intervention in the Architectural Learning Environment

To better determine areas that require essential improvement, students were asked to rank the urgency of intervention across various components of Nile University's architectural learning environment. As shown in Table 6, the replies provide useful information about user experiences and the perceived adequacy of infrastructure and pedagogical resources. According to the data, Wi-Fi and internet infrastructure were identified as the most crucial subject requiring immediate attention, with 50.0% of respondents rating it as extremely important and a mean score of 4.03, the highest of any category. This emphasises the critical role of internet connectivity in facilitating architectural research, digital design workflows, and access to online educational resources. Closely following this, digital software access (mean = 3.67), mentorship and practical sessions (mean = 3.76), and workshop/model-making space (mean = 3.64) were also rated highly for perceived necessity. These findings indicate that students want both technical tools and practice-oriented interaction with the architecture curriculum. The design studio environment, the traditional centre of architectural education, had a mean score of 3.58, indicating that a sizable proportion of students (31.6%) believe its urgent repair is critical. While this remains a priority, it has been eclipsed by worries about digital infrastructure and experiential learning assistance. Computer laboratories, on the other hand, received a middling rating, with a mean score of 3.46, indicating that, while still relevant, students may prefer access to personal or mobile computing tools over traditional lab settings. This trend shows a shift in learning preferences towards adaptable and personalised digital settings.

Table 6: Priority Areas for Urgent Intervention in the Architectural Learning Environment

Priority Areas	EI	VI	MI	SI	NI	Mean Value	Decision
The Current Design Studio Environment	50 (31.6)	38 (24.1)	36 (22.8)	22 (13.9)	12 (7.6)	3.58	Very Important
The Workshop/ Model-Making Space	46 (29.1)	52 (32.9)	26 (16.5)	25 (15.8)	9 (5.7)	3.64	Very Important
The Computer Laboratory	39 (24.7)	42 (26.6)	42 (26.6)	26 (16.5)	9 (5.7)	3.48	Moderately Important
The Digital Software Access	49 (31)	48 (30.4)	30 (19)	22 (13.9)	9 (5.7)	3.67	Very Important
The Wi-Fi And Internet Infrastructure	79 (50)	39 (24.7)	15 (9.5)	15 (9.5)	10 (6.3) S	4.03	Very Important
The Mentorship and Practical Sessions	58 (36.7)	40 (25.3)	35 (22.2)	14 (8.9)	11 (7)	3.76	Very Important
NI= Not at all important, SI= Slightly Important, MI= Moderately Important, VI= Very Important and EI= Extremely Important							

The relative importance index, calculated using the formula below, was used to prioritise the parts of the architectural learning environment that require immediate intervention based on students' and staff opinions.

$$\mathrm{RII} = \frac{\sum \mathrm{W}}{\mathrm{A} * \mathrm{N}} \quad (1)$$

where:
w = weight given to each statement by the respondent
a = highest response integer which is 5
n = total number of respondents = 158

Table 7 shows the ranking of areas requiring immediate attention. A comparative analysis of architectural learning environment components reveals a prioritised hierarchy of needs as viewed by students and faculty. Wi-Fi and Internet infrastructure were ranked first in terms of the necessity of intervention, followed by mentorship and practical sessions, digital software access, workshop/model-making facilities, and computer laboratories. Wi-Fi and Internet Infrastructure – Ranked first, this indicates the growing reliance on cloud-based design tools, digital collaboration platforms, and remote access to resources. The mean score of 4.03 supports this priority, demonstrating that connectivity is not only supplementary, but also necessary for effective architectural learning.

Table 7: Ranking of areas requiring urgent intervention

Areas requiring urgent intervention	ΣW	RII	RANK
The current design studio environment	566	0.716	5
The workshop/model-making space	575	0.728	4
The computer laboratory	550	0.696	6
The digital software access	580	0.734	3
The wi-fi and internet infrastructure	636	0.805	1
The mentorship and practical sessions	594	0.752	2

Mentorship and Practical Sessions – The second-ranked component emphasises the importance of hands-on experience and exposure to the real world. The prioritisation of mentorship implies a realisation of gaps between academic learning and practical application, emphasising the importance of enhanced student-mentor engagement. Digital Software Access — This outcome, ranked third, demonstrates the critical importance of access to specialised software in modern architecture education. This desire is reinforced by the use of powerful digital design tools, graphics programs, and simulation software. Workshop/Model-Making Spaces — Despite being placed fourth, these spaces remain significant. Model-making serves as a concrete link between conceptual thinking and physical realisation, which is a fundamental element of architectural education. Computer Laboratories — The least prioritised, this reflects a larger trend towards mobile computers and decentralised access. Students are increasingly reliant on personal devices and flexible access, rather than fixed-location labs.

