OPEN ACCESS

JOURNAL OF ARCHITECTURAL RESEARCH AND DESIGN STUDIES
Vol. 10, No. 2, 2026, pp 215-224
p-ISSN 2580-1252; *e*-ISSN 2580-1260
DOI: 10.20885/jars.vol10.iss2.art3

Students' Preferences and Satisfaction in Activity Centres for Nigeria's Hot-Dry Climate

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Article History:

Submitted: September 29, 2025
Revised: December 16, 2025
Accepted: January 18, 2026
Published: August 10, 2026

Abstract

Student Activity Centres (SACs) are vital for holistic student development, providing platforms for social interaction, intellectual exchange, and recreation. In the hot-dry climate of Nigeria, the architectural design of these centres must respond to bioclimatic challenges while meeting evolving user expectations. This study, therefore, investigates the architectural factors that enhance user satisfaction within SACs in this specific climatic context, guided by two research questions: What are the key architectural factors influencing satisfaction, and what preferences do users assign to them? A mixed-methods approach was employed, utilizing structured questionnaires, visual surveys, and focus group interviews across two case studies at Ahmadu Bello University, Zaria. Data from 194 respondents were analysed using descriptive statistics, mean scores (M), and the Relative Importance Index (RII). The results delineate six critical factor categories: Spatial Organization, Service Quality, Maintenance Mechanism, Morphological Configuration, Social Factors, and Physical Environment. A significant finding was a pronounced sense of exclusion among female users (59.8% felt activities did not favour their gender, vs. 16.7% among males). User preferences strongly favoured the incorporation of outdoor social spaces and modern amenities like movie theatres and advanced gaming facilities. The study concludes that in Nigeria's hot-dry climate, a user-centric and climatically-responsive design approach, which prioritizes the identified factors, integrates passive cooling strategies, and addresses gender inequity, is paramount for enhancing satisfaction and ensuring the relevance and sustainability of SACs.

Keywords: *Bioclimatic Design; Hot-Dry Climate; POE; Student Activity Centre; User Satisfaction*

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Introduction

The role of tertiary institutions has expanded beyond academic instruction to encompass the holistic development of students (Datnow et al., 2022; Conefrey, 2018). Central to this mission are Student Activity Centres (SACs), which serve as hubs for socialisation, intellectual exchange, and extracurricular engagement (Redmond, 2020). In Nigeria, however, many existing SACs are underutilized, often perceived as inadequate and failing to meet the evolving needs of a diverse student body (Yusuf & Ibrahim, 2024; Nasirdeen et al., 2018). This is compounded by the challenges of the hot, dry climate, which demands specific bioclimatic design strategies to ensure indoor comfort without excessive energy consumption (Bera et al., 2024; Simeon & Alibaba, 2017; Akadiri, 2016).

The concept of user satisfaction is a critical metric in post-occupancy evaluation (POE), bridging the gap between design intent and actual building performance (Hassanain et al., 2024; Zhao et al., 2024). In architectural terms, satisfaction is derived from how well a building's design supports and enhances its occupants' goals and activities (Akinluyi, 2012). While previous research has explored satisfaction with student housing (Hassanain et al., 2024; Gong & Söderberg, 2024; Dunfu, 2015), there is a paucity of studies focusing specifically on SACs in Nigeria's unique socio-cultural and climatic context. Recent work by Kumar & Khan (2024) and Mbubi (2023) on communal spaces underscores the growing academic interest in this typology, yet a dedicated framework for SACs in hot-dry climates remains lacking.

This study aims to address this gap by answering two research questions:

1. What are the architectural factors that enhance user satisfaction within SACs in the hot dry climate of Nigeria?
2. What preferences do users assign to these factors?

By identifying and hierarchically structuring these factors, this research provides an evidence-based guide for architects, university administrators, and policymakers to design and retrofit SACs that are not only climatically responsive but also genuinely user-centric, fostering inclusive patronage and enhancing the overall student experience.

Literature Review

Frameworks for Satisfaction in Educational Facilities

1. The Concept of User Satisfaction in Architecture

In architecture, user satisfaction is a measure of the positive experience occupants have when a facility meets or exceeds their expectations, needs, and desires (Hassanain et al., 2024; Dunfu, 2015). It is a fundamental determinant of a building's success, influencing patronage, retention, and the overall well-being of its users. The disparity between predicted and actual building performance, often called the "performance gap," underscores the need to incorporate user feedback through POE (Zhao et al., 2024).

