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EVALUATING THE IMPACT OF SUSTAINABLE LANDSCAPE PLANNING ON STUDENT WELL-BEING AND ACADEMIC PERFORMANCE: A Case Study of the University of Ibadan

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Abstract: This study investigates the impact of sustainable landscape planning on the well-being and academic performance of students at the University of Ibadan. Utilizing survey data, the research highlights the positive effects of well-maintained green spaces on students' mental health, stress reduction, physical health, and connection to nature. The findings indicate that a significant proportion of students perceive sustainable landscape planning as beneficial to their overall well-being and academic experience. Hypothesis testing results further confirm the substantial positive impact, underscoring the importance of incorporating sustainable landscape practices in educational institutions. These results advocate for increased investment in sustainable landscaping to foster a healthier and more conducive learning environment.

Keywords: Sustainable landscape planning, Student well-being, Academic performance, University of Ibadan, Green spaces

Introduction

The initial impression an individual forms upon arriving at a new location is often shaped by the landscape practice in that environment. This is because the landscape, encompassing the visible features of an area including its landforms and their integration with natural or man-made elements, significantly influences the self-image of the inhabitants (Bondarenko *et al*., 2020). A campus landscape, therefore, holds substantial weight in students' decision-making processes when selecting an institution for admission, embodying both cultural and aesthetic values. The landscape is the front door and welcome page of an institution, revealing more about a college, polytechnic, or university than promotional materials or speeches by recruiters and administrators (Olu *et al*., 2018). The local environment and landscape are crucial for future sustainability (Lovett *et al*., 2011). Increased knowledge and awareness of the local environment promote environmental stewardship. An attractive school landscape inspires students, teachers, school employees, and parents. The function of the landscape extends beyond beautification and providing shade; it should also aid students' learning processes and foster an appreciation for the environment (Ali *et al*., 2020).

The campus landscape, akin to its buildings, is the physical embodiment of an institution's values. It plays a vital role in campus life by providing spaces for study, play, outdoor events, aesthetic appreciation, and even food production, while serving as a "living lab" for research. The perception of the campus landscape can influence the extent and rate of naturalization efforts (Wu & Yan, 2019). Natural landscaping offers numerous environmental benefits. The reduced use of fertilizers, pesticides, and lawnmowers can positively impact plants, water, and land use, preventing ecosystem degradation (Wu & Yan, 2019). Natural landscapes, with native plant materials, reduce the need for synthetic fertilizers, minimizing contamination

and eutrophication of surface water (Lerman *et al*., 2018). Additionally, reducing lawn mowing and relying more on natural flora utilizing native species can decrease fossil fuel consumption (Lerman *et al*., 2018).

Landscapes are perceived by individuals as areas that appeal to the human sense of beauty, combining natural and man-made features. Designers play a crucial role in shaping our living environment by thinking critically and visualizing innovative solutions related to usability, form, and ergonomics. The

benefits of natural landscapes are diverse, including environmental, social, and economic factors. Natural landscapes help people recover from stress more effectively than urban environments, improving physiological indicators such as blood pressure and muscle relaxation in as little as 400 milliseconds (Ulrich et al., 1991). People living in areas with abundant green space experience better general health and immunity, and hospital patients recover faster with views of natural environments (Mitchell & Popham, 2007)

The primary issue is the lack of understanding of the true importance of sustainable landscape planning in a university setting. Recognizing the importance of sustainable landscapes is crucial for creating and designing environments that benefit both students and the university at large. Poorly planned or unsustainable landscapes negatively affect a university's image, while well-planned landscapes enhance aesthetics, improve air quality, and support student learning and assimilation. Poor landscaping can lead to unappealing environments, poor air quality, and increased vulnerability to natural disasters such as erosion.

The aim of this study is to investigate, examine, and understand how sustainable landscape planning can impact the University of Ibadan and improve the lives of its students. The specific objectives are to assess the impact of sustainable landscape planning on the well-being of students at the University of Ibadan and to determine the effects of sustainable landscape planning on student learning and assimilation.

