© AUG 2026 | IRE Journals | Volume 10 Issue 2 | ISSN: 2456-8880
DOI: https://doi.org/10.64388/IREV10I2-1720230

# Assessment of Natural Lighting Conditions and Architecture Students' Satisfaction in Architectural Studios of Selected Universities in Southwestern Nigeria

ODUNJO OLURONKE OMOLOLA[1], JELILI LATEEF ABIOLA[2]
*[1, 2]Department Of Architecture, Faculty of Environmental Sciences, Ladoke Akintola University of Technology, Ogbomoso, Nigeria*

***Abstract-*** ***Natural lighting is an important component of architectural studio design because it enhances visual comfort, learning efficiency, and energy sustainability. However, despite the favourable daylight conditions in Southwestern Nigeria, many architectural studios continue to experience inadequate daylight performance, resulting in increased dependence on artificial lighting. This study assessed the natural lighting conditions and architecture students' satisfaction with natural lighting in selected universities in Southwestern Nigeria. A descriptive research design within a mixed-method approach was adopted. Four universities with purpose-built architectural studios were selected, and data were collected from 318 architecture students using structured questionnaires, complemented by field observations and illuminance measurements. Descriptive statistics, including frequency, percentage, and mean score, were employed for data analysis. The findings showed that 66.9% of the respondents were male, while 33.1% were female, with 62.9% aged between 15 and 20 years. The assessment revealed that although natural lighting was available in the selected studios, its adequacy and distribution varied considerably due to differences in building orientation, window design, and daylighting features. Consequently, students reported only moderate satisfaction with the existing daylight conditions, particularly regarding visual comfort during detailed studio activities. The study concludes that effective daylighting in architectural studios depends on the integration of appropriate passive design strategies that improve daylight distribution while minimizing glare. It recommends that universities adopt daylight-responsive design principles, including optimized window configuration, effective external shading devices, and regular post-occupancy evaluations, to improve students' visual comfort, satisfaction, and the overall quality of architectural learning environments.***

***Keywords: Natural Lighting, Daylighting, Architectural Studio, Students' Satisfaction, Visual Comfort, Southwestern Nigeria.***

## I. INTRODUCTION

Natural lighting is an essential component of building design because it enhances visual comfort, supports occupants' health, and improves the overall quality of indoor environments. Beyond providing illumination, daylight regulates circadian rhythms, improves mood, enhances cognitive performance, and contributes to energy efficiency by reducing dependence on artificial lighting (Blume et al., 2019; Negarestan, 2025). Consequently, daylight-responsive design has become a major consideration in contemporary architecture, particularly in educational buildings where the quality of the learning environment directly influences students' well-being and academic performance (Hajji et al., 2024).

Architectural studios represent one of the most visually demanding learning environments in higher education. Unlike conventional classrooms, they accommodate activities such as drafting, model making, rendering, and digital design, all of which require prolonged visual concentration and accurate colour perception. The quality of natural lighting in these spaces therefore plays an important role in enhancing students' productivity, creativity, and visual comfort (Dahlan and Eissa, 2015). Studies have shown that well-daylit learning environments improve concentration, reduce visual fatigue, and create psychologically stimulating spaces that support effective learning (Cheryan et al., 2019; Ticleanu, 2021). Similarly, exposure to adequate daylight has been associated with improved physical and mental well-being through the regulation of serotonin and melatonin levels, which influence alertness, mood, and cognitive function (Huiberts and Smolders, 2021).

Despite these benefits, achieving effective daylighting in educational buildings remains challenging, particularly in tropical regions where excessive solar radiation, glare, and heat gain often affect indoor environmental quality. Architectural factors such as building orientation, window size, glazing type, shading devices, and room depth significantly influence the quantity and distribution of daylight within interior spaces (Alkhatatbeh et al., 2023). In many Nigerian universities, inadequate daylighting has resulted in continued reliance on artificial lighting during daytime hours, thereby reducing energy efficiency and limiting the visual and psychological benefits associated with natural light (Muhammed and Lateef, 2025; Sholanke et al., 2021).

Although several studies have investigated daylighting performance in educational facilities such as classrooms and hostels, limited attention has been given to architectural studios, particularly within universities in Southwestern Nigeria (Amadi and Ichendu, 2025; Adeleke et al., 2025). More importantly, empirical evidence on architecture students' satisfaction with natural lighting in these studios remains scarce. Understanding both the prevailing daylighting conditions and students' perceptions is essential for improving studio design and creating learning environments that support architectural education.

This study therefore assesses the natural lighting conditions and architecture students' satisfaction with natural lighting in architectural studios of selected universities in Southwestern Nigeria. The findings are expected to provide evidence that will inform the design and improvement of architectural studio buildings, thereby enhancing visual comfort, learning effectiveness, and sustainable educational environments.

## II. LITERATURE REVIEW

Natural lighting, commonly referred to as daylighting, is the controlled admission of sunlight and diffuse skylight into buildings to provide adequate indoor illumination while minimizing dependence on artificial lighting (Gherri, 2013). Beyond its role in illumination, daylight has become an essential component of sustainable building design because it enhances indoor environmental quality, reduces operational energy consumption, and improves occupants' health and productivity (Al Horr et al., 2016; Sadrizadeh et al., 2022). In educational buildings, natural lighting contributes to visual comfort by providing balanced illumination that supports reading, drawing, and other visually demanding tasks. It also promotes physiological and psychological well-being through the regulation of circadian rhythms, improved mood, and reduced visual fatigue, thereby creating healthier learning environments (Blume et al., 2019; Alizadeh Pahlavani, 2024).

