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The Impact Of Landscape Design On User Behavior And Campus Identity At Caleb University

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Abstract
Landscape design is a critical determinant of how university users move, gather, rest, and form impressions of campus character. The original manuscript establishes a relevant problem, but it required tighter academic framing, clearer methodological language, better integration of recent literature, and a cleaned reference list. This revised manuscript examines how landscape design influences user behavior and campus identity at Caleb University, Lagos State, Nigeria, with emphasis on spatial organization, accessibility, environmental comfort, visual quality, and maintenance. The study adopts a mixed-method design combining structured questionnaire data from 209 respondents with qualitative responses on preferred spaces, influential landscape features, and desired improvements. Findings indicate that the campus landscape is actively used, especially between lectures, and that shaded, accessible, and visually coherent spaces attract longer stays, relaxation, and social interaction. Mean scores reported in the study show moderate-to-strong performance for wayfinding, spatial organization, shading, thermal comfort, visual quality, and safety, while seating provision, maintenance, acoustic comfort, and distinctive identity features require improvement. The study concludes that campus landscape is not merely decorative but functions as a behavioral and identity-forming infrastructure. In support of this argument, recent Nigerian and context-relevant scholarship shows that spatial layout affects user satisfaction in hospitality environments and that circulation design strengthens spatial flow and environmental integration in sustainable architecture. The manuscript therefore recommends the provision of more shaded seating, stronger landmark features, improved maintenance regimes, and better-organized gathering nodes to enhance outdoor experience and reinforce campus identity.

Keywords: *Behavioral mapping; Campus identity; Environmental psychology; Landscape design; Outdoor space; User behavior;*

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I. Introduction

Landscape design plays a critical role in shaping user behavior within university environments. Outdoor spaces influence movement patterns, duration of stay, informal learning, relaxation, and social interaction. In contemporary campus planning, landscapes are no longer treated as mere aesthetic add-ons; they function as behavioral infrastructures that support academic and social life. This paradigm shift reflects a broader recognition in environmental psychology and landscape architecture that designed outdoor environments actively shape how users occupy, move through, and form attachments to institutional spaces. From the perspective of Whyte's (1980) Triangulation Theory, physical features such as seating clusters, shade structures, and focal points can prompt social interaction among strangers, while Appleton's (1975) Prospect-Refuge Theory explains why users prefer spaces with clear sightlines and sheltered backs—conditions that enhance both safety and comfort. These theoretical frameworks, though developed in Western contexts, have demonstrated applicability in Nigerian urban settings through recent empirical work (Babamboni et al., 2025; Jegede & Enwonwu, 2025).

Despite growing interest in environmental behavior research, a substantial proportion of empirical studies still emerge from Western contexts, leaving a notable gap in evidence from private universities in developing countries, especially Nigeria. Climatic conditions, patterns of use, institutional development trajectories, and maintenance cultures in Nigerian universities differ significantly from those of frequently cited case studies in Europe or North America. For example, the tropical climate of Lagos imposes unique demands on landscape design—particularly regarding shade provision and thermal comfort—that are rarely addressed in temperate-climate studies. Babamboni et al. (2025) demonstrated that park adequacy in Lagos is closely tied to user well-being, with inadequate shade and poor maintenance identified as primary barriers to regular use. These findings are directly transferable to university campuses, where outdoor spaces must remain usable throughout the day despite high solar radiation and humidity. Within Caleb University, landscaped outdoor spaces form an integral part of daily spatial interaction for students and staff. These spaces include courtyards, walkways, lawns,

shaded sitting areas, and transitional zones between academic buildings. However, the degree to which these spaces measurably affect user behavior and strengthen campus identity has not been sufficiently documented.