2. Architectural Determinants of Satisfaction

User satisfaction in buildings is not merely a subjective reaction but is theoretically anchored in the concept of *person-environment fit* (Akinluyi, 2012). This study's framework consolidates determinants into six categories (Table 1), each with a theoretical basis influencing satisfaction:

- **Physical Environment:** Rooted in environmental psychology, this category addresses how ambient conditions (thermal, visual, acoustic) and aesthetics directly affect cognitive performance, mood, and well-being (Abbas & Ghazali, 2011). In a hot-dry climate, thermal comfort becomes a primary driver, where satisfaction is achieved when the built environment mitigates climatic stress.
- **Social Factors:** Based on theories of territoriality and proxemics, these factors influence satisfaction by mediating social interaction, privacy, and a sense of safety, which are essential for communal facilities (Dunfu, 2015; Maina, 2017).

- **Service Quality & Maintenance Mechanism:** Derived from facility management theory, these are *hygiene factors* (Nimako, 2013). Their absence causes dissatisfaction, but their presence alone is not sufficient for high satisfaction; they form the essential operational baseline.
- **Morphological Configuration & Spatial Organization:** These relate to architectural theory concerning legibility, wayfinding, and functional efficiency. A building's form and spatial logic affect navigability, social encounters, and integration with campus life, thereby influencing patronage and satisfaction (Roizen & Davis, 2013; Kumar & Khan, 2024).

Table 1. Architectural Factors Enhancing User Satisfaction

Factor Category	Description	Key Sources
1. Physical Environment	The immediate built and natural surroundings, including aesthetics, greenery, amenities, and ambient conditions (light, noise, temperature).	Hassanain et al. (2024); Abbas & Ghazali (2011); Najib et al. (2011); Hussain et al. (2012)
2. Social Factors	Elements that foster community and interaction, including privacy, reduction of overcrowding, and mitigation of social vices.	Dunfu (2015); Maina (2017)
3. Service Quality	The provision, adequacy, and reliability of core and auxiliary services (e.g., electricity, water, security, internet, commercial services).	Nimako (2013); Dunfu (2015)
4. Maintenance Mechanism	The systems in place to preserve the facility and its services, preventing dilapidation and ensuring operational functionality.	Joachim & Olachi (2010); Kantiok (2017)
5. Morphological Configuration	The overall building form, aesthetic appeal, architectural style, and cultural expression.	Roizen & Davis (2013); Martins (2012)
6. Spatial Organization	The functional relationship between spaces, zoning, circulation, and proximity to key campus areas (hostels, academic blocks).	Kumar & Khan (2024); Mbubi (2023)

Source: Author, 2025

3. Bioclimatic Design and Energy Behaviour

In hot dry climates, architectural design must prioritize passive cooling, natural ventilation, solar shading, and appropriate material selection to achieve thermal comfort. The theoretical link between climate, design, and satisfaction is central to bioclimatic architecture. In hot-dry climates, the *comfort zone*, a range of temperature, humidity, and air velocity where occupants feel thermally neutral, is frequently exceeded (Toroxel & Silva, 2024; Givoni, 1992). Satisfaction, in this context, is theoretically defined as the outcome of a design that successfully maintains indoor conditions within or near this zone through passive means, thereby reducing physiological stress and energy dependency. Key strategies include:

- **Solar Shading & Orientation:** To minimize heat gain.
- **Natural Ventilation:** To promote cooling through air movement and night-time purging.
- **Thermal Mass:** To dampen indoor temperature swings.

The effectiveness of these strategies directly impacts the Physical Environment factor. However, a "performance gap" often exists between predicted and actual comfort, influenced by occupant behaviour and control (Azar et al., 2020). Therefore, user satisfaction with the thermal environment is a product of both *objective performance* (e.g., air temperature) and *perceived control* (Xie et al., 2020). This study posits that a SAC that successfully applies these bioclimatic principles will score higher on user satisfaction metrics for ambient conditions. Recent systematic reviews, such as that by Bera et al. (2024), confirm the efficacy and necessity of these strategies in educational buildings. Furthermore, the energy performance of a building is not solely determined by its design but also by occupant behaviour (Azar et al., 2020). Studies show that proactive, pro-environmental behaviour among occupants can significantly reduce energy consumption, highlighting the need for designs that encourage such behaviour (Xie et al., 2020).

