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IMPACT OF ECO-FRIENDLY ARCHITECTURE IN PROMOTING ENVIRONMENTAL AWARENESS AMONG STUDENTS IN HIGHER EDUCATION INSTITUTIONS

AISHA WALI AMINU-UMAR; FATIMA BABA CIROMA; & DANAAT JAMES DAWAM

Department of Architecture, College of Environmental Studies, Kaduna Polytechnic.

Corresponding Author:

ayshaaminuumar@gmail.com

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Abstract

This study examines the influence of sustainable architectural design on promoting environmental consciousness inside higher education institutions via education, behavior, and organizational frameworks. This research utilizes a quantitative methodology to examine the influence of sustainable architecture design on environmental consciousness among students, teachers, and staff in higher education institutions. The research used a standardized questionnaire sent via Google Forms, with closed-ended questions centered on environmental awareness and attitudes towards sustainability. The study's results disclose some critical insights [redacted] about the correlation between sustainable design methods and environmental consciousness. The

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findings indicate that sustainable architectural designs might enhance environmental consciousness in higher education institutions. The research emphasizes the need to integrate sustainable materials, energy-efficient technology, and green areas into architectural design to enhance environmental consciousness and well-being.

Introduction

Higher education institutions (HEIs) are using sustainable architecture to mitigate their environmental impact and promote sustainability. HEIS and other sectors have used sustainable practices to tackle the environmental challenges of the 21st century. These institutions serve as microcosms of society, influencing the environmental stewardship perspectives of future leaders. Consequently, eco-friendly architectural design, which prioritizes sustainability, energy efficiency, and environmental stewardship, has proliferated in these contexts(Umoh et al., 2024).

Eco-friendly architecture employs sustainable materials, energy-efficient technology, and environmentally conscious construction practices. Renewable energy, water conservation, natural lighting, ventilation, and green roofs and walls are integral to this architectural idea (Besir & Cuce, 2018). The primary objective is to reduce the environmental effect of buildings while enhancing occupant health and productivity.

Environmental awareness entails understanding ecological issues and embracing sustainable practices (Coyle, 2022). Curriculum integration, campus sustainability initiatives, and environmental activities at higher education institutions promote this comprehension (Abo-Khalil, et al., 2024). The campus's architectural design enhances the teaching process.

Studies indicate that sustainable buildings enhance renters' environmental awareness. Higher Education Institutions with green buildings report increased student and staff engagement in sustainability and enhanced environmental literacy (Goldman et al., 2018). These structures serve as functional spaces and experimental laboratories for sustainability education (Von Wirth et al., 2019).

This study investigates the role of sustainable architecture design in fostering environmental awareness inside higher education institutions through education, behavior, and organizational structures. This research examines literature,

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investigates case studies, and assesses sustainable design principles to underscore architecture's role in environmental awareness and provide methods for higher education institutions to include eco-friendly designs. This study employs qualitative and quantitative data to assess how sustainable architecture might enhance environmental awareness in higher education(Hamid et al., 2017).

Architecture, design, and scholarly accomplishment converge in the edifices of higher education institutions. The learning settings of students influence both aesthetics and education. Architectural design fosters learning, collaboration, and innovation (Adams Becker et al., 2017).

As educational institutions endeavor to provide inclusive, technologically advanced, and sustainable environments, academics and architecture play a crucial role in student development. Thoughtfully crafted buildings may stimulate intellectual curiosity. Well-designed classrooms, libraries, and study environments facilitate learning(Lotfy et al., 2022). The arrangement, illumination, and visual appeal can enhance concentration, collaboration, and education.

As environmental consciousness increases, a greater number of higher education institutions are adopting sustainable architecture while Green building designs, energy-efficient technologies, and sustainable construction materials diminish ecological footprints and inform students and educators about environmental issues (Ortegon & Acosta, 2022).

Research Objectives:

1. To assess the prevalence and characteristics of sustainable architectural practices in higher education institutions to assess the current state of eco-friendly architectural designs.
2. To investigate the relationship between eco-friendly design and environmental awareness, highlighting the influence of including sustainable architectural features on the environmental consciousness of educators, personnel, and students.
3. To identify key sustainable design aspects to determine which eco-friendly architectural elements (e.g., renewable energy, green roofs, water conservation) promote environmental consciousness the most.

