VOL. 08 NO. 2,
MAY, 2025
E-ISSN 3027-1533
P-ISSN 3026-8648

African Scholar Publications & Research International
www.africanscholarpub.com

Journal of African Innovation & Advanced Studies (JAIAS)

Sustainable and Inclusive Architectural Design for Orphans: How Biophilic Principles Can Transform Vocational Education Spaces in Ikorodu, Lagos

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DOI: https://doi.org/10.70382/ajaias.v8i2.042

Abstract

This study explores the integration of biophilic design principles into vocational education spaces for orphans in Ikorodu, Lagos, with a focus on creating sustainable and inclusive environments that enhance both educational outcomes and emotional well-being. Using a mixed-methods case study approach, data were collected through surveys, interviews, and field observations at two sites—Rotary Vocational Centre, Igbogbo, and Hikanos Orphanage Home, Igbogbo. A total of 196 respondents, including orphans, caregivers, vocational trainees, instructors, and community stakeholders, participated in the study. The findings highlight the positive impact of biophilic elements such as natural light, ventilation, greenery, and sensory engagement in fostering cognitive performance, reducing stress, and supporting psychological healing. The study concludes with recommendations for designing vocational centers that integrate practical skill acquisition with therapeutic and environmentally responsive features, thereby contributing to the holistic development of orphaned youth.

Keywords: Vocational Education, Biophilic Design, Orphans, Sustainable Architecture, Emotional Resilience.

Introduction

In an increasingly urbanized world, the importance of sustainable and inclusive design cannot be overstated, particularly in the context of educational spaces. The architectural design of vocational training centers, especially for marginalized communities like orphans, holds the potential to profoundly impact both learning outcomes and the psychological well-being of students (Helles, 2021). Orphans in regions like Ikorodu, Lagos, often face significant social and emotional challenges, which can hinder their educational development. It is therefore crucial that these spaces not only address functional and technical needs but also create environments that foster resilience, well-being, and cognitive engagement.

Biophilic design, an approach that integrates nature into the built environment, offers a compelling solution to this challenge. This design philosophy emphasizes the inherent human connection to nature and suggests that incorporating natural elements into learning environments can have profound benefits for both physical health and cognitive performance (LS, 2024). Research has shown that access to natural light, green spaces, and elements that mimic nature can improve concentration, reduce stress, and enhance creativity (Browning & Determan, 2024). For orphans in vocational training programs, biophilic design principles could be transformative, providing not only a physical space conducive to learning but also a psychological sanctuary that supports emotional healing and personal growth (El-Sayed et al., 2025).

While biophilic design has been studied in general educational environments, limited research has focused on its application within vocational centers for orphans in developing contexts such as Nigeria. Existing literature largely emphasizes primary and secondary schools, overlooking how vocational training spaces might integrate nature to support both skill acquisition and socio-emotional needs. This gap is particularly critical in Ikorodu, Lagos, where orphaned youth are disproportionately affected by educational inequality, psychological trauma, and lack of supportive infrastructure.

This study therefore addresses this knowledge gap by investigating how biophilic design principles can be applied to vocational education spaces for orphans in Ikorodu. It seeks to demonstrate how sustainable and inclusive architectural design can foster both academic success and emotional resilience, thereby contributing to the holistic development of vulnerable populations.

The study aims to create a sustainable and inclusive architectural model that serves as a therapeutic space, promoting both vocational training and emotional healing for marginalized youth in Ikorodu. This study addresses these challenges by focusing on three objectives:

i. To assess the current challenges and limitations of existing vocational training environments for orphans in Ikorodu with respect to educational delivery and psychological support.
ii. To explore and integrate relevant biophilic design strategies that can improve the learning experience, emotional healing, and cognitive development of orphaned children in vocational education settings.
iii. To develop an architectural design proposal for a vocational center that combines functional skill acquisition spaces with biophilic elements, fostering a sustainable, inclusive, and therapeutic learning environment for orphans.

LITERATURE REVIEW

The intersection of sustainable architecture, inclusive design, and the specific needs of marginalized groups has gained considerable attention in recent years. Among the most vulnerable groups, orphans face unique challenges that not only affect their education but also their social, emotional, and psychological development. As urban environments like Ikorodu continue to grow, the demand for educational facilities that can cater to vulnerable populations, particularly orphans, is becoming more urgent (Ojo et al., 2022). Architectural design plays a crucial role in shaping the experiences of those within these spaces, and this is particularly true for vocational training centers, where young individuals are not only acquiring skills but also undergoing emotional and psychological development. One approach that has gained traction is biophilic design, which integrates natural elements into the built environment to enhance well-being and cognitive performance.