Methodology

1. Research Design and Case Studies

This study employed a mixed-methods research design, strategically integrating both quantitative and qualitative approaches. This decision was predicated on the understanding that the research objectives, to comprehensively evaluate user satisfaction and unravel the underlying hierarchies of user preferences, required a methodological framework that could capture both the breadth and depth of user experiences (Evans et al., 2011). A single approach was deemed insufficient to address the complexity of the phenomenon. This study employed a mixed-methods case study approach, combining quantitative and qualitative strategies.

The methodological approach of this study is grounded in the Post-Occupancy Evaluation (POE) framework, which validates user perception as a critical and legitimate measure of building performance (Hassanain et al., 2024; Zhao et al., 2024). POE recognizes that satisfaction is a holistic construct shaped by the interplay of objective building attributes and subjective user experience.

To ensure the findings are not based solely on interviewee opinions, a triangulation strategy was employed:

1. **User Perceptions (Questionnaires):** Provided data on satisfaction levels and factor importance (RII).
2. **Professional Audit (Visual Survey):** Offered an objective assessment of the physical and bioclimatic state of the SACs, verifying or contextualizing user complaints (e.g., poor ventilation).
3. **Qualitative Depth (Focus Groups):** Explained the *reasons* behind the quantitative ratings, uncovering nuanced issues like gender exclusion.

This convergence of data sources strengthens the validity of the conclusions, ensuring that the "results of the article" are derived from a robust, multifaceted investigation that connects reported satisfaction to observable design features and theoretical principles.

Two SACs at Ahmadu Bello University (ABU), Zaria, were selected: the Aliyu Mustapha SAC (Main Campus) and the Kongo Campus SAC. Both are in Nigeria’s hot, dry climatic zone, allowing for an examination of bioclimatic principles and user satisfaction under similar environmental conditions.

2. Data Collection

Primary data was collected through:

I. **Questionnaires:** The sample size for the user survey was determined through a statistical calculation to ensure the findings are representative of the total user population of the Student Activity Centres across both campuses. The calculation was based on the standard formula for estimating a finite population proportion (Chaiyapong, 2012), which is applied when the population size is known. This method was chosen to enhance the precision and generalizability of the findings (Israel, 2013).

   The following parameters were adopted for the calculation:

   - **Confidence Level:** 95%, which corresponds to a Z-score of 1.96. This indicates a 95% probability that the true population parameter lies within the calculated margin of error.
   - **Margin of Error (Precision):** ±10% (0.10). This sets the acceptable range within which the sample estimate is expected to deviate from the true population value.
   - **Population Proportion (p):** 50% (0.50). This conservative estimate is used in the absence of prior knowledge of the actual proportion, as it maximizes the required sample size and ensures robustness.

- **Population Size (N):** 20,000. This is the estimated total student population who are potential users of the activity centres on both campuses.

The formula used for an infinite population is:

$$n=(Z2\cdot p\cdot(1-p))/e2n=(Z2\cdot p\cdot(1-p))/e2$$

Where:

n = required sample size for an infinite population

Z = Z-score (1.96 for 95% confidence)

p = estimated population proportion (0.50)

e = margin of error (0.10)

First, the sample size for an infinite population was calculated:

$$n = (1.96^2 * 0.50 * 0.50) / 0.10^2 = (3.8416 * 0.25) / 0.01 = 96.04$$

This initial calculation yielded a sample size of approximately 97. Since the total population (N) is known and finite (20,000), a finite population correction (FPC) was applied to refine the sample size, providing a more accurate target for a defined user group (Cochran, 1977)

nfinal = n/(1+((n−1)/N))

n_final = n / (1 + ((n - 1) / N)) n_final = 97 / (1 + ((97 - 1) / 20,000)) = 97 / (1 + (96 / 20,000)) = 97 / (1 + 0.0048) = 97 / 1.0048 ≈ 96.54

Therefore, the total target sample size for the study was 194, distributed as 100 from the Main Campus and 94 from the Kongo Campus. This sample size is deemed sufficient to generate statistically significant and generalizable results regarding user satisfaction and preferences within the defined population (Ajay & Micah, 2014; Israel, 2013). The questionnaire used a 5-point Likert scale (1=Strongly Dissatisfied to 5=Strongly Satisfied) to assess satisfaction across the six factor categories.