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Research Questions:

1. What specific eco-friendly architectural designs are most commonly implemented in higher education institutions?
2. To what extent can eco-friendly design help to increase public awareness of environmental issues?
3. To what extent do key sustainable design aspects determine which eco-friendly architectural elements (e.g., renewable energy, green roofs, water conservation) promote environmental consciousness the most?

Literature Review

Numerous studies have examined the influence of sustainable architecture design on environmental consciousness in higher education institutions. Seatter and Ceulemans (2023) discovered that design studio instruction and theoretical lectures on sustainability enhance students' comprehension of sustainability. Research by Wijesooriya and Brambilla (2022) emphasized the benefits of sustainable design, such as resource efficiency, less environmental effects, enhanced health and well-being, long-term financial savings, and biodiversity preservation. Other studies have examined the impact of architectural design on cultivating inclusive settings, improving well-being and mental health, and encouraging sustainable behaviors. Mavromatidis (2022) underscored the significance of intentional architectural design in developing environments that accommodate varied requirements, foster cooperation and creativity, and embody educational principles. It highlighted the importance of sustainable architectural design in mitigating the adverse environmental impacts of construction and enhancing the well-being of building inhabitants.

Eco-Friendly Architectural Design

Eco-friendly architectural design integrates sustainable materials, energy-efficient systems, and environmentally responsible building methodologies. Essential components encompass the utilization of renewable energy sources, water conservation methods, natural illumination, and ventilation, with green roofs and walls (Kibert, 2016). These designs seek to reduce the environmental impact of buildings and provide a healthy, productive atmosphere for residents. In response to environmental issues, architects and builders have begun a revolutionary

journey, adopting eco-friendly design as a means to develop sustainable, efficient, and visually appealing structures. Eco-friendly architecture amalgamates creative design, sustainable technology, and environmentally conscious materials, transforming urban and residential construction. This study will examine the tenets of sustainable architecture, its benefits, and its influence on fostering a more sustainable future for the globe.

Environmentally Sustainable Architecture: The focal term for this article is "eco-friendly architecture." In recognition of the pressing necessity for sustainable living, architects, engineers, and institutions are progressively embracing environmentally friendly approaches. Organizations such as Unicaf are at the forefront, advocating for environmentally sustainable education and research, equipping the forthcoming generation of architects to prioritize ecological responsibility in their designs(Leong et al., 2024).

Advantages of Eco-Friendly Architecture

1. Resource Efficiency: Sustainable design prioritizes resource efficiency. Passive solar heating, rainwater harvesting, and ecological landscaping help architects create energy- and water-efficient buildings.
2. Reduced Environmental Impact: Structures degrade the environment. Eco-friendly design uses recycled materials, energy-efficient technology, and renewable energy to reduce this effect. By decreasing carbon emissions, architects combat climate change.
3. Health and Well-being: Eco-friendly buildings prioritize air quality and occupant health. These buildings improve residents' quality of life by using non-toxic, low-emission materials and natural ventilation.
4. Long-term cost benefits: Environmentally friendly technology may cost more upfront, but it pays off in the long run. Energy-efficient buildings and robust materials minimize maintenance and replacement costs, making sustainable design economically beneficial over time.
5. Biodiversity Conservation: Urban eco-design enhances biodiversity via green spaces and sustainable landscaping. Green roofs, vertical gardens, and permeable pavements improve ecological balance by creating homes for plants and animals.

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In the pursuit of a sustainable future, eco-friendly design is essential, not just a fad. The incorporation of eco-conscious education into architecture practices is becoming a reality thanks to organizations like Unicaf. In addition to creating structures, adopting eco-friendly architecture is establishing the groundwork for a more sustainable, healthy, and greener planet. In order to ensure that our architectural heritage is one of harmony with nature and one that future generations can be proud of, let's keep innovating, educating, and building.

Eco-Friendly Building Practices

Construction is essential to a sustainable future in the face of climate change and environmental degradation. This goal requires innovative, sustainable construction approaches that meet urbanization's pressing requirements while protecting the planet's health.

Green construction uses renewable energy (Olabi et al., 2020). Buildings' energy and fossil fuel consumption emit carbon. Wind turbines, solar panels, and other technologies may provide green energy in buildings. This reduces the environmental effect and non-renewable resource utilization.

