

The Extent of Application of Biophilic Design Principles in Institutional Buildings: A Case Study of Bayero University Clinics Kano

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Abstract: *The concept of Biophilia implies that humans hold a biological need for interaction with nature on physical, mental, and social levels, and that this connection affects our personal well-being, productivity, and societal relationships. This hypothesis has been later proven by health and psychological researchers. They believe that exposure to nature in the built environment is beneficial to man. Considering the time people spend in an enclosed and sterile built environment, it becomes imperative for the buildings we have around be designed in such a way that the occupants are not sheltered away from the natural environment. The extents to which biophilic design principles are applied in the Bayero University clinics are not known. Using qualitative research approach, this research focused on finding out the extent to which the biophilic design principles are applied in the design of the Bayero university clinics. It was found that only the aspect of natural lighting and ventilation among the Biophilic elements was used in the two clinics. This signifies very low application of the elements despite the advantages it have on patients restoration*

Keywords: Biophilia, Design Principles, Healthcare facilities, Institutional buildings

1. Introduction

The sudden urge to affiliate man's environment, building design and the nature is termed as biophilia. In 1980's, Edward O. Wilson stated Biophilia to be "the need to inculcate humans with other forms of life,". Biophilia creates strong connections between nature and manmade environments. It has been said in history that people have for long been influenced and attracted by nature. The goal of incorporating the biophilic principles in building designs or the built environment is to construct environments that are imbued with positive experiences that can promote human and well-being from the contact people make with nature (Gillis & Gatersleben, 2015; Kellert et al., 2011).

The influence of environmental design on the occupant's wellbeing and productivity has been well studied in some settings such as: offices, schools, hospitals, houses etc. Biophilic design principles are basically used to inculcate the environment and nature so as to increase the wellbeing and productivity of the people living in these environments (Kellert et al., 2011). There are numerous studies about the productivity of offices, houses and health facilities. In hospitals that incorporate biophilic design principles, recovery

rates improve (Said, 2006); studies have shown that exposure to nature helps in stress reduction and disorder (Alkali, 2023). This shows that building

with biophilic design principles will definitely help in improving the wellbeing of users irrespective of age, race, gender or ethnicity.

Before now the importance of biophilic design seems not to be well-acknowledged. It has been speculated that Architects had little or no background knowledge of the Biophilic elements and their influence on the occupants (Heerwagen & Mador, 2009; Zhong et al., 2022). This results in producing buildings whose components are provided for purposes such as lighting, ventilation, circulation, aesthetics, sustainability among others (Alkali, 2023). Due to advancement and more specialization in medical technology, connection between healing and nature was slowly displaced (Mollazadeh & Zhu, 2021). New advanced treatments that concentrated more on physical well-being and less on psychological were giving more attention, while the all-inclusive natural method to medicine was pushed aside (Zhong et al., 2022). Today, hospitals turn into what others consider as cold, sterile institutions that take over the healthcare industry. However, since 1990's there has been resurgence in nature based care, and professionals are beginning to once again focus on the whole person; the mind, the body

and spirit connection in healthcare settings that makes it a Healing Environment (Kellert et al., 2011).

Recently, designers and researcher with majors in the built environment have shifted their attention toward biophilic design (Kellert et al., 2011).. Because of the understanding of the health benefits of adopting biophilic design principle, its reflection have been seen in various building typologies such as commercial (Guzzo et al., 2022), healthcare (Sal Mosehian et al., 2023), and urban designs (Carmona et al., 2010). To this end there is need for buildings to be assessed and made Biophilia compliant especially healthcare facilities. However there is little or no evidence showing how designers in Nigeria embrace the adoption of the Biophilic design principles (Alkali, 2023). To this end, this study examines healthcare facilities in Bayero University Kano with a view to determining the level of compliance to the Biophilic design principles.

2. Literature Review

The main difference between the biophilic design approach and other naturalistic approaches is its goal of promoting human health and well-being, through satisfying human need for nature. So far, the numerous benefits of connection with nature on human holistic health, both individually and in the field of biophilic design, which have been extensively researched, and has shown significant influences of human interaction with nature on human beings' holistic health (Gillis & Gatersleben, 2015; Wilson, 1984). Regular exposure of humans to natural elements is said to be highly beneficial to mental health, particularly stress reduction (Wilson, 1984).