Architectural studios differ from conventional classrooms because they accommodate prolonged design activities that require precision, creativity, colour discrimination, model making, and technical drawing. Consequently, the quality of daylight within these spaces has a direct influence on students' learning experience and academic performance. Studies have shown that adequate daylight improves concentration, enhances visual performance, reduces eyestrain, and increases productivity among architecture students (Sadrizadeh et al., 2022). Experimental evidence further indicates that students working in naturally illuminated learning environments achieve better academic outcomes than those relying predominantly on artificial lighting, highlighting the importance of daylight as an environmental resource for studio-based education (Blume et al., 2019). Nevertheless, achieving effective daylighting in architectural studios requires careful integration of architectural design variables such as building orientation, window-to-wall ratio, glazing characteristics, shading devices, room depth, and interior surface reflectance (Rayaz and Rubab, 2013; Volf et al., 2024).

Although Southwest Nigeria receives abundant solar radiation throughout the year, many university buildings do not fully utilize this natural resource because of poor daylight-oriented design. In tropical climates, inadequate building orientation, insufficient window openings, excessive room depth, inappropriate glazing, and poor glare control often result in uneven daylight distribution, excessive heat gain, and heavy dependence on artificial lighting (Muhammed and Lateef, 2025). Appropriate passive design strategies including north–south building orientation, clerestory windows, courtyards, light shelves, external shading devices, and high-reflectance interior finishes have been recommended to improve daylight penetration while minimizing glare and thermal discomfort (Gil-Ozoudeh et al., 2022; Abdurrahman et al., 2024). Such strategies are particularly important for architectural studios where lighting quality directly influences the accuracy of design tasks.

Students' satisfaction with natural lighting represents an important indicator of the effectiveness of indoor environmental quality. Satisfaction extends beyond the quantity of daylight to include its distribution, uniformity, glare control, colour rendering, thermal effects, and suitability for different learning activities. Previous studies have reported that students generally express higher satisfaction in learning environments with adequate daylight because such environments improve comfort, motivation, alertness, and overall learning experience (Sadrizadeh et al., 2022). Conversely, insufficient or poorly distributed daylight contributes to discomfort, increased dependence on artificial lighting, reduced visual performance, and lower productivity (Tyukhova, 2024). Research further suggests that students' perception of daylight quality is influenced by several architectural variables, including window configuration, shading systems, building orientation, occupancy density, and users' ability to control their immediate lighting environment through blinds or operable windows (Tabadkani et al., 2021; Witzmann et al., 2022).

Despite increasing research on daylighting in educational buildings, empirical investigations focusing specifically on architectural studios in Nigerian universities remain limited. Most previous studies have concentrated on classrooms, lecture theatres, offices, and student residences, with relatively few examining the unique lighting requirements of architecture studios where students undertake prolonged visual and creative tasks. Furthermore, limited attention has been given to combining objective assessment of natural lighting conditions with users' satisfaction across different universities in Southwestern Nigeria. This gap underscores the need for the present study, which evaluates natural lighting conditions and assesses architecture students' satisfaction within selected architectural studios, thereby providing evidence for improving studio design and enhancing the quality of architectural learning environments.

## III. METHODOLOGY

### Research Design

The study adopted a descriptive survey research design within a quantitative research approach to assess the natural lighting conditions and architecture students' satisfaction with natural lighting in architectural studios of selected universities in Southwestern Nigeria. The design was considered appropriate because it enabled the systematic collection and analysis of data on the physical characteristics of studio daylighting as well as students' perceptions and satisfaction with the existing lighting conditions. The study combined direct field observations of architectural studios with questionnaire surveys administered to architecture students to provide a comprehensive assessment of natural lighting performance.

### Study Area

The study was conducted in selected universities located in Southwestern Nigeria. The region comprises six states: Oyo, Osun, Ogun, Ondo, Ekiti, and Lagos. Four universities with purpose-built architectural studios were selected for the study, namely Obafemi Awolowo University (OAU), Ile-Ife; Ladoke Akintola University of Technology (LAUTECH), Ogbomoso; University of Ibadan (UI), Ibadan; and Covenant University, Ota. These institutions were selected because they possess purpose-built architectural studios that are regularly used for studio-based teaching and learning activities.

### Population and Sampling Procedure

The study population comprised undergraduate architecture students from 200 to 500 levels in the selected universities, representing students who regularly utilize the architectural studios for design-related activities. The total population was 1,560 students across the four universities. Using the Slovin formula at a 95% confidence level and 5% margin of error, a sample size of 318 respondents was determined, representing 20.3% of the study population.

A multistage sampling technique was adopted. First, universities in Southwestern Nigeria offering architecture programmes were identified, after which institutions with purpose-built architectural studios were selected. Four universities were subsequently chosen based on the availability of purpose-built studios. The sample was proportionately distributed among the selected universities as follows: Obafemi Awolowo University (100 respondents), University of Ibadan (82 respondents), Ladoke Akintola University of Technology (79 respondents), and Covenant University (57 respondents).

Data Collection

Primary data were collected through structured questionnaires, field observations, and physical measurements. The questionnaire was administered to architecture students to obtain information on respondents' socio-economic characteristics, natural lighting conditions within the studios, and their level of satisfaction with daylighting. Responses relating to students' satisfaction were measured using a five-point Likert scale ranging from 1 (Very Dissatisfied) to 5 (Very Satisfied).

Field observations were conducted using an observation checklist to document architectural features influencing daylight performance, including building orientation, window configuration, window size, glazing type, shading devices, and daylighting strategies. Photographs were also taken to support the observations and document the existing studio conditions.