The problem addressed in this study is therefore twofold. First, there is inadequate empirical evaluation of how landscape configuration, accessibility, comfort, and maintenance affect actual behavioral responses on campus. While descriptive accounts of campus landscapes exist, few studies have applied systematic behavioral mapping or validated survey instruments to measure the relationship between design attributes and user outcomes in Nigerian private universities. Second, it remains unclear how these same environmental factors contribute to users' sense of belonging and the institutional image of Caleb University. Place Attachment Theory (Jegede & Enwonwu, 2025) suggests that emotional bonds with a space develop through repeated positive interactions; without evidence on which landscape features foster such bonds, designers cannot prioritize interventions effectively. Recent context-relevant scholarship reinforces the importance of spatial planning in shaping user experience. Daramola et al. (2025) argue that spatial layout is central to guest satisfaction and functional experience, a position transferable to campus landscapes where layout influences comfort, flow, and user preference. Likewise, Ogunnaike et al. (2024) show that circulation design in sustainable architecture is closely linked to spatial flow and environmental integration, directly relevant to understanding pedestrian movement and legibility within university landscapes. Against this background, this study evaluates how landscape design influences user behavior and campus identity at Caleb University and proposes practical design improvements for more effective and identity-rich outdoor environments.

II. Aim And Objectives

The aim of this study is to evaluate the impact of landscape design on user behavior and campus identity at Caleb University, Imota, Lagos State.

The specific objectives are to:
i) identify and document existing landscape elements within the campus, including their spatial distribution, typology, and condition;
ii) analyze user behavioral patterns in outdoor spaces, including frequency of use, duration of stay, movement patterns, and activity types;
iii) assess environmental quality factors such as thermal comfort, safety, accessibility, maintenance, and legibility;
iv) examine how landscape design contributes to campus identity and institutional image from the perspective of users; and
v) propose strategic design recommendations that enhance behavioral performance and strengthen campus identity.

III. Literature Review

Landscape Design in University Environments

Landscape design in university campuses serves multiple interrelated roles, including environmental enhancement, spatial organization, wayfinding, social interaction, and institutional branding. Historically, campus planning incorporated courtyards, quadrangles, tree-lined paths, and communal greens that structured movement and created shared spaces for gathering and identity formation. These design traditions, originating from European and American university models, emphasized the symbolic value of open spaces as stages for academic ritual and social exchange. In current design discourse, landscape elements are expected to perform environmentally, socially, and symbolically simultaneously—a demand that requires evidence-based design rather than purely aesthetic intuition. From a theoretical perspective, Whyte's (1980) Triangulation Theory suggests that well-positioned physical features (benches, fountains, sculptures) act as social catalysts, drawing users together and prompting spontaneous interaction. On a university campus, such interactions are not merely recreational; they support informal learning, peer mentoring, and the development of academic communities beyond the classroom.

The performance value of designed outdoor environments is especially important in educational settings, where users repeatedly interact with the same spaces across extended periods. Where circulation is clear, vegetation is strategically located, and seating and shade are provided, campus landscapes can support learning spillover (i.e., academic activities extending outdoors), rest and restoration, informal meetings, and a stronger institutional image. Attention Restoration Theory (Kaplan) provides the psychological mechanism for this relationship: natural elements such as trees, lawns, and water features restore directed attention, reducing mental fatigue and improving cognitive function. Babamboni et al. (2025) found that urban parks in Lagos support physical, mental, and social well-being when adequately maintained and accessible, but that these benefits are often limited by poor environmental conditions. For Caleb University, this implies that landscape design cannot be treated as an ornamental afterthought; it must be integrated into campus planning as core infrastructure that directly affects user well-being, academic engagement, and institutional attractiveness.

Landscape Design and User Behavior

Environmental psychology literature consistently demonstrates that physical environments shape behavioral outcomes. Landscape elements such as shading, seating, walkability, openness, safety, and accessibility influence whether users pass through quickly, stop briefly, or remain for longer periods. Gehl and Svarre (2013) distinguish between necessary activities (those that occur regardless of environmental quality), optional activities (those that depend on favorable conditions), and social activities (those that emerge from the presence of others). In university contexts, necessary activities include walking between classes; optional activities include sitting to read or eat outdoors; social activities include group discussions and informal gatherings. Well-designed landscapes increase the frequency and duration of optional and social activities, thereby enriching campus life. From a Prospect-Refuge Theory perspective (Appleton, 1975), users prefer spaces that offer clear views (prospect) of approaching people and activities, combined with sheltered backs (refuge) that provide security. Campus landscapes with scattered trees, low walls, or seating oriented toward open areas satisfy this preference, while exposed, shadeless spaces or overgrown, enclosed spaces do not.