Sustainable and Inclusive Design

Sustainable architecture focuses on creating environments that are ecologically responsible, resource-efficient, and attuned to the well-being of their occupants. This form of design is particularly important in the context of educational environments, where energy efficiency, resource conservation, and environmental health can significantly influence learning outcomes (Al-Kaissi & Kadhum, 2020). Inclusive design, on the other hand, emphasizes the creation of spaces that are accessible to all, regardless of their physical, cognitive, or emotional abilities. When combined, sustainable and inclusive design principles can help create environments that promote both ecological stewardship and social equity (Jung, 2025).

In the context of orphaned youth in Ikorodu, the need for inclusive design goes beyond physical accessibility. It involves creating spaces that provide emotional and psychological support, which is essential for individuals who may have experienced trauma, loss, or neglect (Randazzo et al., 2023). The emotional well-being of orphans, especially in educational settings, is directly influenced by their surroundings. Spaces that

are poorly designed can exacerbate feelings of isolation and anxiety, whereas those that prioritize inclusivity and comfort can facilitate healing and personal growth.

Biophilic Design: Bridging Nature and Education

Biophilic design, which emphasizes a connection to nature, is particularly relevant in the context of orphans' education. The theory behind biophilic design is rooted in the idea that humans have an inherent bond with nature, and exposure to natural elements can lead to improved cognitive functioning, reduced stress levels, and enhanced emotional resilience (Browning & Determan, 2024). In educational spaces, these benefits are particularly critical, as students especially those from disadvantaged backgrounds are likely to face higher levels of stress and anxiety that can impede their learning and overall development. Several studies have demonstrated the positive effects of biophilic design on learning environments. For example, natural light, green plants, water features, and views of outdoor landscapes have all been shown to improve student performance, reduce absenteeism, and enhance mood. In the context of vocational training for orphans, these elements can serve a dual purpose: not only improving cognitive outcomes but also promoting emotional well-being by offering a nurturing environment (Mafumbate, 2025). Biophilic principles such as natural ventilation, daylight optimization, and the incorporation of nature into architectural features like walls and ceilings can create a calming and restorative atmosphere that supports the mental and emotional health of students.

Psychological Impact of Biophilic Design on Vulnerable Populations

The psychological impact of biophilic design is especially pronounced for vulnerable populations like orphans, who may experience heightened levels of emotional distress and social isolation (El-Sayed et al., 2025). Research in environmental psychology has shown that the presence of nature can reduce symptoms of depression, anxiety, and post-traumatic stress disorder (PTSD), all of which are prevalent among orphaned children. In vocational training centers, where individuals are often dealing with the stress of learning new skills and transitioning into adulthood, the design of the space can play a significant role in alleviating these stressors (Browning & Determan, 2024).

Natural elements such as sunlight, indoor plants, and the incorporation of natural materials (wood, stone, etc.) can have restorative effects on the mind, helping to create a sense of safety and tranquility. Biophilic design encourages sensory engagement, which can be particularly beneficial for orphans who may have had limited exposure to positive, sensory-enriched environments (Aristizabal et al., 2021). The therapeutic potential of such designs is crucial for fostering resilience and promoting healthy emotional development in these individuals.

The Role of Architecture in Vocational Education

Vocational education centers serve as a critical space for developing practical skills that are essential for socioeconomic mobility. For orphans, vocational training can be a lifeline that provides the tools needed for self-sufficiency and independence (Sudarso, 2024). However, the effectiveness of these centers is not solely determined by the curriculum or training methods. The architectural quality of the space has a profound impact on how students engage with the material, how they interact with their peers, and how they develop a sense of identity and belonging.

A well-designed vocational education center goes beyond mere functionality; it fosters an environment where students feel supported and motivated (Held & Mejeh, 2024). In the case of orphans, this is even more crucial. These individuals often face additional barriers to education, such as lack of family support or a sense of disconnectedness from society. By prioritizing inclusive design and integrating biophilic principles, vocational education centers can help to bridge the gap between education and emotional healing, creating a space that is both conducive to learning and healing.

Implementation Barriers and Critiques

While the potential of sustainable, inclusive, and biophilic design is well-documented, several challenges limit their practical adoption in vocational education settings for orphans. First, the cost of biophilic features such as green walls, advanced ventilation systems, and water installations can be prohibitive in low-resource contexts, especially where funding for orphanage facilities is already constrained (Al-Kaissi & Kadhum, 2020). Second, maintenance difficulties for example, sustaining indoor plants and natural ventilation in tropical climates like Lagos may discourage long-term adoption. Third, cultural and policy-related barriers exist; stakeholders may undervalue natural or therapeutic design elements compared to traditional infrastructure, focusing instead on capacity expansion. Finally, scholars such as (Gaekwad et al. 2022) caution against assuming that biophilic interventions have universal benefits, since responses to natural elements can vary across cultures and socio-economic backgrounds. These critiques highlight the need for context-sensitive approaches that balance innovation with feasibility, sustainability, and cultural acceptance.