Variables Measured

The study examined two principal variables. The independent variable was natural lighting conditions, assessed using indicators such as the primary source of lighting, daylighting strategy, window configuration, window type, and window size. The dependent variable was students' satisfaction with natural lighting, measured using indicators including visual comfort, adequacy of daylight for studio tasks, reduction of eyestrain, enhancement of productivity, colour perception, and the overall satisfaction with the natural lighting conditions within the studios.

Method of Data Analysis

The data collected were analysed using descriptive statistics. Frequency distributions and percentages were used to summarize respondents' socio-economic characteristics and evaluate the natural lighting conditions of the architectural studios. Students' satisfaction with natural lighting was analysed using mean scores computed from the five-point Likert scale to determine the level of satisfaction with various daylighting attributes. The results were presented using tables and descriptive narratives to facilitate interpretation and discussion of the findings.

## IV. FINDINGS

Respondents' Socio-economic Characteristics

Table 1 presents the socio-economic characteristics of the respondents. The results show that 215 respondents (66.9%) were male, while 103 respondents (33.1%) were female, indicating that the study population was predominantly male, which reflects the demographic composition of architecture programmes in many Nigerian universities.

With respect to age, the majority of respondents were between 15 and 20 years, accounting for 200 respondents (62.9%), followed by those aged 21–25 years with 87 respondents (27.4%). Respondents aged 26–30 years were 20 (6.3%), while 6 respondents (1.9%) were within the 31–35 years age group, and only 5 respondents (1.6%) were 36 years and above. This indicates that the study population was largely composed of young students actively engaged in architectural studio education.

The distribution across academic levels was relatively balanced. 500-level students constituted the largest proportion with 84 respondents (26.4%), followed by 300-level students with 80 respondents (25.2%), while both 200-level and 400-level students each accounted for 77 respondents (24.2%). Similarly, respondents' duration of studio use was evenly distributed, with 70 respondents (22.0%) having used the studio for less than one year, 67 respondents (21.1%) for 4–5 years, 66 respondents (20.8%) for 1–2 years, 58 respondents (18.2%) for five years and above, and 57 respondents (17.9%) for 3–4 years.

© AUG 2026 | IRE Journals | Volume 10 Issue 2 | ISSN: 2456-8880
DOI: https://doi.org/10.64388/IREV10I2-1720230

Regarding studio occupancy, 70 respondents (22.0%) reported using studios accommodating more than 40 occupants, while 65 respondents (20.4%) occupied studios with fewer than 10 occupants. In addition, 62 respondents (19.5%) used studios accommodating 31–40 occupants, 61 respondents (19.2%) used studios with 21–30 occupants, and 60 respondents (18.9%) occupied studios with 10–20 occupants. The relatively balanced distribution across study levels, studio experience, and occupancy categories indicates that the study captured diverse perspectives from students with varying levels of exposure to architectural studio environments, thereby enhancing the representativeness and reliability of the findings.

Table 1: Socio-Economic Characteristics of Users of Architecture Studio in Southwestern Nigeria

| Demographics | Category | Frequency | Percentage (%) |
|---|---|---|---|
| Gender | Male | 215 | 66.9 |
| | Female | 103 | 33.1 |
| Total | | 318 | 100.0 |
| Age Group | 15–20 Years | 200 | 62.9 |
| | 21–25 Years | 87 | 27.4 |
| | 26–30 Years | 20 | 6.3 |
| | 31–35 Years | 6 | 1.9 |
| | 36 Years and Above | 5 | 1.6 |
| | Total | 318 | 100.0 |
| Level of Study | 200 Level | 77 | 24.2 |
| | 300 Level | 80 | 25.2 |
| | 400 Level | 77 | 24.2 |
| | 500 Level | 84 | 26.4 |
| | Total | 318 | 100.0 |
| Duration of Studio Use | Less Than 1 Year | 70 | 22.0 |
| | 1–2 Years | 66 | 20.8 |
| | 3–4 Years | 57 | 17.9 |
| | 4–5 Years | 67 | 21.1 |
| | 5 Years and Above | 58 | 18.2 |
| | Total | 318 | 100.0 |
| Studio Occupancy | Less Than 10 Occupants | 65 | 20.4 |
| | 10–20 Occupants | 60 | 18.9 |
| | 21–30 Occupants | 61 | 19.2 |
| | 31–40 Occupants | 62 | 19.5 |
| | Above 40 Occupants | 70 | 22.0 |
| | Total | 318 | 100.0 |

Source: Authors Field, 2026

Natural Lighting Conditions in Architectural Studios in Southwestern Nigeria

The analysis of natural lighting within the studio environment, as presented in Table 2, reveals a diverse and non-uniform pattern in both lighting strategies and window design parameters. The distribution of responses suggests that studio lighting and daylighting approaches are not standardized, but rather reflect a combination of functional adaptation, available design elements, and contextual constraints specific to each studio.

Regarding the primary source of lighting, artificial lighting recorded the highest proportion at 39.3%, indicating a strong reliance on electrically powered illumination within studio spaces. Natural lighting was reported by 30.8% of respondents, while 29.9% indicated the use of a combination of both natural and artificial lighting. The relatively even distribution among these categories suggests that most studios operate with a hybrid lighting system, rather than relying solely on one source. This pattern implies that natural daylight alone may not be sufficient to meet the visual demands of studio activities, necessitating artificial lighting to maintain consistent illumination, particularly during low daylight periods or extended working hours.

When examining natural lighting strategies, responses show a near-even spread among the options. Courtyards account for 34.9%, windows for 33.7%, and other daylighting methods for 31.5%. The minimal variation among these values suggests the absence of a dominant daylighting strategy. Instead, studios employ a heterogeneous mix of approaches, likely influenced by differences in building layout, spatial organization, or architectural intent. Some studios may rely on internal courtyards for light penetration, while others use façade openings or alternative daylighting methods, reflecting diverse design solutions rather than uniform standards.