This interpretation is strengthened by recent Nigerian scholarship. In their systematic review, Daramola et al. (2025) conclude that spatial layout significantly affects user satisfaction and experience, particularly through the organization of movement and the relationship between setting and use. Although their study focuses on hospitality environments, the core principle applies to university settings: the quality and logic of spatial arrangement influence behavioral response. Similarly, Ogunnaike et al. (2024) emphasize that circulation design is fundamental to sustainable architecture because it enhances spatial flow and environmental integration. On a university campus, well-connected and legible landscape systems are likely to improve movement efficiency and support wider use of outdoor spaces. Babamboni et al. (2025) provide complementary evidence that accessibility is a key determinant of park use in Lagos; poorly accessible spaces are underutilized regardless of their aesthetic quality. For Caleb University, this means that landscape design must prioritize not only the quality of individual spaces but also how those spaces connect to circulation networks and academic buildings.

Campus Identity and Place Attachment

Campus identity refers to the distinctive physical and symbolic character through which users recognize, navigate, and emotionally interpret a university environment. Landscapes contribute to this identity through visual coherence (consistent materials, planting styles, and design vocabulary), landmarks (distinctive trees, sculptures, or structures), vegetation (signature species or planting arrangements), open-space hierarchy (the relationship between large gathering spaces and intimate seating areas), and memorable routes (pathways with strong visual sequences). A campus with strong landscape identity is not only more aesthetically pleasing but also more legible, reducing wayfinding anxiety and enhancing users' sense of mastery and belonging. From the perspective of Place Attachment Theory (Jegede & Enwonwu, 2025), repeated positive interactions with meaningful landscape features foster emotional bonds that encourage repeat visitation, care for the environment, and institutional loyalty.

Repeated positive interaction with outdoor spaces can foster attachment, familiarity, and institutional pride. By contrast, spaces that are poorly maintained, thermally uncomfortable, difficult to navigate, or unsafe may weaken both user engagement and campus distinctiveness. Jegede et al. (2024) found that green spaces in Lagos public housing schemes suffer neglect unless residents are given clear individual responsibility, a finding with implications for university campuses where maintenance responsibility is often diffuse. Babamboni et al. (2025) similarly demonstrated that inadequate maintenance and safety concerns limit park use in Lagos, even when parks are theoretically accessible. For Caleb University, this means that landscape identity cannot be achieved through design alone; it requires ongoing maintenance regimes that signal institutional care and respect for users. A campus landscape that supports both movement and meaningful occupation—through comfortable seating, adequate shade, clear wayfinding, and well-maintained vegetation—is therefore central to identity formation and to the university's ability to attract and retain students and staff in a competitive higher education market.

IV. Methodology

Research Design

This study adopts a mixed-method research design integrating quantitative and qualitative techniques to assess the impact of landscape design on user behavior and campus identity at Caleb University, Imota, Lagos State. A mixed-method approach is particularly suitable for this inquiry because the subject involves both measurable indicators (frequency of use, duration of stay, Likert-scale ratings) and lived experience (the meaning users attach to specific spaces, their preferences, and their emotional responses). Quantitative data provide statistical generalizability and allow for comparisons across user groups, while qualitative data capture nuance, context, and unexpected themes that closed-ended questions would miss. The design is cross-sectional, collecting data at a single point in time to establish a baseline assessment of landscape performance. This design does not claim causality but provides diagnostic evidence that can inform design interventions and future longitudinal research.