5. DISCUSSION

The demographic data revealed that the architectural learning environment at Nile University is mostly inhabited by young, entry-level students, the majority of whom are under the age of 20 and in their early years. This conclusion emphasises the importance of a student-centered design strategy in which physical spaces are customised to promote exploration, guided mentorship, and collaborative learning [18,1]. Given the developmental stage of these students, the studio and digital settings must encourage curiosity, creativity, and comfort by providing access to natural light, current equipment, adaptable furniture, and designated areas for individual and group activity. The implication is consistent with Environmental Behaviour Theory [35], which argues a reciprocal interaction between users and their surroundings. The evaluation of the physical learning environment shows that while students expressed general satisfaction with studio lighting, acoustics, cleanliness, and furniture quality, major concerns were raised about insufficient ventilation and unreliable technological infrastructure. These shortcomings are especially concerning given that architectural pedagogy relies largely on continuous digital access and physical comfort for creative output [40-41]. According to Constructivist Learning Theory [18], physical impairments limit the learner's ability to fully connect with their surroundings and impede experiential learning. As a result, fixing these infrastructural gaps through user-centred, theory-driven design would improve academic performance and learner satisfaction. In terms of the role of hands-on learning and studio culture, the research findings support the importance of experiential and reflective learning processes in architectural education. The regular use of conventional model-making rooms, wood workshops, masonry labs, and photographic studios lends credence to Kolb's [37] Experiential Learning Theory. Furthermore, the presence of exhibition studios and criticism sessions is consistent with Schön's [42] Reflective Practitioner Model, which emphasises iterative learning via feedback and representation. The adoption of digital tools such as VR/AR studios, 3D printing laboratories, and parametric software aligns with Oxman's [43] call for hybrid learning ecosystems that mix analogue and digital abilities. This change is not only necessary, but also represents current architectural practices. The digital gap is centred on infrastructure, access, and autonomy; a striking finding from the survey is that students place a high priority on enhanced Wi-Fi and digital access. According to Siemens' [44] Connectivism Theory, digital networks are now essential for knowledge creation and collaboration. The study's findings indicate that having access to a dependable internet connection, design tools, and collaborative digital platforms is crucial for studio success and peer-to-peer learning. Interestingly, the low priority given to computer laboratories reflects a paradigm shift towards personalised, mobile learning environments, compatible with the Student-Centered Learning Model [40]. Students appear to prefer the liberty and convenience of using their own devices to typical lab settings. Students emphasised the importance of mentorship and experiential learning, ranking it second only to internet infrastructure in terms of intervention priority. This identifies a critical pedagogical need in architectural education: structured, experiential contact with professors and industry experts. Kolb's [37] theory states that learning is most effective when students actively participate in tangible situations and receive guided reflections. This desire is consistent with the need to improve faculty-student connection through crit sessions, design reviews, and collaborative projects, which are essential components of a strong studio culture [1]. The synthesis of priorities and strategic implications demonstrated that prioritising needs—Wi-Fi, mentorship, software access, workshop/model-making spaces, and computer labs—provides a strategic intervention roadmap. It illustrates the essential realignment of resources to meet changing student expectations and modern teaching approaches. These findings are consistent with Salama [1] and Owoseni et al., [3], who emphasised the necessity of balancing physical comfort with spatial and pedagogical flexibility. Furthermore, Wong [41] emphasised that often-overlooked factors such as acoustics and cleanliness have a substantial impact on students' cognitive and emotional states in educational settings. This conversation demonstrates a distinct movement in Nile University's architecture education towards hybrid, experiential, and student-centered learning. Addressing infrastructure inadequacies and integrating the studio setting with current educational theories would improve learning outcomes and user happiness.

6. RECOMMENDATIONS

The following recommendations are presented to improve the quality of architecture education and learning at Nigeria's Nile University. (i) Future studio space designs and adaptations should focus on modular, adaptable studios outfitted with ergonomic and gender-inclusive furnishings. Spatial zoning should be implemented by defining critique, focus, and cooperation zones. Biophilic characteristics (natural lighting, indoor plants) should be prioritised to improve user well-being. In addition, lighting, ventilation, and acoustic systems should be upgraded to increase user comfort and cognitive performance. (ii) To improve the user's learning experience, digital infrastructure and technology integration must be strengthened, including Wi-Fi bandwidth and power infrastructure throughout. There should also be provisions for universal access to important software (for example, current versions of AutoCAD, Revit, Rhino, and Adobe Suite). In addition, the institution should encourage cloud-based access and virtual desktop infrastructure for off-campus use. (iii) Emphasis should be placed on continual curriculum and learning. Innovation that should promote multimodal learning by combining physical model-making with digital simulations and mixing real-world transdisciplinary projects into several workshop settings. (iv) Staff and student co-design engagement should be encouraged through the creation of platforms that enable staff and students to collaborate on learning environments. Furthermore, professors should participate in design feedback loops and space planning. (v) The value of mentorship and industry connections should not be underestimated; this might be accomplished by developing a mentorship program in the department that includes professional and practicing architects as well as alumni. Externships and practical sessions should also be scheduled on the academic calendar. (vi) Feedback and monitoring measures, as well as semesterly spatial satisfaction surveys and usage evaluations, should be conducted on a regular basis. A student-staff committee should be formed to assess facility needs and make timely recommendations to management as needed. By combining these physical, digital, pedagogical, and administrative measures, Nile University can create a dynamic, inclusive, and future-ready architecture education environment.

7. CONCLUSION

This study investigated strategies for improving the learning environment and user experience in architectural education at Nile University, with the objective of generating competent and innovative architects. Improving the learning environment and user experience in architectural education at Nile University of Nigeria necessitates a planned and multidimensional approach. The study finds that, while present studio conditions support basic functionality, there are severe inadequacies in digital infrastructure, ventilation, and spatial adaptability. A user-centred, theory-informed design of learning environments, which incorporates environmental psychology and constructivist concepts, can greatly boost student engagement, creativity, and academic achievement. Prioritising digital access, ergonomic studio upgrades, and mentorship opportunities will align Nile University's architecture education with worldwide best practices, creating a more accessible, innovative, and forward-thinking academic environment.

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