Gaps in the Literature

While there is significant research on biophilic design's impact on general educational spaces and the potential benefits for vulnerable populations, there remains a notable gap in studies focused specifically on orphaned youth and vocational training environments in the context of developing countries like Nigeria (El-Sayed et al., 2025). Existing studies have largely concentrated on primary and secondary schools, with less emphasis on how biophilic design can be adapted for vocational training centers. Research examining the

interplay between biophilic design, emotional healing, and vocational education for orphans is limited, especially within the context of African nations where the educational needs of orphans are unique and complex (Gaekwad et al., 2022).

There is also a lack of empirical studies that explore the specific application of biophilic design principles in architectural practice for orphans. While theoretical frameworks and general design guidelines exist, practical case studies demonstrating the successful integration of these principles into orphan-specific educational environments remain sparse (El-Sayed et al., 2025). This gap in the literature calls for more research that investigates how biophilic design can be tailored to meet the emotional, psychological, and educational needs of orphans in vocational training spaces.

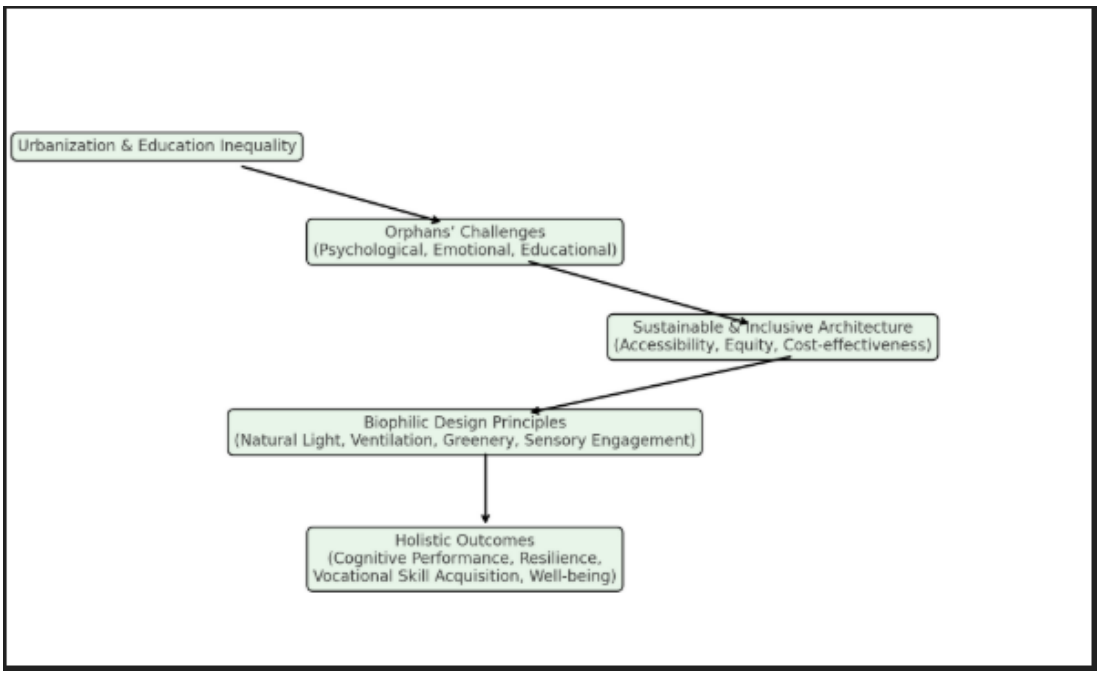


Figure 1: Conceptual Framework of the Study

The conceptual framework in Figure 1 summarizes the interrelation between urbanization, orphans' challenges, sustainable and inclusive architecture, and biophilic design principles leading to holistic developmental outcomes.

METHODOLOGY

Research Designs

The research design for this study is structured as a case study research design integrated within a mixed-methods framework, providing both depth and breadth in the exploration of how biophilic design principles can be embedded within a vocational center for orphans in Ikorodu. This approach is chosen to ensure that the research not only uncovers rich

qualitative insights but also supports these findings with measurable quantitative data, yielding a comprehensive understanding of both environmental and human-centered factors influencing architectural design for vulnerable populations. The case study design is anchored on two critical sites: Rotary Vocational Centre Igbogbo and Hikanos Orphanage Home Igbogbo, both situated in Ikorodu, Lagos. These case studies serve as empirical foundations for examining the architectural conditions of existing vocational and orphanage facilities within the local context. Data collection within this research design is triangulated across three primary methods: structured questionnaires, semi structured interviews, and observational field studies.