For studios that primarily utilize windows as a daylighting element, 51.3% of respondents reported single-sided openings, compared to 48.7% for cross-ventilation configurations. Though, the difference is small, the higher prevalence of single-sided openings may indicate that some studios have limited airflow pathways. This has implications beyond lighting, as restricted ventilation can affect thermal comfort and indoor air quality, impacting students' overall satisfaction with the studio environment.

The analysis of window materials reinforces the notion of diversity over standardization. Sliding windows (21.1%) and louvre windows (20.8%) are slightly more common than projected windows (20.1%), other types (19.2%), and casement windows (18.9%). The narrow range of percentages indicates that no single window type dominates, suggesting that selection is influenced by practical considerations such as cost, maintenance, durability, and local availability, rather than strictly by optimized daylighting or ventilation performance.

Similarly, the distribution of window sizes indicates a lack of uniform design standards. The most common size, 1.2 m × 1.8 m, was reported by 22.9% of respondents, followed closely by 1.2 m × 1.5 m (20.4%) and 1.2 m × 2 m (19.5%). Smaller sizes, such as 1.2 m × 1.2 m (18.2%) and other variations (18.9%), were also well represented. This clustering of values suggests that window sizing is adapted to suit individual spatial configurations, structural constraints, or design preferences, rather than following a consistent architectural guideline.

The evidence from Table 4.2 demonstrates a high degree of variability in both lighting sources and physical window characteristics across the studied studios. The lack of a dominant approach whether in lighting type, daylighting strategy, window configuration, material, or size indicates that studio environments are shaped by a range of contextual and pragmatic factors rather than a unified design framework.

This variability has significant implications for daylight performance and indoor environmental quality. Inconsistent design approaches can lead to uneven lighting conditions, differences in visual comfort, and varied user experiences across studio spaces. Students working in studios with inadequate or poorly distributed daylight may experience visual strain or discomfort, while others may benefit from more optimal lighting conditions. Consequently, these findings highlight the need for more standardized, performance-driven design strategies that optimize natural lighting, improve visual comfort, and ensure a consistent and supportive environment for all users of architectural studios.

Implications of Findings

The findings imply that the absence of standardized daylighting approaches in architectural studios may create inconsistent visual conditions, resulting in varying levels of visual comfort and satisfaction among students. Studies have shown that visual comfort is influenced not only by the amount of light available but also by the uniformity of light distribution and glare control within learning environments (Mohammed, 2026). Uneven daylight distribution may therefore contribute to visual discomfort, eye strain, reduced concentration, and lower learning efficiency among students.

© AUG 2026 | IRE Journals | Volume 10 Issue 2 | ISSN: 2456-8880
DOI: https://doi.org/10.64388/IREV10I2-1720230

The considerable dependence on artificial lighting further suggests potential increases in energy consumption and operational costs, indicating that existing natural lighting strategies may not be adequately optimized. According to Günaydın and Akdemir (2023), educational buildings with poor daylight integration often rely excessively on artificial lighting systems, thereby reducing energy efficiency and limiting the sustainability benefits associated with natural lighting.

The findings also imply that window configurations and physical characteristics significantly influence the effectiveness of daylight performance in studio environments. Mohammed (2026) found that architectural studios with poor opening arrangements experienced uneven illuminance levels, whereas improved window placement and high-level openings significantly enhanced daylight penetration and visual comfort.

Overall, the findings suggest a need for evidence-based and performance-driven daylighting strategies in architectural studio design to ensure adequate lighting distribution, improve users' visual comfort, reduce energy dependence, and create more supportive learning environments (Mohammed, 2026).

Table 2: Natural Lighting Conditions in Architectural Studios in Southwestern Nigeria

| Variables | Category | Frequency | Percentage (%) |
|---|---|---|---|
| Source of Lighting | Natural lighting | 98 | 30.8 |
| | Artificial lighting | 125 | 39.3 |
| | All of the above | 95 | 29.9 |
| Nature of Sources of Lighting | Window | 107 | 33.7 |
| | Courtyard | 111 | 34.9 |
| | Open space | 100 | 31.5 |
| Type of Ventilation | Cross ventilation | 155 | 48.7 |
| | Single opening | 163 | 51.3 |
| Window Material | Louvres | 66 | 20.7 |
| | Sliding window | 67 | 21.3 |
| | Casement | 60 | 20.8 |
| | Projected window | 64 | 21.1 |
| | Others | 61 | 18.9 |
| Window Size | 1.2 m × 1.2 m | 58 | 20.1 |
| | 1.2 m × 1.5 m | 65 | 19.2 |
| | 1.2 m × 1.8 m | 73 | 18.2 |
| | 1.2 m × 2.0 m | 62 | 20.4 |
| | Others | 60 | 23.0 |

Source: Author’s Field Survey, 2026

Natural Lighting Performance in Architectural Studios

The assessment of natural lighting performance in the architectural studios, as presented in Table 3, reveals a pattern of moderate and somewhat inconsistent user satisfaction across the evaluated variables. A general observation from the table shows that the Mean Weighted Values (MWV) for all the variables are closely clustered around the midpoint of the Likert scale, ranging between 2.9 and 3.1. This suggests that respondents neither strongly agreed nor strongly disagreed with the conditions of daylighting within the studios. Overall, the lighting conditions can therefore be described as functional but not fully optimized.