II. **Visual Survey Checklist:** Conducted by three architecture professionals to objectively assess the physical state and bioclimatic features of each centre.

III. **Focus Group Interviews:** Semi-structured interviews with 20 infrequent users (10 from each campus) to gain deeper insights into reasons for dissatisfaction and unmet needs.

3. Data Analysis

Quantitative data were analyzed using SPSS and Microsoft Excel. Descriptive statistics (frequencies, percentages, means) were calculated. The Relative Importance Index (RII) was used to rank the factors according to user perception, calculated as:

$$RII = \Sigma W / (A * N)$$

Where:

W = weight given to each factor by respondents (1-5),

A = highest weight (5), and

N = total number of respondents.

The RII score was interpreted as follows: 0.76-1.00 (Highly Influential), 0.66-0.75 (Influential), 0.45-0.65 (Low Influence), 0.00-0.44 (Not Influential) (Waziri & Vanduhe, 2013). The Cronbach's alpha for the Likert-scale items was 0.849, indicating high internal reliability.

Results and Discussion

1. Respondent Demographics

The demographic profile of respondents is summarized in Table 2. The sample included a mix of genders, ages, and years of study, providing a representative cross-section of the user population.

Table 2. Demographic Profile of Questionnaire Respondents

Demographic Variable	ABU Main Campus (n=100)	ABU Kongo Campus (n=94)
Gender		
Male	64.0%	38.0%
Female	36.0%	56.0%
Age		
15-24 years	48.0%	87.0%
24-35 years	50.0%	6.0%
Length of Stay		
1-2 years	23.0%	80.0%
4+ years	67.0%	8.0%

Source: Author, 2025

2. Factors Enhancing User Satisfaction: Importance and Ranking

The analysis of user satisfaction levels across the six architectural factors is presented in Table 3. Spatial Organization and Service Quality were the most critical factors for user satisfaction.

Table 3. Ranking of Architectural Factors by Mean Score and RII

Factor Category	Mean Score (M)	Relative Importance Index (RII)	Rank	Degree of Influence
Spatial Organization	3.21	0.642	1	Influential
Service Quality	3.20	0.640	2	Influential
Maintenance Mechanism	3.00	0.600	3	Influential
Morphological Configuration	2.98	0.596	4	Influential
Social Factors	2.91	0.582	5	Influential
Physical Environment	2.76	0.552	6	Low Influence

Source: Author, 2025

Interpretation: The RII ranking indicates that designers should prioritize **Spatial Organization** and **Service Quality** as foundational requirements. While **Physical Environment** ranks lowest, its score still falls within the 'Influential' range, suggesting it cannot be neglected but may be addressed after core functional and service needs are met.

3. User Preferences and Behavioural Insights

Beyond overall factors, specific user preferences were identified:

I. **Spatial Needs:** 70% of respondents identified "Outdoor spaces for socialising, eating, and studying" as the most important space to include in a new SAC (Table 4).

II. **Desired Amenities:** When asked which new facilities would increase satisfaction, a movie theatre (31%) and advanced gaming/entertainment spots (27-29%) were highly favoured.
III. **Gender Inclusivity:** A significant disparity was found: 59.8% of female respondents felt the social activities in the centre did not favour their gender, compared to only 16.7% of male respondents.
IV. **Bioclimatic Performance:** User perception of bioclimatic factors was low. For instance, only 36-50% of users were satisfied with natural air movement through windows, indicating poor natural ventilation design.
V. **Energy Behaviour:** User behaviour was mixed; while 74% reported unplugging devices when not in use, only 50-56% reported turning off lights in daylit spaces, indicating room for promoting pro-environmental practices.

Table 4. Summary of Specific User Preferences and Perceptions

Category	Findings	Key Insight
Spatial Needs	70% prioritised outdoor spaces for socialising, eating, and studying.	Outdoor communal areas are the most valued spatial feature.
Desired Amenities	Top preferences: Movie theatre (31%) and advanced gaming/entertainment spots (27–29%).	Entertainment facilities strongly drive user satisfaction.
Gender Inclusivity	59.8% of female respondents felt social activities did not favour their gender, vs 16.7% male.	Significant gender gap in perceived inclusivity of activities.
Bioclimatic Performance	Only 36–50% satisfied with natural air movement through windows.	Poor natural ventilation design noted.
Energy Behaviour	74% unplug devices when not in use, but only 50–56% switch off lights in daylit spaces.	Users show partial pro-environmental behaviour; more awareness is needed.