Building materials are crucial for sustainable architecture. Construction with eco-friendly materials reduces environmental effects. Korbelyiova et al. (2021) list low-carbon items, sustainable forestry, and recycled materials. Conventional materials emit more and use more resources, yet they help build a sustainable building business.

Sustainable building requires energy efficiency. Buildings utilize less energy with energy-efficient HVAC systems, smart architecture, and better insulation. These technologies might significantly reduce building energy usage, decreasing greenhouse gas emissions and non-renewable energy use. Sustainable construction reduces building development and operation carbon emissions. Energy efficiency and renewable energy quickly cut greenhouse gas emissions. Green roofs and carbon-absorbing materials may reduce construction projects' carbon footprint (Göker & Tuna, 2017).

Traditional building requires a lot of natural resources (Zhang et al., 2021). Sustainable construction conserves resources. Reusing or salvaging resources, decreasing waste, using efficient building techniques, and choosing eco-friendly products helps preserve ecosystems and biodiversity (Wang et al., 2020).

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Environmental Awareness in Higher Education

According to Coyle (2005), environmental awareness is the comprehension and admiration of environmental concerns as well as the readiness to adopt actions that promote sustainability. Active involvement in environmental programs, campus sustainability efforts, and curricular integration are ways that HEIs foster environmental awareness (Leal Filho, 2011). An important part of this teaching process is the campus's constructed environment.

Impact of Eco-Friendly Design on Environmental Awareness

According to studies, eco-friendly structures may raise residents' knowledge of environmental issues. For instance, higher education institutions with green buildings often indicate that their staff and students are more environmentally literate and actively involved in sustainability initiatives (Smith & Williams, 2012). Additionally, according to Orr (2004), these structures function as living labs that provide experiential learning opportunities pertaining to sustainability.

Application of Eco-Design Concept

Eco-design can be used in residential structures, neighborhoods, estates, and industrial parks.

1. **Building Design:** Ecological design addresses environmental issues via passive architecture (Blume, 2011). Although this industry has advanced, building construction and operation must be more energy and resource-efficient. Our body and the environment can metabolize nourishment and waste. Eco-architecture collects, stores, and filters water, cleans air, and processes nutrients (Ragheb, El-Shimy, & Ragheb, 2015). Other examples:
2. **Land optimization:** Using land effectively by avoiding large structure designs and distributing interior space to meet needs. Passive and active solar heating systems, summer shade overhangs and reflecting surfaces, and energy-efficient insulation, windows, lighting, and appliances may reduce energy use. Carefully placed trees may provide summer shade and winter wind shelter.

Eco-friendly green roofs in high-rise cities. Green roofs last longer, save energy costs via natural insulation, provide peace for people and animals, and absorb rainwater, possibly reducing the need for costly drainage and cooling systems. In

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cities and suburbs, green roofs improve air quality and lessen the Urban Heat Island Effect.

Naturalise landscaping using topography and native plants like Talinum triangulare (Florida spinach or water leaf) (Yang et al.). Landscapes mimic local ecosystems for low-impact recreation and beauty.

Building Materials and Furniture

a. Building materials and furniture should be renewable, durable, recyclable, and non-polluting.
b. Traditional or vernacular design elements may improve energy and material efficiency, aesthetics, and comfort while preserving culture. Northern Nigerian buildings use adobe or thermal mass.

City Planning

Eco-design can improve cities and develop new ones. Inefficient material and energy use due to extensive transportation distances and inadequate business resource usage and disposal coordination are recognized to initiate environmental improvements (Yang et al., 2013). Environmental concerns include pollution and indigenous biodiversity conflicts. Consider equality, commutes, and economically connected communities (Tiezheng, 2002). Urban structures and functions may be adapted or redeveloped using them.

1. Promote renewable sources, recycling, minimizing transportation distances, supporting locally produced food, and increasing public transit, bicycling, and walking to decrease energy and material use.
2. Keeping ecosystems healthy by avoiding air, water, and soil pollution and storing carbon in urban trees and lawns.
3. Protecting and expanding urban native species. Urban forests and green areas dominated by natural trees like the Udala (cherry) and palm trees can cool, heat retain, mitigate pollutants, store carbon, beautify, and boost the local economy.