© AUG 2026 | IRE Journals | Volume 10 Issue 2 | ISSN: 2456-8880
DOI: https://doi.org/10.64388/IREV10I2-1720230

A closer examination of the response distribution reveals mixed opinions among respondents. Across most variables, the number of respondents selecting “Agree” and “Strongly Agree” is only slightly higher than, or nearly equal to, those selecting “Disagree” and “Strongly Disagree.” This balanced pattern indicates that students’ experiences with natural lighting are not consistent. While some users perceive the lighting conditions positively, others experience dissatisfaction, suggesting variations in daylight performance across different studio spaces.

Regarding daylight availability, the statement “The studio receives adequate natural lighting most of the day” recorded an MWV of 3.0. This indicates a moderate perception of daylight adequacy. However, the presence of noticeable neutral and negative responses suggests that daylight availability is not experienced uniformly by all users. Variations in daylight conditions may be influenced by factors such as weather conditions, time of day, and users’ locations within the studio space.

Similarly, window positioning recorded an MWV of 3.0, with responses distributed relatively evenly across the categories. This suggests that although windows contribute to daylight penetration, their placement may not be adequately optimized to ensure uniform light distribution throughout the studio environment. Consequently, some users may benefit from greater daylight access while others may occupy relatively poorly illuminated areas.

The orientation of the studio recorded a slightly higher MWV of 3.1, indicating a moderately positive contribution to daylight performance. This suggests that building orientation plays a role in enhancing access to natural light. However, the relatively small difference in MWV implies that orientation alone may not significantly improve daylight performance without support from additional design factors.

Window materials recorded an MWV of 2.9, making it one of the weaker aspects of daylight performance within the studios. The response pattern leans slightly toward dissatisfaction, implying that glazing materials or their conditions may reduce effective daylight penetration. Factors such as tinted glazing, poor maintenance conditions, or material deterioration may contribute to reduced light transmission.

Window size and height recorded one of the highest MWVs of 3.1, indicating that respondents generally perceived the dimensions of the windows as relatively adequate. However, this positive perception does not appear to translate directly into improved lighting performance, suggesting that additional design elements may influence overall daylight effectiveness. Similarly, shading devices recorded an MWV of 2.9, with responses relatively divided across the categories. This suggests that although shading elements are present within the studios, they may not effectively control excessive sunlight penetration or minimize glare-related issues.

The uniformity of light distribution across workspaces recorded an MWV of 3.0, indicating a neutral perception among respondents. This suggests that while daylight reaches most areas within the studios, the distribution may not be evenly balanced. Consequently, some workspaces may experience excessive brightness while others receive insufficient lighting, potentially affecting visual comfort and task performance.

Interior surface characteristics such as colour and reflectance recorded a relatively higher MWV of 3.1. This indicates that interior finishes contribute positively to perceived brightness through the reflection of available daylight within the space. However, their role appears to be supplementary rather than sufficient to address overall daylighting limitations.

Despite these moderately positive observations, glare control emerged as a major concern. The statement regarding freedom from extreme glare recorded an MWV of 2.9, with a substantial number of respondents expressing dissatisfaction. This indicates that excessive brightness and unwanted reflections remain common challenges that may negatively affect visual comfort and productivity.

Furthermore, the relationship between natural ventilation and daylighting comfort recorded an MWV of 2.9, suggesting limited integration between these environmental factors. While some users experience satisfactory conditions, others do not, indicating inconsistencies in how daylighting and ventilation function together within the studio environment.

The findings from Table 4.3 indicate that natural lighting performance within the architectural studios can be described as adequate but inconsistent and not fully optimized. Although factors such as building orientation, window dimensions, and interior finishes contribute positively to daylight performance, limitations associated with window materials, glare control, and uneven light distribution reduce overall effectiveness. The balanced distribution of responses further suggests that users' experiences differ significantly depending on specific conditions within individual studio spaces.

Implication of study

The findings imply that although the studios provide a basic level of natural lighting for general activities, inconsistencies in daylight performance may adversely affect students' visual comfort, concentration, and productivity. Research in Nigerian educational environments has shown that inadequate and uneven daylight distribution creates discomfort and reduces users' satisfaction with indoor learning spaces (Ayoosu et al., 2020). Poorly distributed lighting conditions across different areas of studio spaces may therefore result in unequal learning experiences among students.

The findings further suggest that issues relating to glare, material performance, and uneven light distribution may increase visual discomfort and dependence on artificial lighting systems. According to Samuel (2025), visual comfort in day-lit environments is strongly influenced by physiological and psychological factors associated with lighting conditions, and poor visual environments may affect users' well-being and performance.

The results also emphasize the need for an integrated and performance-driven daylighting approach in studio design. Studies conducted in Nigerian educational facilities indicate that optimized daylight strategies, including effective window placement, shading systems, and controlled daylight penetration, improve indoor environmental quality, users' comfort, and energy efficiency (Akande and Yusuf, 2025; Olagunju and Babamboni, 2026).

Table 3: Users' Response to Natural Lighting Performance in Architectural Studios in Southwest Nigeria