The study focuses on exploring sustainable landscape planning specifically within the University of Ibadan, encompassing various dimensions. It concentrates on the University of Ibadan campus and its immediate surroundings, analyzing the existing landscape and potential areas for sustainable interventions. It considers the student population of approximately 41,743 as of 2023, including both undergraduate and postgraduate students, to understand how it affects sustainable landscape planning. The study examines the influence of sustainable landscapes within the University of Ibadan, evaluating their impact. Spanning from the past decade to the present, the study examines the evolution of the university's landscape and changes over time affecting sustainability efforts. It explores students' perceptions and experiences of the landscape environment, gathering feedback on air quality, aesthetics, and general impressions to identify areas for improvement. Based on the findings, the study provides insights and recommendations for optimizing and sustaining the landscape environment, including architectural modifications, proper waste management, resource management, and student involvement.

The justifications for this study on sustainable landscape planning at the University of Ibadan are multifaceted. Examining the landscape can enhance students' well-being by providing more relaxation and recreation areas. Understanding sustainable landscapes helps identify areas for improvement and informs efforts to enhance the university's overall landscape. Sustainable landscape planning aids in adapting to climate change impacts, supporting the campus's long-term sustainability. Promoting sustainable practices enhances biodiversity, conserves resources, and reduces the university's ecological footprint. As a leading academic institution in Nigeria, the University of Ibadan can serve as a model for sustainable practices, influencing other educational institutions and the wider community. Sustainable landscape planning reduces resource consumption, leading to cost savings and efficient use of limited resources. Furthermore, the study fosters innovative research opportunities in sustainable landscape planning, encouraging interdisciplinary collaborations within the university.

The study area is the University of Ibadan, located in Ibadan, Oyo State, Nigeria. It lies approximately between longitude N07° 26’850” and N07° 27’087” and latitude E003° 53’899” to E003° 53’552”, with an

elevation ranging from 205 to 227 meters above sea level in the sub-humid tropics. Established in 1948, the

University of Ibadan is one of Nigeria's oldest and most prestigious institutions, known for its academic excellence and contributions to research, teaching, and cultural development.

The university campus spans approximately 224 hectares and includes 92 academic departments organized into 17 faculties: Arts, Science, Basic Medical Sciences, Clinical Sciences, Agriculture, Social

Sciences, Education, Veterinary Medicine, Pharmacy, Technology, Law, Public Health, Dentistry, Economics and Management Sciences, Renewable Natural Resources, Environmental Design and Management, and Multidisciplinary Studies.

The University of Ibadan offers accommodation through 15 halls of residence, housing about 30% of its students. Notable halls include Lord Tedder Hall, Kenneth Mellanby Hall, and Obafemi Awolowo Hall. The university employs 5,339 staff members and provides 1,212 housing units for senior and junior staff. The campus is equipped with residential, sports facilities, and separate botanical and zoological gardens.

As a leading educational and cultural center in southwestern Nigeria, the University of Ibadan is recognized for its beautiful landscape, diverse student body, and significant role in Nigerian higher education.

Methodology

Landscape Character Assessment

The landscape character assessment of the University of Ibadan was systematically divided into seven distinct areas:

1. School Gate: This includes the university's main entrance and surrounding environs. Photographic documentation was used to capture the landscape characteristics of this area.
2. Administrative Area: This encompasses the University Senate building, the university bookshop, the senate chambers, and the student affairs building.
3. Academic Area: Defined by all faculty buildings within the campus, this area includes lecture halls and offices of academic staff, such as those in the Faculty of Science, Faculty of Social Sciences, and Faculty of Education.
4. Religious Area: This area includes religious buildings such as the central mosque, the school chapel, and the Catholic Church.
5. Residential Area: This includes both junior and senior staff quarters where university staff reside.
6. Halls of Residence: This includes student housing areas such as Lord Tedder Hall, Mellanby Hall,
7. and Queen Elizabeth II Hall
8. Recreational Area: This includes areas designated for leisure and recreation, such as Gamaliel Onasode Park, Heritage Park, and the Student Union Building (SUB).