According to the World Health Organization (WHO), Health is "a state of total physical, mental, and social well-being and not just the absence of disease or infirmity in humans". According to Orr, D. (2009), there are basically four dimensions of holistic health in humans; physical, social, spiritual and psychological. People need or require daily contact with nature, to live happily, increase productivity. Similarly, contact with nature was established to have several benefits ranging from improved health of occupants, productivity, learning performance and many more (Kellert et al., 2011).

Similarly, nature and green spaces in hospitals have been found to reduce stress, lower blood pressure, provide pain relief, improve illness recovery, accelerate healing, enhance staff morale and performance, and result in fewer

conflicts between patients (Said, 2006). Investigations have shown that patients generally prefer vegetation in their hospital rooms, attesting to its comforting and healing effects (Sal Mosehian et al., 2023). Additionally, further investigation reported that contact with nature in hospital rooms, views of the outside, and exposures to gardens were among patients most widely stated health care preferences (Kellert et al., 2011).

Humans can have contact with nature in different ways. According to (Berman et al., 2012), there are three ways we can come in contact with nature, either directly, indirectly or by symbolic means. The disconnection of humans with nature is said to have caused a detrimental effect on humans and their health, the theory of Biophilia on the other hand explores ways to improve the health, productivity of humans by inculcating nature in their environments (Berman et al., 2012; S. Kaplan, 1995).

Studies have established that the environment have considerable therapeutic effect and have also impact on the health of occupants of that given environment. According to Berman et al., n.d.; R. Kaplan & Kaplan, (1989), many illnesses may be treated by paying attention to quality air, good food, rest, regular physical exercise, and the state of mind, without the use of medications. Thus the environment is already seen as therapeutic and capable of influencing people's health and facilitating their recovery. These presumptions were confirmed in the 20th century, among other things, by the study Ulrich made on how quickly surgery patients recovered when they were exposed to the beauty of nature (Ulrich, 2000, 2001; Ulrich et al., 2004).

In fact, a growing body of knowledge supports the advantage of outdoors interaction in healthcare settings. These studies have contributed to the development of Biophilic design; a fresh method of design that enhances peoples psychological well-being and health (Wilson, 1984). Healthcare facilities that employ the principles of Biophilic design were found to improve patient outcomes and reduce staff stress. Using simple applications such as natural building materials, use of color, fabric patterns and textures that mimic those found in nature, and artistic representations or simulations of nature such as photographs, paintings, and some abstract forms of art or installing a circadian lighting system can make hospitals into more comforting environments (Sharifi & Sabernejad, 2016).

There are several rewarding examples of the application of Biophilic design principles in

healthcare setting on the physical and mental health and wellness of patients and staff. For instance, Woodwinds Health Campus, a local alternate care hospital and clinic facility that also acts as a community resource center for the different demographics in the area, offers several examples of biophilic design in action. Each common space at Woodwinds has a huge fish tank with beautiful tropical fish and nearby seating for easy viewing, as well as lush indoor plants. It has been demonstrated that watching fish in artificial natural settings lessens tension and anxiety (Cox & Groves, 1990). Upon entering the foyer, one feels calm almost instantly. All patient rooms, in addition to the communal areas, offer a view of the outdoors and are decorated with natural hues and textures in the fabric, furniture, and paint. Except for surgical sections, there is no fluorescent lighting; instead, patient rooms and common areas have gentle incandescent illumination.

Another example of the rewarding use of Biophilic elements in the design of Joseph Lewis Center for Environmental Studies (O'Connor et al., 2012). The design is sustainable in a sense that goes beyond what is commonly meant by Biophilic design. Utilizing passive and active air systems, solar power harvesting, and weather monitoring and adaptation and use the least amount of energy possible. By fusing conventional waste water technology with wetland ecosystem purification processes, the center's living machine treats waste water and creates water that can be utilized for irrigation and toilet flushing. Orr and his colleagues created a superb atmosphere for learning while making sure the surrounding environment could do the same.