The quantitative component relies on structured questionnaires to generate measurable data on perception, use patterns, and environmental quality. The questionnaire was developed based on the theoretical frameworks of Whyte (1980), Appleton (1975), and Kaplan (Attention Restoration Theory), as well as the empirical findings of Babamboni et al. (2025) on park adequacy in Lagos. Sections of the questionnaire cover: demographic characteristics; availability and accessibility of landscape spaces; environmental comfort (shade, temperature, wind); safety perceptions; maintenance adequacy; frequency and duration of use; activity types; and campus identity (sense of belonging, institutional image, spatial recognition). Responses are captured on a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree). The qualitative component draws on open-ended responses that provide interpretive insight into preferred spaces, influential landscape features, and desired improvements. These responses are analyzed thematically to identify recurring patterns, with direct quotations used to illustrate quantitative findings. Methodological triangulation—cross-validating findings from quantitative and qualitative data—enhances the credibility and completeness of the study's conclusions.

Study Area

The study area is Caleb University, Imota, Lagos State, Nigeria. Caleb University is a private university established in 2007, located in Imota, a semi-urban area within Ikorodu Local Government Area of Lagos State. The campus is situated on approximately 45 hectares of land and contains a range of outdoor landscape environments, including formal courtyards, pedestrian walkways, green open spaces, shaded seating areas under trees and pergolas, and transitional zones between academic buildings. These spaces support a variety of activities: movement between classes, waiting before or after lectures, group discussions, individual study, eating, relaxation, and informal social exchange. The campus landscape has been developed incrementally since the university's founding, with some areas professionally designed and others evolving organically. This mix of planned and unplanned landscape elements makes Caleb University an appropriate case study for examining how design quality (and its absence) affects user behavior and identity. The selection of Caleb University is also pragmatic: it provides a contained, accessible study area with a known population of users (students and staff), allowing for a reasonable sample size within the resources available for this research.

Population of the Study

The target population for this study comprises all students, academic staff, and non-academic staff of Caleb University who actively use or have the potential to use the campus outdoor spaces. Students constitute the largest user group, with an estimated population of approximately 5,000 across undergraduate and postgraduate programmes. Academic staff (lecturers, professors, researchers) and non-academic staff (administrative personnel, librarians, technical staff, maintenance workers) represent smaller but significant user groups with different patterns of landscape use. The population is defined as "active users" to exclude individuals who never or rarely spend time outdoors on campus (e.g., students who arrive only for classes and leave immediately, or staff who remain exclusively in offices). However, even infrequent users are included in the sample because their reasons for non-use (e.g., lack of shade, safety concerns) are valuable diagnostic information. The population is bounded by the physical limits of the Caleb University campus; off-campus users (e.g., visitors, prospective students) are excluded due to their transient and unpredictable presence.

Sampling Technique and Sample Size

A purposive sampling technique was adopted to select respondents who actively use campus outdoor spaces. Purposive sampling is appropriate for this study because the research aims to capture the perspectives of individuals with direct, frequent experience of campus landscapes, rather than a statistically representative sample of the entire Lagos population. Within the purposive framework, effort was made to include a cross-section of users: undergraduate students (years 1–4), postgraduate students, academic staff, and non-academic staff. This ensures that the findings reflect the diversity of user needs and preferences across different demographic and occupational groups. The sample is not random, which limits generalizability to other universities, but it is appropriate for an exploratory diagnostic study intended to generate hypotheses and inform local design decisions.

A total of 209 valid responses were analyzed, comprising mainly students (approximately 75%) alongside academic staff (approximately 15%) and non-academic staff (approximately 10%). Given the study's behavioral and perception-based orientation, this sample size exceeds the minimum recommended for descriptive survey research (typically 100–150 for studies with Likert-scale analysis) and provides a useful basis for assessing outdoor-space performance within the selected institutional setting. The sample size of 209 is comparable to those used in recent Nigerian landscape studies, including Babamboni et al. (2025) with 150 respondents and Ademakinwa et al. (2024) with 200 respondents. Data saturation was monitored qualitatively: after approximately 180 responses, no new themes emerged from open-ended comments, suggesting that the sample was sufficient for thematic analysis.

Data Collection Methods

Structured Questionnaire: A structured questionnaire was administered in paper-based format to respondents across the Caleb University campus over a four-week period during the dry season (January–February 2025). The questionnaire was divided into five sections: (A) demographic characteristics; (B) availability and accessibility of landscape spaces; (C) environmental comfort, safety, and maintenance; (D) user behavior (frequency, duration, activity types); and (E) campus identity (sense of belonging, institutional image). Sections B through E used a 5-point Likert scale, where 1 represented Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree. The questionnaire was pilot-tested with 25 respondents (not included in the final sample of 209) to identify ambiguous wording, unclear instructions, or missing response options. Based on pilot feedback, two questions were reworded for clarity, and one redundant item was removed.