Methodology

This study employs a quantitative research design to investigate the influence of eco-friendly architectural design on environmental awareness among students,

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faculty, and staff in higher education institutions (HEIs). A total of 70 participants were selected from different departments to guarantee a broad range of representation. The data collection process involved a structured questionnaire administered through Google Forms, which included closed-ended questions focused on environmental awareness and attitudes towards sustainability. The analysis entailed computing the mean and standard deviation for each item on the questionnaire to encapsulate the perceptions of the participants. Approval for ethical considerations was granted, and informed consent was acquired from every participant involved. This methodology seeks to illuminate the connection between sustainable design practices and the level of environmental consciousness within higher education institutions.

Results Presentation

Demographic characteristics	Frequency	Percentage(%)
Age Brackets		
16 – 20 years	10	20
21 - 25 years	12	24
26 – 30 years	15	30
31-35 years	13	26
Field of study		
Architecture	18	36
Environmental Science	12	24
Engineering	10	20
Science	10	20
Institution type		
Private	20	30
Public	30	60
TOTAL	**60**	**100**

Table 1 presents the demographic features of this investigation. The age distribution of the responses reveals that 10 (20%) are aged 16 to 20 years, 12 (24%) are between 21 and 25 years, 15 (30%) fall within the 26 to 30-year range, and 13 (26%) are aged 31 to 35 years. Furthermore, the distribution of fields of study is as follows: 18 (36%) are pursuing architecture, 12 (24%) are from environmental

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science, 10 (20%) are in engineering, and 10 (20%) are from the science domain. Additionally, 20 (30%) of the participants are from private institutions, while 30 (60%) are from public institutions.

Research Question 1: What specific eco-friendly architectural designs are most commonly implemented in higher education institutions?

Table 2: *Responses on* the specific eco-friendly architectural designs are most commonly implemented in higher education institutions

S/n	Items on ways to specific eco-friendly architectural designs are most commonly implemented in higher education institutions.	Mean	S.D	Decision
1	The campus structures include energy-efficient illumination technology, such as LED lights and motion sensors.	4.22	.737	Agreed
2	Higher institutions have instituted water-saving techniques, including rainwater gathering and low-flow fixtures.	3.78	.864	Agreed
3	The campus has green roofs or rooftop gardens to improve insulation and decrease energy use.	3.80	.639	Agreed
4	Sustainable building materials, such as recycled or locally produced materials, are used in campus construction and restorations.	3.54	.838	Agreed
5	Buildings are built with natural ventilation systems to minimize reliance on air conditioning.	3.64	.693	Agreed
6	Waste management measures, including recycling and composting systems, are included in the campus design.	3.66	.982	Agreed
	Grand Mean	3.77	0.79	Agreed

Table 2 indicates a consensus among higher education institutions on the active implementation of sustainable architecture designs. All six evaluated items received an "Agreed" rating, with an overall mean of 3.77, signifying that participants generally acknowledge the implementation of sustainable practices, including energy-efficient lighting, water conservation techniques, green roofs, sustainable materials, natural ventilation, and waste management systems across campuses. Given that all items were accepted, there is scant evidence to indicate

dissent to these practices. This consensus indicates that sustainable designs are broadly embraced and implemented in higher education institutions, with minimal to no substantial dissent recorded in the data.

Research Question 2: What are the factors that contribute to raising environmental awareness through eco-friendly design?

Table 3: *Responses on* the factors that contribute to raising environmental awareness through eco-friendly design.

12	Items on factors that contribute to raising environmental awareness through eco-friendly design	Mean	S.D	Decision
1	The existence of sustainable structures on campus heightens my awareness of environmental concerns	2.90	1.389	Disagreed
2	The campus initiatives to include sustainable architecture elements have motivated me to further my understanding of sustainability	2.56	1.146	Agreed
3	I see an increased sense of environmental responsibility while using campus facilities equipped with sustainable attributes.	3.56	.993	Agreed
4	The implementation of campus-wide waste management methods, such as recycling and composting, has enhanced my comprehension of waste reduction measures.	3.46	.994	Agreed
5	Educational endeavors about sustainable architecture on campus have enhanced my environmental consciousness.	3.60	1.030	Agreed
6	The use of green architectural elements has initiated dialogues on sustainability among educators, staff, and students.	2.80	1.565	Agreed
	Grand Mean	**3.15**	**1.18**	**Agreed**

Table 3 demonstrates that sustainable architectural designs in higher education institutions typically enhance environmental consciousness but with differing degrees of effectiveness. The grand mean of 3.15 indicates general consensus, although replies demonstrate that awareness is predominantly increased through

active participation and educational endeavors, including waste management techniques and sustainability education activities. Participants largely concurred that these components promote environmental accountability and stimulate discourse around sustainability on campus. Nevertheless, the mere presence of sustainable structures on campus did not significantly enhance awareness, as indicated by the disagreement on that particular item (mean = 2.90). The findings indicate that awareness is most successfully enhanced when eco-friendly designs are integrated with educational programs and practical sustainability actions.