Source: Author, 2025

4. Discussion

This study successfully identifies and ranks the architectural factors that influence user satisfaction in SACs within Nigeria's hot dry climate. The high ranking of Spatial Organization (e.g., proximity to hostels and academic areas) and Service Quality (e.g., reliable electricity, security, catering) underscores their role as foundational "hygiene factors." Without these, user satisfaction is significantly compromised, leading to low patronage.

The lower ranking of the Physical Environment (e.g., toilet facilities, interior aesthetics) and Social Factors (e.g., privacy, social vices) is not an indication of their unimportance, but rather a reflection of their current poor state in the case studies. This finding aligns with Yusuf & Ibrahim's (2024) observation that Nigerian SACs often become hubs for negative social activities due to design inadequacies.

The most critical finding is the pronounced gender-based dissatisfaction. The high percentage of female users who feel excluded suggests a design that is not gender-sensitive. This hegemony can be attributed to a lack of differentiated spaces that cater to the varied social comfort levels and activities preferred by different genders, a crucial consideration for future designs. This aligns with broader calls for gender-responsive design in public architecture, which seeks to create equitable and safe environments for all users (Maina, 2017).

The user preferences for outdoor spaces and modern amenities (cinema, gaming) signal a shift in student expectations. Students seek flexible, multifunctional environments that support both socialisation and informal learning, moving beyond the traditional model of a SAC as merely a collection of shops and a snack bar. Furthermore, the poor user perception of bioclimatic performance highlights a significant gap between design intention and user experience, emphasizing the need for more rigorous application of passive cooling and ventilation strategies. This gap is consistent with findings in similar climates, where the theoretical benefits of bioclimatic design are often not fully realized in occupant experience, pointing to flaws in execution or maintenance (Toroxel & Silva, 2024).

Conclusion and Recommendations

This study concludes that enhancing user satisfaction in Student Activity Centres within Nigeria's hot dry climate requires a holistic and user-centric design approach. Satisfaction is not derived from a single feature but from the synergistic integration of six key architectural factors: Spatial Organization, Service Quality, Maintenance Mechanism, Morphological Configuration, Social Factors, and the Physical Environment.

Based on the findings, the following specific and actionable recommendations are proposed for designers and university administrators:

I. Prioritize Location and Services: New SACs must be centrally located, with clear pedestrian connections to hostels and academic blocks, and equipped with reliable, high-quality services (uninterrupted power, high-speed WiFi, visible security) as a non-negotiable baseline for satisfaction.

II. Incorporate Abundant and Flexible Outdoor Space: Designs should prioritize shaded, landscaped, and well-furnished outdoor areas, such as courtyards, covered walkways, and terraces, to serve as primary social and study hubs, responding directly to the strongest user preference.

III. Design for Gender Inclusivity: Facilities should include a mix of open, communal areas and smaller, more private or gender-specific spaces (e.g., dedicated gaming lounges, female-only relaxation zones, prayer rooms) to ensure equitable access, safety, and comfort for all users.

IV. Integrate Bioclimatic Principles Rigorously: Architects must employ passive design strategies, such as optimal north-south orientation, strategically placed openings for cross-ventilation, deep verandahs for solar shading, and the use of local thermal mass materials, to ensure thermal comfort and reduce energy consumption, thereby aligning building performance with user expectations.

V. Provide Modern Programmatic Elements: To meet contemporary student needs, new SACs should include spaces such as movie theatres, advanced gaming areas, exhibition galleries, and flexible performance spaces with robust acoustic and digital infrastructure.

This research provides a validated framework for assessing and designing Student Activity Centres. Future studies could apply this framework to other climatic zones in Nigeria and across different building typologies to further refine our understanding of user satisfaction in the built environment.

Acknowledgement

The authors wish to thank the study participants for their valuable time and insights. We also extend our gratitude to researchers who have worked in the field of student activity centers and to Ahmadu Bello University for their support.

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