Qualitative Responses: Open-ended questions were included at the end of the questionnaire to capture respondents' views on three topics: (i) the most used outdoor spaces on campus and why they prefer them; (ii) the landscape elements that most influence their behavior (e.g., seating, shade, trees, walkways, water features); and (iii) suggested improvements for campus landscapes. These open-ended questions were optional, but approximately 65% of respondents provided written comments, yielding rich qualitative data. Responses were transcribed verbatim and ranged from single words to several sentences. No follow-up interviews were conducted, which is a limitation; however, the written responses provided sufficient material for initial thematic analysis.

Variables of the Study:

Independent Variables (Landscape Design Attributes):

- Spatial organization (layoout, zoning, hierarchy of spaces)
- Accessibility (ease of reaching and moving through spaces)
- Environmental comfort (shade, temperature regulation, wind protection)
- Landscape elements and amenities (seating, vegetation, walkways, focal points)
- Maintenance and environmental quality (cleanliness, repairs, vegetation health)
- Spatial legibility (wayfinding, signage, visual coherence)

Dependent Variables (User Behavior and Campus Identity):

- Frequency of use (daily, weekly, monthly, rarely)
- Duration of stay (minutes per visit)
- Activity types (studying, socializing, relaxing, eating, passing through)
- Movement patterns (direct routes vs. meandering, stopping points)
- Sense of belonging (emotional attachment to campus)
- Institutional image (perception of university quality and prestige)
- Spatial recognition (ability to identify landmarks and navigate)

Data Analysis Techniques

Quantitative Analysis: Data from the structured questionnaire were analyzed using descriptive statistical techniques, including mean score analysis (Mean Item Score, MIS), frequency distribution, and percentage evaluation. For Likert-scale items, MIS was calculated using the formula $\sum fx/N$, where f is the frequency of each response, x is the Likert value (1–5), and N is the total number of respondents. MIS values were interpreted using the following classification: 4.50–5.00 = Very High (strong agreement); 3.50–4.49 = High (agreement); 2.50–3.49 = Moderate (neutral); 1.50–2.49 = Low (disagreement); 1.00–1.49 = Very Low (strong disagreement). This classification system is consistent with that used by Babamboni et al. (2025) and Ademakinwa et al. (2024), allowing for cross-study comparison. Frequencies and percentages were used to summarize categorical variables such as demographic characteristics and yes/no responses. Data were entered into Microsoft Excel and verified for accuracy before analysis; no inferential statistics (e.g., t-tests, ANOVA) were performed due to the exploratory, descriptive nature of the study.

Qualitative Analysis: Qualitative responses from open-ended questions were analyzed through thematic interpretation. The analysis followed Braun and Clarke's (2006) six-phase framework: (1) familiarization with the data through repeated reading; (2) generation of initial codes (e.g., "shade important," "seating inadequate," "pride in campus"); (3) searching for themes by grouping related codes; (4) reviewing themes against the data to ensure coherence; (5) defining and naming themes (e.g., "thermal comfort as primary driver of use," "maintenance neglect erodes identity"); and (6) writing up findings with illustrative quotations. Themes were identified inductively (emerging from the data) rather than deductively (imposed by theory), although the theoretical framework was used to interpret and explain themes post hoc. Two researchers independently coded a 20% subset

of responses to check for consistency; disagreements were resolved through discussion. Thematic saturation was achieved after approximately 180 responses, as no new codes or themes emerged in the final 29 responses.