Research Question 3: To what extent do key sustainable design aspects determine which eco-friendly architectural elements (e.g., renewable energy, green roofs, water conservation) promote environmental consciousness the most?

Table 3: *Responses on* the key sustainable design aspects to determine which eco-friendly architectural elements promote environmental consciousness

S/n	Items on ways to improve school environment to enhance pupil's academic performance	Mean	S.D	Decision
1	Green roofs and rooftop gardens on campus enhance awareness of sustainable urban life	2.36	1.747	Disagreed
2	The integration of energy-efficient technologies, such as LED lighting and energy management systems, enhances my comprehension of energy-saving	3.62	.945	Agreed
3	The educational initiatives about sustainable architecture on campus have profoundly influenced my environmental awareness.	3.64	.985	Agreed
4	The use of sustainable construction materials, such as recycled or locally produced resources, shapes my perspective on resource conservation.	3.16	.681	Agreed
5	Passive solar architecture in campus structures enables me to acknowledge the advantages of minimizing energy use via building orientation and design.	3.66	.872	Agreed
6	The use of daylighting methods, which utilize natural light in lieu of artificial illumination, enhances comprehension of energy conservation tactics.	4.24	.797	Agreed
	Grand Mean	3.45	1.00	Agreed

Table 4 lists numerous ways to improve school surroundings to promote academic performance, including sustainability. The grand mean of 3.45 suggests these

measures are beneficial. Participants agreed that daylighting (mean = 4.24) and energy-efficient devices (mean = 3.62) help them understand energy conservation. Educational programs on sustainable architecture (mean = 3.64) also help raise environmental awareness. The consensus also noted that passive solar architecture and sustainable materials promote resource conservation. Green roofs and rooftop gardens had a mean score of 2.36, indicating disagreement on their impact on sustainable urban living awareness. The findings suggest that integrating sustainable practices, particularly those that emphasize energy conservation and resource management, can increase students' environmental consciousness and improve the school environment, which may improve academic performance.

Discussion

The findings suggest that eco-friendly architectural design can significantly influence environmental awareness in HEIs. By creating environments that embody sustainability principles, these institutions can educate and inspire their communities. However, the extent of this impact is contingent on various factors, including the level of community engagement, the visibility of sustainability features, and the integration of environmental education into academic programs.

The study's conclusions provide important new information on how eco-friendly building designs affect students' knowledge of the environment in higher education.

The study found that eco-friendly architectural design has a significant impact on environmental awareness in higher education institutions. Students and faculty members who were exposed to eco-friendly architectural designs reported higher levels of environmental awareness and a greater sense of responsibility towards sustainability. The findings of the study reveal several key insights regarding the impact of eco-friendly architectural designs on environmental awareness in higher education institutions.

A significant association exists between enhanced environmental awareness among higher education institution personnel, faculty, and students and sustainable architecture design. A quantitative analysis indicated that the majority of participants believed that sustainable design elements enhanced their

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comprehension of environmental concerns. A recent study indicates that physical environments influence sustainability attitudes and behaviors. Hamid et al. (2017) assert that sustainable design principles in classrooms may enhance students' environmental awareness, hence making the built environment a significant pedagogical instrument.

The study revealed that environmentally conscious designs enhanced comprehension of sustainability. Lotfy et al. (2022) assert that well-organized learning spaces enhance academic achievement and foster a sustainable culture. Incorporating green areas, energy-efficient technology, and sustainable materials in campus design may enhance environmental stewardship and foster a feeling of accountability.