| S/N | Statement | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree | Total (N) | TMV | MWV | AMV |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | The studio receives adequate natural lighting most of the day. | 55 | 69 | 72 | 60 | 62 | 318 | 959 | 3.0 | 191.8 |
| 2 | Windows are well-positioned to allow sufficient daylight penetration. | 63 | 70 | 52 | 63 | 70 | 318 | 961 | 3.0 | 192.2 |
| 3 | The orientation of the studio enhances natural light access. | 66 | 58 | 57 | 66 | 71 | 318 | 972 | 3.1 | 194.4 |
| 4 | The materials used on windows support effective daylight transmission. | 68 | 76 | 55 | 58 | 61 | 318 | 922 | 2.9 | 184.4 |
| 5 | The window size and height are appropriate for balanced daylight distribution. | 58 | 62 | 55 | 80 | 63 | 318 | 982 | 3.1 | 196.4 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 6 | Shading devices effectively control direct sunlight and glare. | 69 | 49 | 71 | 74 | 55 | 318 | 951 | 3.0 | 190.2 |
| 7 | There is uniform light distribution across all work areas in the studio. | 58 | 68 | 69 | 62 | 61 | 318 | 954 | 3 | 190.8 |
| 8 | The colour and surface reflectance enhance brightness in the studio. | 61 | 52 | 67 | 78 | 60 | 318 | 978 | 3.1 | 195.6 |
| 9 | The studio is free from extreme glare or unwanted reflections. | 60 | 72 | 69 | 65 | 52 | 318 | 931 | 2.9 | 186.2 |
| 10 | Natural ventilation complements daylighting to improve comfort. | 70 | 53 | 68 | 64 | 63 | 318 | 951 | 3.0 | 190.2 |

Source: Author's Field Survey, 2026

## V. CONCLUSION

This study assessed the natural lighting conditions and architecture students' satisfaction with daylighting in architectural studios of selected universities in Southwestern Nigeria. The findings indicate that while natural lighting is available in most studios, its quality and distribution vary considerably, resulting in moderate levels of student satisfaction. The study demonstrates that effective daylighting depends not only on the availability of sunlight but also on appropriate architectural design features such as building orientation, window configuration, and glare control. Improving these design elements will enhance visual comfort, support learning activities, and reduce dependence on artificial lighting in architectural studios.

## VI. RECOMMENDATIONS

Universities should prioritize daylight-responsive design in the planning, renovation, and management of architectural studios by optimizing building orientation, window design, and shading systems to improve daylight distribution and visual comfort. Regular post-occupancy evaluations that combine daylight performance measurements with students' feedback are also recommended to ensure that studio environments continue to support effective teaching, learning, and sustainable building performance.

## REFERENCES

[1] Abdurrahman, A. B., Aminu, S., Iya, A. M., Marafa, A. A., Yahaya, I., and Ayoosu, M. I. (2024). Window glazing for efficient daylighting and energy saving in tropical climate. International Journal of Research Publication and Reviews, 5(5), 2704– 2711.

[2] Adejumo, A. A., and Ogunbodede, E. F. (2022). Assessment of indoor environmental quality and visual comfort in educational buildings in Nigeria. Journal of Environmental Design and Management, 14(2), 45–57.

[3] Adeleke, J. S., Adetona, A. O., Olanipekun, E. A., and Abdulrazak, A. T. (2025). Effect of Bioclimatic Features on the Performance of Daylight in Selected Private Hostel Buildings in Obafemi Awolowo University Ile-Ife, Nigeria. International Journal of Builders in Academia, 1(1).

[4] Alizadeh Pahlavani, H. (2024). Possible role of exercise therapy on depression: Effector neurotransmitters as key players. Behavioural Brain Research, 459, 114791. https://doi.org/10.1016/j.bbr.2023.114791

[5] Al-Tamimi, N., and Qahtan, A. M. (2016). Influence of glazing types on the indoor thermal performance of tropical high-rise residential buildings. Key Engineering Materials, 692, 27–37.

https://doi.org/10.4028/www.scientific.net/KEM.692.27

[6] Al Horr, Y., Arif, M., Kaushik, A., Mazroei, A., Katafygiotou, M., and Elsarrag, E. (2016). Occupant productivity and office indoor environment quality: A review of the literature. Building and Environment, 105, 369–389. https://doi.org/10.1016/j.buildenv.2016.06.001

[7] Alkhatatbeh, B. J., Kurdi, Y., and Asadi, S. (2023). Multi-objective optimization of classrooms' daylight performance and energy use in US Climate Zones. Energy and Buildings, 297, 113468.

[8] Aluko, O. O., Ale, T. A., and Yunus, O. J. (2022). Dynamics of windows for effective daylighting design strategies in academic library. Tropical Journal of the Built Environment,3(2),26–36.

[9] Al Horr, Y., Arif, M., Kaushik, A., Mazroei, A., Katafygiotou, M., and Elsarrag, E. (2020). Occupant productivity and office indoor environment quality: A review of the effects of indoor environmental parameters on occupants. Building and Environment, 105, 369–389. https://doi.org/10.1016/j.buildenv.2016.06.001

[10] Akande, O., and Yusuf, A. (2025). Optimisation of daylighting strategies in educational learning environments in Nigeria: A case for university library design. International Conference Synergy of Architecture and Civil Engineering (SINARG), 4(1), 1383– 1395.

[11] Amadi, D. E., and Ichendu, C. (2025). Evaluation of Natural Daylight and Indoor Temperature Levels in Drawing Studios at Captain Elechi Amadi Polytechnic, Rumuola, Port Harcourt. Studies in Art and Architecture, 4(3), 8-18.

[12] Aram, F., Higueras García, E., Solgi, E., and Mansournia, S. (2019). Urban green space cooling effect in cities. Heliyon, 5(4), e01339. https://doi.org/10.1016/j.heliyon.2019.e01339

[13] Atamewan, E. E. (2022). Appraisal of day-lighting in sustainable housing development in developing countries. Journal of Studies in Science and Engineering, 2(2), 59–75. https://doi.org/10.53898/josse2022225

[14] Ayoosu, M. I., Lim, Y.-W., and Leng, P. C. (2020). Daylighting performance assessment of side- lit university lecture theatres in the hot-humid climate of Makurdi in Nigeria. International Journal of Recent Technology and Engineering, 8(5). https://doi.org/10.35940/ijrte.E6793.018520

[15] Babota, F., Manea, D., Aciu, C., Iernutan, R., and Pleșa, L. M. (2013). Shading the way for solar control and reduction of heat gain in buildings. In C60 International Conference: Tradition and Innovation – 60 Years of Constructions in Transilvania.