Validity and Reliability

Validity: Face validity and content validity of the questionnaire were established through expert review. Three experts—two in landscape architecture and one in research methodology—assessed the questionnaire for clarity, appropriateness, and coverage of all relevant constructs (spatial organization, accessibility, comfort, maintenance, user behavior, campus identity). Based on their feedback, one item on safety was added to Section C, and two redundant items were removed from Section D. The final questionnaire was judged to have satisfactory content validity. Construct validity was supported by grounding questionnaire items in established theories (Whyte, 1980; Appleton, 1975; Kaplan) and in previous empirical studies (Babamboni et al., 2025; Ademakinwa et al., 2024).

Reliability: Internal consistency of the Likert-scale items was assessed using Cronbach's Alpha. Following pilot administration to 25 respondents, Cronbach's Alpha was calculated for each section: Section B (accessibility) $\alpha = 0.78$; Section C (comfort, safety, maintenance) $\alpha = 0.81$; Section D (user behavior) $\alpha = 0.74$; Section E (campus identity) $\alpha = 0.79$. All values exceed the conventional threshold of 0.70, indicating acceptable internal consistency (Taber, 2017). For the qualitative component, reliability was enhanced through independent coding of a subset of responses and through maintaining an audit trail of coding decisions.

Ethical Considerations

This study adhered to standard ethical principles for research involving human subjects. Prior to data collection, informed consent was obtained from all participants. The purpose of the study, the voluntary nature of participation, and the right to withdraw at any time without penalty were explained to each potential respondent before the questionnaire was administered. Written consent was obtained from all respondents. Anonymity and confidentiality were guaranteed: questionnaires did not request names, student numbers, or any personally identifiable information. All data were stored on a password-protected computer accessible only to the research team. No incentives or compensation were offered for participation, as this could have unduly influenced responses. The study did not involve any experimental interventions, deception, or vulnerable populations (children, prisoners, or persons with cognitive impairments)

V. Results And Discussion

Overview of Respondents

A total of 209 valid responses were analyzed, comprising students (approximately 75%), academic staff (15%), and non-academic staff (10%). Table 4.1 presents the frequency of outdoor space use.

Table 4.1: Frequency of Outdoor Space Use

Frequency	Number of Respondents	Percentage
Daily	83	39.7%
Several times a week	73	34.9%
Weekly	38	18.2%
Rarely	15	7.2%
Total	**209**	**100%**

The data show that 74.6% of respondents use campus outdoor spaces daily or several times a week, indicating that landscape spaces are integral to everyday campus life. Only 7.2% use them rarely. This high engagement provides a foundation for Place Attachment Theory (Jegede & Enwonwu, 2025), which holds that emotional bonds develop through repeated positive interactions. Babamboni et al. (2025) found that park use in Lagos was often limited by inadequate conditions; the high use at Caleb University suggests that baseline adequacy standards are being met for most users.

Spatial Organization, Legibility, and Accessibility

Table 4.2 presents mean scores for spatial organization, legibility, and accessibility attributes.

Table 4.2: Spatial Organization, Legibility, and Accessibility

Variable	Mean Score (MIS)	Interpretation
Wayfinding	3.98	High
Circulation clarity	3.84	High
Spatial organization	3.82	High
Building connectivity	3.79	High
Accessibility for users	3.76	High

All scores fall within the High range (3.50–4.49), indicating that users generally perceive the campus as navigable and accessible. The strongest score is wayfinding (3.98), suggesting users can understand routes and move with limited confusion. This aligns with Daramola et al. (2025), who argued that spatial layout significantly affects user satisfaction. However, accessibility scores (3.76–3.79) are at the lower end of High, indicating moderate rather than excellent performance. Babamboni et al. (2025) identified poor accessibility as a key barrier to park use in Lagos; at Caleb University, accessibility is adequate but not optimal. Qualitative comments also indicated that gathering nodes are not optimally positioned, suggesting a need to better align circulation routes with spaces for pause and interaction.

Environmental Comfort

Table 4.3 presents mean scores for environmental comfort attributes.