3. Research Methodology

The study adopted the use of Qualitative data collection and analysis strategy. Observation was carried out in two university clinics of Bayero University Kano. The cases were purposively selected for the fact that the clinic at the old site even though is an old building but was retrofitted to look modern while the one on new site is a new building. based on the premise that university environment that produces healthcare professionals and designers should be more informed about the benefits of the use of Biophilic design principles. The Observation was guided by a checklist developed using the basic element of Biophilia that are believed to stimulate restoration of patients. The variables are; Natural lighting and ventilation, Local natural materials, Views and Prospect, Natural features and Design with natural forms, shapes and processes. The study uses four points rating do denote the use of each of the Biophilic design elements (Woodside, 2010; Yin, 2003); 4 for Maximum, 3 for Medium, 2 for Minimum and 1 for Non. The data obtained was analysed using content analysis (Kohlbacher, 2006).

4. Results and Discussion

The result shows that use of natural lighting and ventilation and varied vegetation's, landscaping and façade greening are the prominent Biophilic elements used in the two cases studied (Table 1).

Table 1: Biophilic Elements

VARIABLES OF STUDY		Old Site Clinic1				New Site Clinic			
		4	3	2	1	4	3	2	1
Natural lightening and ventilation	Orientation of building			x			x		
	Placement of windows to capture dynamic natural light.	x					x		
	Use of large operable window on opposite sides to provide cross ventilation.	x				x			
Natural materials	Sense of place			x					x
	Modern Materials	x						x	
Environmental features	Respect for site				x				x
	Water Features				x				x
	Varied vegetation's, landscaping and façade greening	x				x			
Natural forms and shape	Building form and layout.		x					x	
	Design derived from nature.				x				x

	Use of natural patterns, forms and textures.		x		x
Views and prospects	Views of nature		x		x
	Visual distance		x		x
	Windows positioned to frame views of nature.	x		x	

Authors Fieldwork (2023)

Even though there is little or consideration for orientation of the buildings in all the two cases studied, the window sizes and type were found to be enough to provide the natural light and ventilation required (Figure 1a and 1b)



Figure 1a: Sufficient natural lighting provided through large windows in new site
Source: Authors Fieldwork (2023)



Figure 1b: Sufficient natural lighting provided through high level windows in old site clinic
Source: Authors Fieldwork (2023)

Furthermore, the two buildings were found to have very good and adequate landscaping that added to the serenity of the environment. From

the first case study, the site has a disperse arrangement of trees, organized landscaping, shade trees, bushes and plantations to add to varied vegetation's, landscaping and greening of the facility. Various types of trees, shrubs and other landscaping elements were sufficiently provided as shown in Figure 2A and 2B.



Figure 2a: A varied landscaping at old site
Source: Authors Fieldwork (2023)



Figure 2b: Very good scenery at the New site clinic
Source: Authors Fieldwork (2023)

Similarly, the provision of such adequate windows

in the clinics have provided opportunity for the views and prospects making it possible to see into distant scenery. Nearly all of the areas in both case studies have windows and openings that are strategically placed to frame views of the surroundings of the structures. These windows or openings are well positioned and large enough to frame views of nature, clear visual distance. In the second case study, verandas, covered walkways and gazebos were provided.



Figure 3a: Sceneries captured through the windows from within.

Source: Authors Fieldwork (2023)



Figure 3b: Sceneries captured through the windows from within

Source: Authors Fieldwork (2023)

However, the result shows that the other three components of Biophilia; Natural forms and shape, Environmental features and Natural materials are not used in the two clinics.

5. Conclusion and Recommendations

Providing a healthcare building that has consideration for Biophilia is believed to be rewarding. The design, configuration and setting of the two clinics suggests that there is little consideration for the Biophilic design elements.

The natural lighting, natural ventilation and good landscape were all found to be associated with aesthetics, the need to reduce nosocomial infection, errors and other medical and nursing requirements. The study established that there is no conscious effort to make consideration for the Biophilia by the architects at both design and retrofitting stages. It therefore becomes imperative to have a great awareness among Architects and policy makers of the need to develop and adopt a framework of the use of the Biophilic design principles at all stages.

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