School Gate	Administrative Area	Academic Area	Religious Area	Residential Area	Recreational Area	Hall of Residence

Methods of Data Collection

The data collection methodology for this study involved the use of a questionnaire, a quantitative research method. A structured set of questions was designed to gather standardized data from a targeted sample of respondents, ensuring that all participants answered the same questions. The collected data were then analyzed using hypothesis testing methods and statistical techniques to identify patterns, trends, and associations among variables.

Questionnaire Administration

For this research, 50 questionnaires were randomly distributed to students and staff of the University of Ibadan. The questionnaire was divided into two sections:

Section 1 assessed the impact of sustainable landscape planning on the well-being of students at the University of Ibadan while Section 2 determined the effects of sustainable landscape planning on the learning and assimilation of students at the University of Ibadan. Thereafter, the data collected were analyzed using hypothesis testing method. Hypotheses were formulated based on the described survey outcomes and statistical methods were used to test them. The key aspects of the data include student well-being, academic performance, mental health, stress levels, physical health, and connection to nature, as well as the overall impact of sustainable landscape planning on their learning experiences.

Results and Discussion

Hypotheses Formulation

Hypothesis 1: Impact on Well-being

Null Hypothesis (H_0): Sustainable landscape planning has no significant impact on the well-being of students at the University of Ibadan.

Alternative Hypothesis (H_1): Sustainable landscape planning has a significant positive impact on the well-being of students at the University of Ibadan.

Hypothesis 2: Impact on Academic Performance

Null Hypothesis (H_0): Sustainable landscape planning has no significant impact on the academic performance of students at the University of Ibadan.

Alternative Hypothesis (H_1): Sustainable landscape planning has a significant positive impact on the academic performance of students at the University of Ibadan.

Data Summary

1. Well-being:
   - 76% rate the importance of landscape as 4 or 5.
   - 94.7% affirm the positive impact on academic experience.
   - 81.3% note improved mood or mental health.
   - 88% state a decrease in stress levels.
   - 80.7% agree that access to outdoor spaces positively influences physical health.
2. Learning and Assimilation:
   - 85.3% believe green spaces positively impact their learning experience.
   - 64.7% perceive the campus as conducive for learning.
   - 72.6% believe incorporating sustainable landscaping is important for universities.

Hypothesis Testing

A one-sample proportion test was used to determine if the observed proportions are significantly greater than a baseline (e.g., 50% which indicates a neutral effect).

Test 1: Impact on Well-being

Using the data, the Z-score for the proportion test was calculated and compared with the critical value for a given significance level (α = 0.05).

$$Z = \frac{\hat{p} - p_0}{\sqrt{\frac{p_0(1-p_0)}{n}}}$$

Where:

- $\hat{p}$ is the sample proportion.
- p_0 is the null hypothesis proportion (0.5).
- n is the sample size.

Data for Well-being:

1. Improved mood or mental health: 81.3% (0.813)
2. Sample size: 50

Calculations:

$$Z = \frac{0.813 - 0.5}{\sqrt{\frac{0.5 \times 0.5}{50}}}$$

```python
import math

# Given values
p_hat = 0.813
p_0 = 0.5
n = 50

# Z-score calculation
z_score = (p_hat - p_0) / math.sqrt((p_0 * (1 - p_0)) / n)
z_score
```

Test 2: Impact on Academic Performance

Data for Academic Performance:

1. Positive impact on learning: 85.3% (0.853)
2. Sample size: 50

$$Z = \frac{0.853 - 0.5}{\sqrt{\frac{0.5 \times 0.5}{50}}}$$

```python
# Given values for academic performance
p_hat_academic = 0.853

# Z-score calculation for academic performance
z_score_academic = (p_hat_academic - p_0) / math.sqrt((p_0 * (1 - p_0)) / n)
z_score_academic
```

The Z-scores were interpreted by comparing them with the critical value from the Z-table for α = 0.05 (Z = 1.645 for a one-tailed test).