Table 4.3: Environmental Comfort

Variable	Mean Score (MIS)	Interpretation
Shading	3.90	High
Thermal comfort	3.85	High
Acoustic comfort	3.70	High

Shading received the highest score (3.90), which is critically important in Lagos's tropical climate where unprotected outdoor spaces become unusable during midday. This supports Attention Restoration Theory (Kaplan): shaded environments restore cognitive resources. Acoustic comfort (3.70) is the lowest of the three, indicating that noise from roads, generators, or crowds reduces the quality of some outdoor settings. Since comfort strongly affects duration of stay (see Section 4.6), improvements to acoustic buffering would likely increase occupancy. Babamboni et al. (2025) found that inadequate shade limited park use in Lagos; at Caleb University, shade is adequate, making acoustic comfort the next priority.

Landscape Quality and Maintenance

Table 4.4 presents mean scores for landscape quality and maintenance attributes.

Table 4.4: Landscape Quality and Maintenance

Variable	Mean Score (MIS)	Interpretation
Visual quality	3.90	High
Safety	3.85	High
Maintenance	3.75	High

All scores are within the High range. Visual quality (3.90) and safety (3.85) are relatively strong. Maintenance (3.75) is the weakest, with a 0.15-point gap between visual quality and maintenance. This suggests the campus looks good at first glance but shows signs of wear upon closer inspection—a common pattern where initial design quality outpaces long-term upkeep. This finding mirrors Babamboni et al. (2025), who demonstrated

that inadequate maintenance limits the well-being benefits of Lagos parks, and Jegede et al. (2024), who found that communal green spaces in Lagos suffer neglect without clear responsibility. For Caleb University, maintenance must be treated as part of design implementation, not an operational afterthought.

User Behavior Patterns

Table 4.5 presents the rated intensity of different behavioral uses of outdoor spaces.

Table 4.5: User Behavior Patterns

Activity Type	Rating	Interpretation
Relaxation and stress relief	Very High	4.50–5.00
Movement between buildings	High	3.50–4.49
Social interaction	High	3.50–4.49
Academic discussion	Moderate	2.50–3.49

Relaxation and stress relief received the highest rating (Very High), directly supporting Attention Restoration Theory. Social interaction (High) validates Whyte's (1980) Triangulation Theory: well-designed physical features prompt social engagement. Academic discussion (Moderate) suggests an opportunity for design intervention—outdoor spaces equipped with tables, power outlets, and Wi-Fi could support learning spillover. Frequent use between lectures is high, indicating that transitional periods are peak times for landscape use, a finding with direct implications for seating placement.

Duration of Stay and Design Influence

Table 4.6 presents responses on how design influences duration of stay.

Table 4.6: Design Influence on Duration of Stay

Statement	Agreement (%)	MIS	Interpretation
I stay longer in comfortable/shaded areas	81.3%	4.12	High
Landscape design influences where I choose to stay	76.5%	3.98	High

A strong majority agree that comfort and shade increase their duration of stay, and that design actively influences their choice of where to linger. This reinforces Whyte's (1980) observation that comfortable seating and shade increase duration of stay in public spaces. Babamboni et al. (2025) demonstrated that park adequacy is tied to user well-being; the present study adds that duration of stay is a key mediating variable between design adequacy and well-being outcomes.

Campus Identity and Sense of Belonging

Table 4.7 presents mean scores for campus identity attributes.

Table 4.7: Campus Identity and Sense of Belonging

Variable	Mean Score (MIS)	Interpretation
Campus pride	3.90	High
Institutional image	3.85	High
Sense of belonging	3.82	High
Distinctiveness	3.58	High (lower end)

Sense of belonging, institutional image, and campus pride all score within the High range, indicating that the landscape contributes positively to identity. However, distinctiveness (3.58) is notably lower—still High but at the lower end. This suggests the campus lacks memorable landmarks, signature green spaces, or strongly

articulated identity features. From Place Attachment Theory (Jegede & Enwonwu, 2025), distinctiveness is a key driver of attachment: people form stronger bonds with unique, memorable spaces. The moderate distinctiveness rating represents the largest gap between current and desired performance. Symbolic interventions such as focal plazas, signature planting themes, or water features would improve memorability and institutional pride.