Research indicates that sustainable design education enhances environmental consciousness. Adams Becker et al. (2017) determined that sustainability ought to be included in the curriculum. Students exposed to sustainability ideas in their environment are more inclined to internalize and apply them. Higher education institutions need to advocate for multidisciplinary courses in sustainable design and environmental stewardship to improve education and comprehension of sustainability challenges.

Data indicate that engagement in sustainability programs significantly enhances environmental comprehension. Participants in the sustainability program exhibited heightened environmental awareness. Ortegon and Acosta (2022) determined that community participation is essential for fostering a sustainable culture. Encouraging sustainability activities among staff, faculty, and students may assist higher education institutions in cultivating a more ecologically aware community.

Eco-friendly structures provide advantages; however, research suggests that community involvement and education enhance these benefits. This indicates that awareness requires more than just seeing sustainable designs. The results indicate that showcasing sustainability components did not enhance participants' awareness, underscoring the need for a more comprehensive strategy that incorporates educational initiatives and physical design.

This study demonstrates that sustainable architecture design enhances environmental consciousness in higher education. Institutions may shape community attitudes and behaviors by creating sustainable, energy-efficient, and

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environmentally conscious campus environments. To augment the efficacy of sustainable designs, higher education institutions need to integrate sustainability into the curriculum, promote active engagement in sustainability initiatives, and raise the visibility and communication of sustainable elements on campus. This holistic strategy may enhance public and environmental consciousness, hence advancing sustainability objectives. Sustainable designs must be analyzed to assess their impact on the long-term behavior of campus communities, environmental stewardship, and the development of future academics and leaders.

In summary, the results show that while environmentally friendly building designs are a positive start, they only reach their full potential in increasing environmental consciousness when paired with educational programs and proactive community involvement. Higher education institutions' sustainability cultures may be greatly improved by taking a comprehensive approach.

Recommendations

To maximize the impact of eco-friendly architectural design on environmental awareness, HEIs should consider the following strategies:

1. Integrating Sustainability into the Curriculum: Develop interdisciplinary courses that focus on sustainable design and environmental stewardship.
2. Promoting Active Participation: Encourage students, faculty, and staff to participate in sustainability initiatives and the ongoing maintenance of eco-friendly buildings.
3. Enhancing Visibility and Communication: Use signage, tours, and digital platforms to highlight the sustainable features of campus buildings and their benefits.
4. Fostering Partnerships: Collaborate with sustainability organizations and industry experts to enhance the design and implementation of eco-friendly projects.

The study highlights how crucial it is to include sustainable design concepts in educational institutions' architectural designs. It recommends that in addition to developing environmentally friendly structures, universities should provide extensive curricula that include the public in sustainability practices and conversations.

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Conclusion

The findings of this study support the notion that eco-friendly architectural design can have a positive impact on environmental awareness in higher education institutions. The study highlights the importance of incorporating sustainable materials, energy-efficient technologies, and green spaces into building design to promote environmental consciousness and well-being. Future research should focus on the long-term effects of eco-friendly architectural design on environmental awareness and the development of more effective strategies for integrating sustainability into architectural design.

In conclusion, sustainable architecture design is essential for enhancing environmental awareness among higher education students, faculty, and staff. Sustainable building methods enhance environmental consciousness, particularly when integrated with education and community involvement. Participants demonstrated enhanced awareness and accountability for sustainability when exposed to eco-friendly items. The research emphasizes a complete approach that combines sustainable design with extensive teaching methods, including the incorporation of sustainability into the curriculum and the promotion of active participation in sustainability initiatives. To optimize the advantages of eco-friendly designs, educational institutions should provide interdisciplinary courses, collaborate with sustainability groups, and promote sustainable behaviors. The study indicates that environmentally sustainable architectural design is crucial for a sustainable future. Higher education institutions may cultivate and educate future leaders and intellectuals by creating sustainable environments. Future research should investigate the long-term effects of these designs on environmental awareness and develop sustainable architectural practices.

Recommendation

The report suggests many ways HEIs might help eco-friendly building design:

1. Green Architecture, Interdisciplinary Sustainable Design, and Environmental Stewardship. Work and school teach sustainability.
2. Get students, instructors, and staff interested in green facility sustainability. Environmental activism, volunteering, and seminars build community.