Summary of Results

a. If Z > 1.645, we reject the null hypothesis in favor of the alternative hypothesis, indicating a significant positive impact.
b. If Z ≤ 1.645, we fail to reject the null hypothesis, indicating no significant impact.

To calculate the Z-scores for both hypotheses testing,

Well-being:

$$Z = \frac{0.813 - 0.5}{\sqrt{\frac{0.5 \times 0.5}{50}}}$$
$$Z = \frac{0.813 - 0.5}{\sqrt{\frac{0.25}{50}}}$$
$$Z = \frac{0.313}{\sqrt{0.005}}$$
$$Z = \frac{0.313}{0.0707}$$
$$Z \approx 4.43$$

Academic Performance:

$$Z = \frac{0.853 - 0.5}{\sqrt{\frac{0.5 \times 0.5}{50}}}$$
$$Z = \frac{0.853 - 0.5}{\sqrt{\frac{0.25}{50}}}$$
$$Z = \frac{0.353}{\sqrt{0.005}}$$
$$Z = \frac{0.353}{0.0707}$$
$$Z \approx 4.99$$

a. For Well-being: $Z \approx 4.43$
b. For Academic Performance: $Z \approx 4.99$

Both Z-scores are significantly greater than 1.645, so we reject the null hypothesis for both hypotheses, indicating a significant positive impact of sustainable landscape planning on the well-being and academic performance of students at the University of Ibadan.

Conclusion

The statistical analysis highlights the positive perceptions and significant impacts of sustainable landscape planning on students' learning experiences at the University of Ibadan. The data suggests that enhancing green spaces and sustainable landscape features could further improve student well-being, academic performance, and overall campus satisfaction. The findings advocate for increased investment in sustainable landscaping to foster a conducive and productive educational environment.

Conflict of interests
The authors declare no conflict of interest.

References

Ali, Salina & Othman, Noriah & Latif, Faridatul Akma & Awang, Abd & Rostam, Katiman. (2020). The Functions Of Landscape In School Learning Process. Planning Malaysia. 18. 10.21837/pm.v18i14.826.

Bondarenko, Iryna & Kokhan, Natalia & Gonchar, Olena & Bondarenko, Bohdan. (2020). Man-Made Landforms In Landscape Design Of Territories As A Means Of Solving Environmental Problems. Architecture, Civil Engineering, Environment. 12. 7-14. 10.21307/ACEE-2019-047.

Lerman, Susannah & Contosta, Alix & Milam, Joan & Bang, Christofer. (2018). To mow or to mow less: Lawn mowing frequency affects bee abundance and diversity in suburban yards https://www.nrs.fs.fed.us/pubs/55816. Biological Conservation. 221. 10.1016/j.biocon.2018.01.025.

Lovett, Andrew & O'Riordan, Timothy & Watkinson, Andrew. (2011). Sustainable landscape governance: Lessons from a catchment based study in whole landscape design. Landscape and Urban Planning - Landscape Urban Plan. 101. 179-189. 10.1016/j.landurbplan.2011.02.010.

Mitchell, Richard & Popham, Frank. (2007). Greenspace, urbanity and health: Relationships in England. Journal of epidemiology and community health. 61. 681-3. 10.1136/jech.2006.053553.

Olu, Joshua & Oare, Abdul-Ahad & Lucky, Ezekiel. (2018). Factors Affecting Landscape Design in Nigeria Tertiary Institution (A Case Study of Auchi Polytechnic). 10.13140/RG.2.2.36450.71361.

Ulrich S. Roger, Robert F. Simons, Barbara D. Losito, Evelyn Fiorito, Mark A. Miles And Michael Zelson, 1991, “Stress Recovery During Exposure To Natural And Urban Environments”, Journal Of Environmental Psychology Vol 11,Pp 201-230

Wu, Haixia, and Yan Ge. 2019. "Excessive Application of Fertilizer, Agricultural Non-Point Source Pollution, and Farmers’ Policy Choice" Sustainability 11, no. 4: 1165. https://doi.org/10.3390/su11041165