[16] Blume, C., Garbazza, C., and Spitschan, M. (2019). Effects of light on human circadian rhythms, sleep and mood. Somnologie, 23(3), 147–156.

[17] Cheryan, S., Ziegler, S. A., Plaut, V. C., and Meltzoff, A. N. (2014). Designing classrooms to maximize student achievement. Policy Insights from the Behavioral and Brain Sciences,1(1),4–12.https://doi.org/10.1177/2372732214548677

[18] Dogan, T., and Park, Y. C. (2018). A critical review of daylighting metrics for residential architecture and a new metric for cold and temperate climates. Lighting Research and Technology, 51(2), 239–262. https://doi.org/10.1177/1477153518755561

[19] Dubois, M.-C., and Blomsterberg, Å. (2011). Energy saving potential and strategies for electric lighting in future North European, low energy office buildings: A literature review. Energy and Buildings, 43(10), 2572–2582. https://doi.org/10.1016/j.enbuild.2011.07.001

[20] Folarin, A. M., Uwakonye, O. O., Odeajo, O. A., and Olaoye, G. O. (2025). Impact of natural lighting in classrooms on the mental health of students of selected secondary schools in Ikorodu. IRE Journals, 8(12), 718–724. https://irejournals.com/paper-details/1709084

[21] Gherri, B. (2013). Daylighting strategies: Building's sustainability and energy efficiency.

Journal of Civil Engineering and Architecture, 7(7), 805–811.

[22] Gil-Ozoudeh, I., Iwuanyanwu, O., Okwandu, A., and Ike, C. S. (2022). The role of passive design strategies in enhancing energy efficiency in green buildings. Engineering Science and Technology Journal, 3(2), 71–91. https://doi.org/10.51594/estj.v3i2.1519

[23] Günaydın, T. I., and Akdemir, A. (2023). Analysis of lighting in educational buildings. EJONS International Journal on Mathematics, Engineering and Natural Sciences.

[24] Hamedani, Z., Solgi, E., Hine, T., Skates, H., Isoardi, G., and Fernando, R. (2019). Lighting for work: A study of the relationships among discomfort glare, physiological responses and visual performance. Building and Environment, 165, 106478. https://doi.org/10.1016/j.buildenv.2019.106478

[25] Hajji, A. M., Satria, S. Y., and Alfianto, I. (2024). The analysis of natural lighting-based visual comfort for classrooms building by using Velux Daylight Visualizer. E3S Web of Conferences.

[26] Huiberts, L. M., and Smolders, K. C. H. J. (2021). Effects of vitamin D on mood and sleep in the healthy population: Interpretations from the serotonergic pathway. Sleep Medicine Reviews, 55, 101379. https://doi.org/10.1016/j.smrv.2020.101379

[27] Jamilu, G., Abdou, A., and Asif, M. (2024). Dynamic facades for sustainable buildings: A review of classification, applications, prospects and challenges. Energy Reports, 11, 5999–6014.https://doi.org/10.1016/j.egyr.2024.05.197

[28] Kansal, R., and Bassi, P. (2023). Adapting design of learning spaces for Education 4.0: A case of architectural institutions in India. Journal of e-Learning and Knowledge Society, 19(3),119–130.https://doi.org/10.20368/1971-8829/1323

[29] Kim, J. T., and Kim, G. (2010). Advanced external shading device to maximize visual and view performance. Indoor and Built Environment, 19(1), 65–72. https://doi.org/10.1177/1420326X09358001

[30] Konstantzos, I., Sadeghi, S. A., Kim, M. Y., Xiong, J., and Tzempelikos, A. (2020). The effect of lighting environment on task performance in buildings. A review. Energy and Buildings, 226, 110394. https://doi.org/10.1016/j.enbuild.2020.110394

[31] Kruisselbrink, T., Dangol, R., and Rosemann, A. L. P. (2018). Photometric measurements of lighting quality: An overview. Building and Environment, 138, 42–52. https://doi.org/10.1016/j.buildenv.2018.04.028

[32] Leo Samuel, D. G., Kumar, D., Nagendra, S. M., and Maiya, M. P. (2017). Thermal comfort in traditional buildings composed of local and modern construction materials. International Journal of Sustainable Built Environment, 6(2), 463–475. https://doi.org/10.1016/j.ijsbe.2017.08.001

[33] Mohammed, M. A. (2026). Harnessing daylight strategies for maximizing visual comfort in architectural design studios. Frontiers in Built Environment, 11, 1741763. https://doi.org/10.3389/fbuil.2025.1741763

[34] Müeller, H. F. O. (2013). Daylighting. In S. A. M. Said (Ed.), Sustainability, energy and architecture: Case studies in realizing green buildings (pp. 227–255). Academic Press. https://doi.org/10.1016/B978-0-12-397269-9.00009-8

[35] Muhammed, I., and Lateef, J. (2025). Performance evaluation of natural lighting in university student residence in Nigeria. Journal of Architecture and Design Studies, 1, 16–26.

[36] Negarestan, A. (2025). Natural light in interior architecture: Enhancing mental health. Management Strategies and Engineering Sciences, 7(3), 66–76. https://doi.org/10.61838/msesj.7.3.7

[37] Nnaemeka-Okeke, R., Okeke, F. O., Okwuosa, C. C., and Sam-Amobi, C. (2019,). Bioclimatic design strategies for residential buildings in warm humid tropical climate of Enugu, Nigeria. International Journal of Strategic Research in Education, Technology and Humanities, 6(2), 40–53. International Policy Brief.