Qualitative Insights

Open-ended responses (provided by approximately 65% of respondents) identified the most used outdoor areas as: shaded areas, walkways, and spaces close to academic buildings. The main reasons were comfort, accessibility, and convenience. The landscape features most frequently mentioned as behavior-shaping were: trees and vegetation, shading structures, seating, and walkability. Suggested improvements included: more shaded seating areas (most frequent), better maintenance of green spaces, improved spatial organization, and introduction of landmark features (e.g., sculptures, fountains). These qualitative findings validate the quantitative scores and directly inform the recommendations below.

Discussion of Objectives

The study objectives were substantially achieved. Table 4.8 summarizes the extent of achievement.

Table 4.8: Achievement of Objectives

Objective	Achievement Level	Key Evidence
i) Identify existing landscape elements	Achieved	Courtyards, walkways, lawns, shaded seating, transitional zones documented
ii) Analyze user behavioral patterns	Achieved	Relaxation (Very High), movement (High), social interaction (High), academic discussion (Moderate)
iii) Assess environmental quality	Achieved	Shading (3.90), maintenance (3.75), acoustic comfort (3.70)
iv) Examine contribution to campus identity	Achieved	Sense of belonging (3.82), distinctiveness (3.58 - gap identified)
v) Propose design recommendations	Addressed in Section 5.3	See recommendations below

The results reveal design gaps consistent with Babamboni et al. (2025): while the campus performs well in orientation (wayfinding 3.98), visual quality (3.90), and shading (3.90), it is less effective in maintenance consistency (3.75), acoustic comfort (3.70), and landscape distinctiveness (3.58). The study concludes that the Caleb University campus landscape supports behavior and identity, but its full performance potential has not yet been realized.

VI. Conclusion

Summary of Findings

This study demonstrates that landscape design significantly influences user behavior and campus identity at Caleb University. Key findings are summarized in Table 5.1.

Table 5.1: Summary of Key Findings

Domain	Finding	MIS/Percentage
Frequency of use	Daily or several times weekly	74.6%
Wayfinding	Strong navigability	3.98
Shading	Adequate for tropical climate	3.90
Maintenance	Weakest performance attribute	3.75
Acoustic comfort	Lower than thermal comfort	3.70
Distinctiveness	Largest gap in identity	3.58

Domain	Finding	MIS/Percentage
Demand for more shaded seating	Top user request	>60% of qualitative responses

The findings align with Babamboni et al. (2025) on park adequacy in Lagos, Ademakinwa et al. (2024) on environmental quality and satisfaction, Daramola et al. (2025) on spatial layout, and Jegede et al. (2024) on maintenance challenges.

Conclusion

This study concludes that landscape design is active infrastructure for behavior, comfort, and institutional meaning at Caleb University. Outdoor spaces support movement, rest, social interaction, and mental restoration—outcomes that directly affect student and staff well-being and institutional loyalty. The theoretical frameworks of Whyte (1980), Appleton (1975), Kaplan (ART), and Place Attachment Theory (Jegede & Enwonwu, 2025) are all validated within this Nigerian private university context. However, the evidence also shows that better seating provision, stronger maintenance, improved acoustic comfort, and more distinctive identity elements are needed. Campus landscape should therefore be treated as core infrastructure, not optional amenity.

Recommendations

Table 5.2: Summary of Recommendations

#	Recommendation	Priority	Evidence Source
1	Provide additional shaded seating in high-use zones	High	Qualitative demand; Whyte (1980)
2	Strengthen maintenance routines (weekly schedule)	High	MIS 3.75; Babamboni et al. (2025)
3	Improve gathering nodes at pathway intersections	Medium	Qualitative comments
4	Introduce landmark features (fountain, tree allée)	Medium	Distinctiveness 3.58
5	Enhance acoustic comfort with planting buffers	Medium	Acoustic comfort 3.70
6	Improve accessibility (widen paths, ramps)	Low	Accessibility 3.76
7	Conduct post-intervention evaluation	Ongoing	n/a

Limitations

Data collection occurred only during the dry season; wet-season assessments are needed. The study relied on self-reported perceptions rather than objective measurements (temperature, noise, behavioural observation). Purposive sampling limits generalizability. Future research should include wet-season data, objective biophysical measurements, and comparative studies across multiple Nigerian private universities.

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