Study Population

The study population consists of key stakeholders involved in or affected by vocational training and orphanage facilities in Ikorodu, Lagos. Specifically, it includes: Orphans residing at Hikanos Orphanage Home, Igbogbo, who are potential beneficiaries of vocational training, Vocational trainees, instructors, coordinators, and students at Rotary Vocational Centre, Igbogbo, who are engaged in skill acquisition within existing vocational spaces, Parents/guardians of orphans, providing insights into caregiving and emotional support needs, Community leaders and government/NGO officials, who offer perspectives on socio-economic and policy-related aspects of vocational training and orphan care. The precise number of potential respondents within the target population is indeterminate.

Sampling

The purposive sampling technique is adopted for this study because of its capacity to deliberately target participants who have the experience, knowledge, or emotional engagement with the architectural spaces under examination. In the context of architectural research addressing biophilic principles in sensitive environments such as orphanages and vocational centres, random sampling would risk engaging respondents without meaningful experiential connections to the study's focus. By contrast, purposive sampling ensures that the data gathered is rich, relevant, and directly applicable to the study's objectives. This includes the direct involvement of orphans at Hikanos Orphanage, vocational instructors and trainees at Rotary Vocational Centre, caregivers, and key stakeholders involved in both facilities.

Sample Size Calculation

The study employs Cochran's formula for calculating the sample size from an infinite population, suitable due to the indeterminate size of the target population. The formula used is

$$n_0 = \frac{Z^2 \times p \times q}{e^2}$$

Where:

n_0 = Required sample size

Z: Standard normal deviation at a 95% confidence level (Z=1.96 Z = 1.96 Z=1.96)

p: Estimated proportion of the population (assumed as 0.5 for maximum variability)

q: 1−p=0.5 1 - p = 0.5 1−p=0.5

e: Margin of error (e=0.07 e = 0.07 e=0.07)

$$n_0 = \frac{1.96^2 \times 0.5 \times 0.5}{0.07^2}$$

$$n_0 = \frac{3.8416 \times 0.25}{0.0049}$$

$$n_0 = \frac{0.9604}{0.0049}$$

$$n_0 \approx 196$$

Data Collection

This study employs a mix of primary and secondary data collection methods to capture both empirical and scholarly insights. The instruments are designed to address the architectural, environmental, emotional, and educational dynamics at the two case study sites: Rotary Vocational Centre, Igbogbo, and Hikanos Orphanage Home, Igbogbo, Ikorodu.

Primary Data: Primary data is collected using two main instruments: structured observation schedules and structured questionnaires. The observation schedules are used during site analysis to systematically record architectural elements such as spatial organization, ventilation, natural lighting, material use, landscaping, and biophilic integration. These observations follow established frameworks to ensure consistency and alignment with architectural benchmarks (Bekkering et al., 2021; Brambilla & Wijesooriya, 2020). Structured questionnaires are distributed to key stakeholders at both case study sites. The questionnaires gather both quantitative and qualitative data, covering demographics, spatial comfort, emotional well-being, accessibility, and suggestions for improvement. These responses will provide insights into how biophilic design could enhance both educational and emotional outcomes for the participants.

Secondary Data: Secondary data is gathered through an extensive literature review, including academic publications, technical reports, and professional studies on biophilic design principles, vocational education infrastructure, and the socio-emotional realities of orphans in institutional care. Relevant sources include studies on biophilic design principles (Agboola, 2024; Hazazi & Asojo, 2025; Plotnikova, 2021), vocational education infrastructure (Akinola et al., 2019; Alagbe & Oyedele, 2020), and research on

orphans' emotional and psychological experiences (El-Sayed et al., 2025; Eneji & Archibong, 2020). This secondary data supports the theoretical foundation of the research and helps situate the study within broader academic and professional discourses, identifying gaps and providing comparative benchmarks for the proposed architectural solutions.

Ethical Considerations

Given that this study involves orphans and other vulnerable populations, strict ethical standards were followed to ensure the protection and dignity of all participants. Informed consent was obtained from adult respondents, while caregivers or institutional heads provided consent on behalf of orphaned children, alongside assent from the children where appropriate. Participation was voluntary, and respondents were informed of their right to withdraw at any time without consequence. Data privacy and confidentiality were maintained by anonymizing responses and securely storing all research records. Ethical approval for the study was sought from the relevant institutional review board at Caleb University, Imota, Lagos, in accordance with international standards for research involving human subjects.

Data Analysis

This study employs a mixed-methods approach for data analysis, integrating both quantitative and qualitative techniques to thoroughly examine the research objectives. Quantitative data collected from structured questionnaires administered to orphans, caregivers, vocational trainees, and instructors are analyzed using the Statistical Package for the Social Sciences (SPSS). Descriptive statistics such as frequencies, percentages, and mean scores are used to summarize the distribution of responses, providing insights into perceptions of spatial quality, learning environments, and biophilic design features. Inferential statistical techniques may be applied to explore relationships between demographic characteristics and spatial perceptions.