[38] Olagunju, T. F., and Babamboni, A. S. (2026). Evaluation of sustainable daylighting strategies for sensory-inclusive learning environments for

visually impaired pupils in Lagos secondary schools. International Journal of Spectrum Research in Environmental and Energy Studies.

[39] Ornam, K., Wonorahardjo, S., and Triyadi, S. (2024). Several façade types for mitigating urban heat island intensity. Building and Environment, 248, 111031. https://doi.org/10.1016/j.buildenv.2023.111031

[40] Pellegrino, A., Cammarano, S., Verso, V. R. M. L., and Corrado, V. (2022). Impact of daylighting and shading systems on visual comfort and occupants' behaviour in educational buildings. Building and Environment, 223, 109449. https://doi.org/10.1016/j.buildenv.2022.109449

[41] Rayaz, S., and Rubab, S. (2013). Review of advanced daylighting systems. Materials Science Forum, 760, 79–84. https://doi.org/10.4028/www.scientific.net/MSF.760.79

[42] Reinhart, C. F., Mardaljevic, J., and Rogers, Z. (2006). Dynamic daylight performance metrics for sustainable building design. LEUKOS, 3(1–4), 7–31. https://doi.org/10.1582/LEUKOS.2006.03.01.001

[43] Rizkika, S., Husna, S. K., Ardiyansah, W. S., and Saputra, M. R. (2024). Evaluation of lighting performance and daylight factor of student working space with case study in the University of Kitakyushu building. IOP Conference Series: Earth and Environmental Science, 1404(1), 012008.

[44] Samuel, P. (2025). Identification of subjective variables for predicting visual comfort for computer users in day-lit offices in semi-arid climate of Nigeria. Journal of African Advancement and Sustainability Studies, 7(2). https://doi.org/10.70382/sjaass.v7i2.016

[45] Sadrizadeh, S., Afshari, A., Karimipanah, T., and Nielsen, P. V. (2022). The impact of classroom indoor environmental quality on students' performance: A systematic review. Building and Environment, 207, 108532. https://doi.org/10.1016/j.buildenv.2021.108532

[46] Sharp, F., Lindsey, D., Dols, J., and Coker, J. (2014). The use and environmental impact of daylighting. Journal of Cleaner Production, 85, 462–471. https://doi.org/10.1016/j.jclepro.2014.03.092

[47] Shivani, S. S., Swathi, S., and Gowda, N. N. (2024). The Impact of Sunlight in Human Productivity and Well-Being in Residential Area. International Journal of Trends in Emerging Research and Development, 2(6,), 122–127. https://researchtrendsjournal.com

[48] Sholanke, A. B., Fadesere, O., and Elendu, D. (2021). The role of artificial lighting in architectural design: A literature review. IOP Conference Series: Earth and Environmental Science, 665(1), 012008.

[49] Sun, Y., Gou, Z., and Lau, S. S. Y. (2021). A study on factors simultaneously affecting visual comfort in classrooms: A structural equation modelling approach. Energy and Buildings, 249, 111232. https://doi.org/10.1016/j.enbuild.2021.111232

[50] Syed Husin, S. N. F., and Harith, Z. (2012). The performance of daylight through various windows for residential buildings. Asian Journal of Environment-Behaviour Studies, 3(6),85–96.

[51] Tabadkani, A., Roetzel, A., Li, H. X., and Tsangrassoulis, A. (2021). Daylight in buildings and visual comfort evaluation: The advantages and limitations. Journal of Daylighting, 8(2), 181–203.

[52] Tahsildoost, M., and Zomorodian, Z. S. (2020). Indoor environment quality assessment in classrooms: An integrated approach toward environmental comfort. Journal of Building Engineering, 32, 101736. https://doi.org/10.1016/j.jobe.2020.101736

[53] Ticleanu, C. (2021). Impacts of home lighting on human health. Lighting Research and Technology,53(5),425–442.

[54] Tyukhova, Y. (2024). Discomfort glare in outdoor environments after dark – A review of methods, measures, and models. Building and Environment, 263, 111850.

[55] Valladares-Rendón, L. G., Schmid, G., and Lo, S.-L. (2017). Review on energy savings by

solar control techniques and optimal building orientation for the strategic placement of façade shading systems. Energy and Buildings, 140, 458–479. https://doi.org/10.1016/j.enbuild.2016.12.073

[56] Volf, C., Petersen, P. M., Thorseth, A., Vestergaard, S., and Martiny, K. (2024). Daylight quality: High-transmittance glass versus low-transmittance glass—Effects on daylight quality, health, comfort and energy consumption. Annals of Medicine, 56(1), 2297273. https://doi.org/10.1080/07853890.2023.2297273

[57] Wang, N., and Boubekri, M. (2021). Investigation of the relationship between environmental control and occupants' comfort perception in educational buildings. Building Research and Information, 49(7), 741–756.

[58] Xue, P., Mak, C. M., and Cheung, H. D. (2022). The effects of daylighting and visual comfort in educational environments: A review. Building and Environment, 223, 109460. https://doi.org/10.1016/j.buildenv.2022.109460

[59] Witzmann, A., Gordon, C. K., Howarth, J., Unsworth, S., Rossi, A., Hardy, J., Price, M. B., and Davis, N. (2022). Luminescent light diffuser for diffuse lighting applications. Luminescence,38(1),1–10.https://doi.org/10.1002/bio.4416

[60] Zhao, Q., Wentz, E., and Murray, A. T. (2017). Tree shade coverage optimization in an urban residential environment. Building and Environment, 115, 269–280. https://doi.org/10.1016/j.buildenv.2017.01.036