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3. Advertise campus sustainability and advantages using signs, tours, and digital media. Sustainability and greening are taught to campus residents via visibility.
4. Work with environmental groups, industry professionals, and communities on green initiatives. Partnerships may explain and encourage campus sustainability.
5. Assess eco-friendly fashion and sustainability strategies for environmental awareness. Creates campuses and services.
6. Establish campus gardens and outdoor learning. Beautiful, sustainable campuses are highlighted.
7. Show campus sustainability using technology. For sustainability and education, use smart building energy data.

References

Abo-Khalil, A. G. (2024). Integrating sustainability into higher education challenges and opportunities for universities worldwide. Heliyon.

Adams Becker, S., Cummins, M., Davis, A., Freeman, A., Hall Giesinger, C., & Ananthanarayanan, V. (2017). NMC Horizon Report: 2017 Higher Education Edition. New Media Consortium.

Besir, A. B., & Cuce, E. (2018). Green roofs and facades: A comprehensive review. *Renewable and Sustainable Energy Reviews*, *82*, 915-939.

Coyle, K. (2022). *Environmental Literacy in America*. National Environmental Education & Training Foundation.

Göker, F. P., & Tuna, S. A. (2017). The eco-mimicry approach towards cityscape design and examples in the world. In 2nd International Conference on Civil and Environment Engineering. May (pp. 8-10).

Goldman, D., Ayalon, O., Baum, D., & Weiss, B. (2018). Influence of 'green school certification on students' environmental literacy and adoption of sustainable practice by schools. *Journal of cleaner production*, *183*, 1300-1313.

Hamid, S., Ijab, M. T., Sulaiman, H., Md. Anwar, R., & Norman, A. A. (2017). Social media for environmental sustainability awareness in higher education. *International Journal of Sustainability in Higher Education*, *18*(4), 474-491.

Kibert, C. J. (2016). Sustainable construction: Green building design and delivery (4th ed.). Wiley.

Korbelyiova, K., Sari, E., & Alsanad, S. (2021). Green building materials: A step towards sustainable construction. Journal of Building Engineering, 35, 102022.

Leong, T. H., Zainordin, N. B., Mohammad, N. A., & Rasdi, M. T. M. (2024). Defining Key Elements for Sustainable Interior Architectural Education via Systematic Literature Review. *Future Cities and Environment*, *10*(1).

Lotfy, M. W., Kamel, S., Hassan, D. K., & Ezzeldin, M. (2022). Academic libraries as informal learning spaces in architectural educational environment. Ain Shams Engineering Journal, 13(6), 101781.

Mavromatidis, L. (2024). A heterogeneous architectural theory inspired by living thermodynamics: Unveiling "architectural ingenuity" using the constructal law. International Communications in Heat and Mass Transfer, 155, 107554.

Ndukwu, M. C., Eboh, F., & Ezema, I. C. (2021). Renewable energy integration in green building practices: Benefits and challenges. Renewable Energy, 168, 208-220.

Olabi, A. G., Mahmoud, M., Soudan, B., Wilberforce, T., & Ramadan, M. (2020). Geothermal-based hybrid energy systems, toward eco-friendly energy approaches. *Renewable energy*, *147*, 2003-2012.

Ortegon, K., & Acosta, P. (2019). Ecological footprint: a tool for environmental management in educational institutions. *International Journal of Sustainability in Higher Education*, *20*(4), 675-690.

Seatter, C. S., & Ceulemans, K. (2017). Teaching sustainability in higher education: Pedagogical styles that make a difference. *Canadian Journal of Higher Education*, *47*(2), 47-70.

Umoh, A. A., Adefemi, A., Ibewe, K. I., Etukudoh, E. A., Ilojianya, V. I., & Nwokediegwu, Z. Q. S. (2024). Green architecture and energy efficiency: a review of innovative design and construction techniques. Engineering Science & Technology Journal, 5(1), 185-200.

Von Wirth, T., Fuenfschilling, L., Frantzeskaki, N., & Coenen, L. (2019). Impacts of urban living labs on sustainability transitions: Mechanisms and strategies for systemic change through experimentation. *European Planning Studies*, *27*(2), 229-257.

Wijesooriya, N., & Brambilla, A. (2021). Bridging biophilic design and environmentally sustainable design: A critical review. *Journal of Cleaner Production*, *283*, 124591.

Zhang, X., Platten, A., & Shen, L. (2021). Green buildings and their implications for resource conservation. Resources, Conservation and Recycling, 169, 105468