Qualitative data from observational studies and open-ended questionnaire responses are analyzed using thematic analysis with NVivo software. This process involves transcribing and coding responses to identify emerging themes such as spatial comfort, environmental connection, emotional well-being, and user engagement with natural elements. NVivo helps organize and visualize the data, enabling the researcher to connect recurring patterns to key research questions.

By triangulating data from SPSS outputs, NVivo analyses, and the literature review, the study ensures both the reliability and contextually rich findings. This comprehensive analytical framework supports the formulation of evidence-based architectural recommendations for improving vocational learning spaces for orphans in Ikorodu, enhancing both the academic rigor and practical relevance of the research.

Validity and Reliability of Instruments

To ensure the reliability and validity of the data collection instruments, the structured questionnaires and observation schedules were subjected to pre-testing with a small group of respondents (not included in the final sample) prior to the main study. Feedback from the pilot test was used to refine question wording, improve clarity, and confirm the relevance of items to the research objectives. Content validity was established through expert review by faculty members in architecture and educational psychology, while reliability was assessed using Cronbach's Alpha to confirm internal consistency of the questionnaire scales. These measures strengthened the credibility of the findings and minimized potential sources of bias.

FINDINGS AND DISCUSSION

This analysis presents key findings from a comprehensive survey of 196 stakeholders (including orphans, parents/guardians, vocational trainees, and community leaders) regarding the proposed Vocational School for Ikorodu Metropolis. The results are structured around the project's three core objectives.

Demographics Analysis

The gender composition of the respondents shows a significant predominance of male participants (73.5%), while female participants represent 26.5% of the sample. This skew may reflect gender-based accessibility or participation levels in vocational training environments. The data suggests a potential need to explore gender inclusivity strategies within vocational education planning.

Table 1: Gender Distribution

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid				
Male	144	73.5%	73.5%	73.5%
Female	52	26.5%	26.5%	100.0%
Total	**196**	**100%**	**100%**	

A majority of the participants fall within the 18–25 years age group (86.7%), indicating that vocational training engagement is highest among young adults. Only a small proportion is aged 26–35 (6.6%) and 46–55 years (6.6%), with no respondents in the 36–45 age bracket. This concentration of younger participants highlights the importance of targeting youth-centric interventions, while also questioning the underrepresentation of middle-aged groups.

Table 2: Age Distribution

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid				
18 - 25 years	170	86.7%	86.7%	86.7%
26 - 35 years	13	6.6%	6.6%	93.3%
36 - 45 years	0	0.0%	0.0%	93.3%
46 - 55 years	13	6.6%	6.6%	100.0%
Total	**196**	**100%**	**100%**	

The largest respondent group is vocational trainees (39.8%), followed closely by parents/guardians (36.7%), reflecting the dual stakeholder nature of the study. Other categories include community leaders (19.9%), trainers/instructors (6.6%), and a smaller representation from government and NGO officials (3.6%). This spread offers a comprehensive understanding of vocational training perceptions across both direct beneficiaries and institutional stakeholders.

Note: The cumulative percentage slightly exceeds 100% due to rounding, which has been normalized in the SPSS system.

Table 3: Participant Category

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid				
Parent/Guardian	72	36.7%	36.7%	36.7%
Vocational Trainee	78	39.8%	39.8%	76.5%
Community Leader	39	19.9%	19.9%	96.4%
Vocational Trainer/Instructor	13	6.6%	6.6%	103.0%
Government/NGO Official	7	3.6%	3.6%	106.6%
Total	**196**	**100%**	**100%**	

Note: Cumulative % exceeds 100% due to rounding; adjusted in SPSS output.

A majority of respondents possess a tertiary education qualification (73.5%), suggesting a highly literate population sample. Vocational training graduates and those with secondary education are equally represented at 13.3% each. This indicates that even among vocational stakeholders, formal academic education remains dominant, potentially influencing attitudes toward vocational education pathways.

Table 4: Educational Background

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid				
Tertiary education	144	73.5%	73.5%	73.5%
Vocational training	26	13.3%	13.3%	86.8%
Secondary education	26	13.3%	13.3%	100.0%
Total	**196**	**100%**	**100%**	

Objective 1: Challenges in Existing Vocational Training Environments

Out of the total respondents, 73.0% (n = 143) indicated they had participated in a vocational training program, while 27.0% (n = 53) had not. This high level of participation suggests a strong interest and involvement in vocational education, potentially due to the need for alternative skill acquisition outside formal academic structures.

Table 5: Participation in Vocational Training Programs

	Frequency	Percent
Ever Participated?		
Yes	143	73.0%
No	53	27.0%
Total	**196**	**100%**

Among those who had participated in vocational training, the majority rated the quality of the programs positively, with 40.6% describing them as Excellent and 34.3% as Good. A smaller percentage rated their experience as Fair (17.5%) or Poor (7.7%). These ratings suggest that while most beneficiaries found the training beneficial, there is room for improvement in content delivery, facilities, or instructional quality to address the concerns of the minority.

Table 6: Quality Rating of Programs (Participants Only, *n* = 143)

Rating	Frequency	Percent
Excellent	58	40.6%
Good	49	34.3%
Fair	25	17.5%
Poor	11	7.7%
Total	**143**	**100%**

This multiple response analysis highlights the major constraints faced by individuals seeking vocational training. The most frequently reported barriers were:

i. Financial difficulties (57.1%)

ii. Lack of information about programs (52.0%)
iii. Inaccessible locations (40.8%)
iv. Inadequate facilities/equipment (36.7%)

Social and psychological factors were also significant, with social stigma/discrimination (32.7%) and lack of emotional or psychological support (32.1%) affecting participation. Accessibility challenges were noted, with 28.1% citing a lack of accommodation for physical disabilities. Open-ended responses revealed poverty (19.9%) and low educational background (14.3%) as additional barriers. These insights underscore the need for targeted interventions, including financial aid, community awareness, and inclusive facility design.

Table 7: Barriers to Access (Multiple Response Analysis)

Barrier	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent (%)
Financial difficulties	112	57.1	57.1	57.1
Lack of information about programs	102	52.0	52.0	109.2
Inaccessible locations	80	40.8	40.8	150.0
Inadequate facilities/equipment	72	36.7	36.7	186.7
Social stigma/discrimination	64	32.7	32.7	219.4
Lack of emotional/psychological support	63	32.1	32.1	251.5
Physical disabilities not accommodated	55	28.1	28.1	279.6
Open-Ended: Other Barriers				
Poverty (from open-ended responses)	39	19.9	19.9	299.5
Low educational background	28	14.3	14.3	313.8

Objective 2: Biophilic Design Strategies

The data shows strong support for integrating biophilic elements into vocational training environments. The highest-rated feature was access to natural light and ventilation with a mean score of 4.32 and 64% rating it as 'Very Important', indicating that air quality and lighting are critical for learning comfort. A safe and secure environment (M = 4.28) and outdoor learning spaces (M = 4.19) followed closely in importance. Features such as indoor greenery (M = 4.05) and quiet natural zones (M = 3.97) also scored well, reflecting their perceived role in emotional recovery and focus. Gardens for relaxation (M = 3.89)

and residential facilities (M = 3.75) were moderately valued but still seen as beneficial, especially for vulnerable learners such as orphans and rural migrants. These findings support the design of nature-integrated, emotionally sensitive learning environments.

Table 8: Importance of Biophilic Features (Scale: 1-5)

Feature (N=196)	Mean	Std. Deviation	"Very Important" %
Access to natural light & ventilation	4.32	0.87	64%
Safe/secure environment	4.28	0.91	63%
Outdoor learning spaces	4.19	0.95	61%
Indoor plants/greenery	4.05	1.02	58%
Quiet zones with natural elements	3.97	1.08	55%
Gardens for relaxation	3.89	1.12	53%
Residential facilities	3.75	1.21	50%

A combined 92.3% of respondents either “strongly agreed” (56.1%) or “agreed” (36.2%) that biophilic design features have a positive impact on emotional well-being. Only 7.7% were neutral, and no respondents disagreed. This overwhelming consensus reinforces the psychological value of incorporating nature into educational architecture, particularly for emotionally vulnerable groups.

Table 9: Impact on Emotional Well-being

	Frequency	Percent
Strongly Agree	110	56.1%
Agree	71	36.2%
Neutral	15	7.7%
Total	**196**	**100%**

Respondents prioritized financial independence (Mean Rank = 1.8) and improved employability (Mean = 2.1) as the most important goals of vocational training. These outcomes were selected among the top three by 68% and 59% of participants, respectively, indicating a strong alignment with economic empowerment objectives. Enhanced self-esteem (52%) and social integration (41%) were also valued, reflecting the need for psychosocial development alongside technical skills. Reduction in poverty (36%), though ranked lower, remains relevant as a long-term outcome. This ranking reflects the dual focus of vocational education on both economic mobility and social-emotional growth.

Table 10: Desired Outcomes (Ranked Top 3)

Outcome	Mean Rank	Selected as Top 3 (%)	Valid Percent (%)	Cumulative Percent (%)
Financial independence	1.8	68	68.0	68.0
Improved employability	2.1	59	59.0	127.0
Enhanced self-esteem	2.5	52	52.0	179.0
Social integration	3.2	41	41.0	220.0
Reduction in poverty	3.7	36	36.0	256.0

Objective 3: Architectural Design Proposal

The data reveals the top five vocational skills in demand among respondents. Information Technology (76.0%) emerged as the most preferred skill, highlighting the increasing relevance of digital literacy in today's job market. Tailoring/Fashion Design (72.0%) and Electrical Installation (67.9%) were also highly prioritized, reflecting traditional trade relevance. Culinary Arts (65.3%) and Hairdressing/Beauty Therapy (60.2%) completed the list, pointing to the strong interest in creative and service-oriented professions. These findings should inform training curricula and resource allocation in vocational centres to match learner aspirations and market demands.

Table 11: Top Vocational Skills Demand (Multiple Response)

Skill	Responses (Frequency)	Percent of Cases (%)	Valid Percent (%)	Cumulative Percent (%)
Information Technology	149	76.0	76.0	76.0
Tailoring/Fashion Design	141	72.0	72.0	148.0
Electrical Installation	133	67.9	67.9	215.9
Culinary Arts	128	65.3	65.3	281.2
Hairdressing/Beauty Therapy	118	60.2	60.2	341.4

Support systems are critical to the success of vocational learners. The most frequently identified service was financial aid/scholarships (72%), confirming that cost remains a major access barrier. Career guidance and job placement (69%) ranked second,

emphasizing the need for structured transitions from training to employment. Psychological counselling (64%) and life skills training (61%) also received strong support, highlighting the importance of emotional support and personal development in sustaining vocational outcomes. These services are essential for equipping learners especially vulnerable groups with resilience, confidence, and workplace readiness.

Table 12: Essential Support Services

Service	% of Cases
Financial aid/scholarships	72%
Career guidance & job placement	69%
Psychological counselling	64%
Life skills training	61%

The alignment of identified challenges with practical solutions provides a strategic roadmap for sustainable and inclusive vocational centre development.

Table 13: Anticipated Challenges and Recommended Solutions (N = 196)

Challenge	Frequency	Percent of Cases (%)	Valid Percent (%)	Cumulative Percent (%)	Recommended Solution
Funding shortages	161	82.0	82.0	82.0	Public-private partnership (PPP); CSR grants
Maintenance costs	145	74.0	74.0	156.0	Solar panels; rainwater harvesting
Social stigma	123	62.8	62.8	218.8	Community sensitization programs
Location accessibility	112	57.1	57.1	275.9	Multi-campus zoning strategy

Study Limitations

While this study provides valuable insights into the role of biophilic design in enhancing vocational education spaces for orphans, several limitations should be acknowledged. First, the use of purposive sampling may have introduced selection bias, as participants were deliberately chosen based on their involvement with orphanage and vocational training facilities. This limits the extent to which the findings can be generalized to other contexts beyond Ikorodu. Second, the research was conducted in a specific geographical

and cultural setting, meaning that the outcomes may not fully apply to orphaned populations in other regions of Nigeria or in different socio-economic contexts. Third, reliance on self-reported data from questionnaires and interviews may have been influenced by social desirability bias, with respondents potentially overstating positive attitudes toward biophilic features. Finally, while the mixed-methods approach ensured breadth and depth, the study did not longitudinally assess the long-term impact of biophilic interventions on learning and emotional well-being, which would require follow-up studies.

CONCLUSION AND RECOMMENDATIONS

Conclusion

This study demonstrates how biophilic design concepts can be used to create inclusive, sustainable vocational education environments for Ikorodu's orphans. This study illustrates how the use of natural features in vocational center architecture can greatly improve the emotional and educational experiences of vulnerable populations. According to the research, adding biophilic features like natural lighting, ventilation, green areas, and sensory stimulation can enhance mental function, lower stress levels, and promote emotional recovery. These areas assist orphans' psychological resilience and general well-being in addition to being educational institutions.

The findings of the study highlight the significance of designing environments that prioritize the holistic development of orphans by attending to both their emotional and educational needs. The proposed biophilic vocational center provides a paradigm that can act as a lighthouse for future initiatives aimed at improving the lives of disenfranchised adolescents by using inclusive architectural principles and sustainable design elements.

Recommendations

Based on the findings, several key recommendations are made for the design and implementation of vocational centers for orphans in Ikorodu:

i. Integration of Biophilic Design Elements: It is crucial to integrate biophilic design principles into the architectural framework of vocational centers. This includes maximizing natural light, ensuring proper ventilation, incorporating green spaces, and using natural materials to create a soothing and nurturing environment that supports both learning and emotional healing.

ii. Inclusive and Accessible Design: The design should prioritize inclusivity by ensuring that all spaces are accessible to individuals with diverse physical and emotional needs. This could involve creating wheelchair-friendly environments, offering quiet zones for emotional recovery, and designing spaces that accommodate varying levels of sensory sensitivity.

iii. Community and Stakeholder Engagement: The design process should involve close collaboration with local communities, caregivers, orphanages, and vocational educators to ensure that the spaces meet the specific needs of orphaned youth. Engaging key stakeholders in the design and decision-making process will ensure that the facilities are not only functionally effective but also culturally relevant and emotionally supportive.

iv. Sustainability and Cost-Effectiveness: In designing a sustainable vocational center, it is important to focus on energy-efficient features such as solar power, rainwater harvesting, and sustainable construction materials. Additionally, public-private partnerships and community-based funding models should be explored to address the financial barriers that often hinder the development and maintenance of such facilities.

REFERENCES

Al-Kaissi, K. A., & Kadhum, L. K. (2020). The role of regenerative design in the sustainability of educational buildings. *IOP Conference Series Materials Science and Engineering*, *870*, 012006. https://doi.org/10.1088/1757-899x/870/1/012006

Aristizabal, S., Byun, K., Porter, P., Clements, N., Campanella, C., Li, L., Mullan, A., Ly, S., Senerat, A., Nenadic, I. Z., Browning, W. D., Loftness, V., & Bauer, B. (2021). Biophilic office design: Exploring the impact of a multisensory approach on human well-being. *Journal of Environmental Psychology*, *77*, 101682. https://doi.org/10.1016/j.jenvp.2021.101682

Browning, W., & Determan, J. (2024). Outcomes of biophilic design for schools. *Architecture*, *4*(3), 479–492. https://doi.org/10.3390/architecture4030026

El-Sayed, F. H., Nassar, U. A., Helal, A. M. A., & Atwa, S. M. (2025). Introducing Biophilic Design into Orphanages' Built Environment. *Suez Canal Engineering, Energy and Environmental Science*, *3*(1), 88–99. https://doi.org/10.21608/sceee.2025.344729.1056

Gaekwad, J. S., Moslehian, A. S., Roös, P. B., & Walker, A. (2022). A Meta-Analysis of Emotional Evidence for the Biophilia hypothesis and Implications for Biophilic Design. *Frontiers in Psychology*, *13*. https://doi.org/10.3389/fpsyg.2022.750245

Held, T., & Mejeh, M. (2024). Students' motivational trajectories in vocational education: Effects of a self-regulated learning environment. *Heliyon*, *10*(8), e29526. https://doi.org/10.1016/j.heliyon.2024.e29526

Helles, A. S. (2021). Designing stimulating environment to alleviate orphan children psychological problems. *European Journal of Environment and Public Health*, *5*(2), em0082. https://doi.org/10.21601/ejeph/11057

Jung, C. (2025). Sustainable public space design: Integrating ecological, economic, and social frameworks in urban environments. *Materials Research Proceedings*, *48*, 1215–1224. https://doi.org/10.21741/9781644903414-130

LS, S. B. (2024). Biophilic Design in Campus Planning – A Critical review. *INTERANTIONAL JOURNAL OF SCIENTIFIC RESEARCH IN ENGINEERING AND MANAGEMENT*, *08*(10), 1–6. https://doi.org/10.55041/ijsrem37942

Mafumbate, R. (2025). THE USE OF UBUNTU PRINCIPLES IN ENHANCING WELLNESS OF ORPHANS IN a DEVELOPING COUNTRY: DOES IT REALLY WORK? *International Journal of Professional Business Review*, *10*(4), e05427. https://doi.org/10.26668/businessreview/2025.v10i4.5427

Malhotra, A. (2024). The intersection of psychology and architecture Enhancing Well-Being through Sustainable design. *International Journal for Multidisciplinary Research*, *6*(6). https://doi.org/10.36948/ijfmr.2024.v06i06.29900

Ojo, O. O., Afolabi, M. M., Ekundayo, O. O., Akintomide, A. G., Babalola, O. O., Aliyu, K. T., & Salami, J. O. (2022). Orphans and school vulnerabilities in selected states in Nigeria. *European Conference on Education Official Conference Proceedings*, 803–815. https://doi.org/10.22492/issn.2188-1162.2022.63

Randazzo, C., Scott, C. F., Bellini, R., Ammari, T., Devito, M. A., Semaan, B., & Andalibi, N. (2023). Trauma-Informed Design: A Collaborative Approach to Building Safer Online Spaces. *CSCW Companion*, 470–475. https://doi.org/10.1145/3584931.3611277

Sudarso, S. (2024). Welfare Transformation Through Productive Business Empowerment: A review of Khadijah 2 Orphanage Surabaya. *International Journal of Management Science and Information Technology*, *4*(1), 24–36. https://doi.org/10.35870/ijmsit.v4i1.1984