



Utilizing Biophilic Design Principles to Enhance Wellness in a Drug Rehabilitation Center at Uzuaku, Ukwa West, L.G.A, Abia State.

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ABSTRACT

Drug addiction is a global issue affecting individuals from all walks of life. In Nigeria, the prevalence of drug abuse among youths is alarming. While government-established agencies and treatment facilities aim to combat drug addiction, their focus on detention and medication neglects the patients' mental, psychological, social, and spiritual needs. This study explores the application of biophilic design principles in drug rehabilitation centers to enhance wellness. Through a review of literature, case studies, and site analysis, this research proposes a design framework that incorporates natural building materials, wall artworks, courtyard systems, and connections to nature. The aim is to create an expressive and enhanced living environment that supports the healing process and recovery of addicts. The Methodology study employed a qualitative research approach, including a review of literature, case studies, and site analysis. The research questions focused on exploring biophilic design principles in drug rehabilitation centers, proposing a befitting design framework, and demonstrating the application of biophilic principles in contemporary rehabilitation centers. Research has shown that contact with natural environments and features has a positive impact on human health and wellbeing, a review of pertinent literature and case study serves as the foundation for the argument studies were also conducted on site and its suitability for the project. From the findings I found out that incorporating biophilic design principles in drug rehabilitation centers can enhance wellness and support the recovery process. The proposed design framework includes natural building materials, wall artworks, courtyard systems, and connections to nature. Adopting these guidelines allowed for the development of a design proposal with a clear concept for the drug rehabilitation center in Uzuaku, Ukwa East LGA, Abia State, South East Nigeria.

Keywords: drug rehabilitation, addiction treatment, biophilic design principles, wellness.

INTRODUCTION

The modern built environment has disconnected humans from nature, resulting in negative impacts on physical and mental health (Kaplan, 1995). Biophilic design principles offer a solution by incorporating natural elements and features into architectural design (Wilson, 1984). This study focuses on applying biophilic design in drug rehabilitation centers to promote wellness and support the recovery process. A drug rehabilitation center is a specialized facility that provides a comprehensive and structured program of treatment and support for individuals struggling with drug addiction or substance use disorders. A biophilic design approach in a drug rehabilitation center incorporates various architectural solutions to create a supportive environment.

This includes maximizing natural light through skylights, and large windows, and utilizing natural ventilation strategies like operable windows. The selection of natural, sustainable materials like wood, stone, and plants also contributes to a calming atmosphere, while water features like fountains, waterfalls, or aquariums provide a soothing ambiance. Green spaces, including indoor and outdoor gardens, courtyards, and green roofs, offer patients access to nature, and organic shapes, curved lines, and natural forms in architecture and interior design create a sense of harmony. Visual connections to nature are provided through windows, balconies, or terraces, while non visual connections engage multiple senses through natural sounds, scents, and textures. Biomimicry, incorporating design elements inspired by nature, and the use of natural patterns and nature-inspired art further enhance the biophilic design. Additionally, wayfinding is facilitated through natural elements, and acoustic comfort, thermal comfort, and air quality are ensured through the incorporation of natural materials and design elements, creating a holistic and supportive environment for patient recovery.

LITERATURE REVIEW

In present day society, the majority of modern building practices have separated people from the natural world, in turn cutting off access to the positive benefits contact with nature can provide. The human need for nature is not a new idea, but one that has been ignored and pushed aside in modern times. Causes of this separation from nature are linked to modern day industry and growth. Constant development that has occurred over the last 100 years, specifically, the results of the Industrial Revolution, has significantly damaged and degraded the natural environment (McDonough & Braungart, 2002), and has served to disconnect humans from the natural world (Kellert, 2005). As a result, many of the current environments we have around us are often devoid of natural features, green spaces, natural light, and ventilation (Kellert, 2005).

The Lack of daylight, fresh air, and exposure to natural processes has begun to take its toll on our physical health and well-being. Until recently most research on the built environment has concentrated on the negative aspects of building design such as poor lighting, inadequate ventilation and climate control as well as chemical “off gassing” which has resulted in the “sick-building syndrome”. 1

Sick building syndrome usually occurs when the ventilation system is inadequate and materials and finishes such as paint, plastics, and wall coverings emit harmful fumes. Buildings with these problems have been known to cause “building related illness,” physical ailments that include respiratory and skin disorders and chronic fatigue (Kellert, 2005). In the modern day world, humans live and depend on the built environment. Nigerians spend approximately 87% of their lives within the confines of walls and in many cases blocking out contact with the natural world (Klepeis et. al, 2001).

An essential role in interior design and architecture is to provide environments that sustain occupants’ safety, health, physiological comfort, psychological well-being, and productivity (Kim & Rigdon, 1998). Fortunately, in the last fifteen years the design community has slowly begun to address these issues by designing their environments with human health and well-being moved to the forefront of their design process. Recent research cited in this review has shown that contact with natural environments and features can have a positive impact on human health and wellbeing. It is now the responsibility of designers, architects, and urban planners to start fostering a relationship between people and nature by harmonizing the built environment with the natural environment.

The human connection with nature can be traced back to the beginning of our species and how our ancestors survived and deeply depended on the natural environment for survival.

Biophilia is the theory that humans have an innate or evolutionary-based affinity for nature, it is the belief that we have a connection and a reliance on nature that has been passed along throughout evolution (Wilson, 1984). According to Wilson (1984, 1993), contact with nature is essential for human health and well-being. Based on this theory, a framework has been developed that will reconnect humans and nature within the built environment. This framework is biophilic design, which incorporates organic design and vernacular design principles to interior and exterior architecture. Biophilic design seeks to create a positive connection between people and the environment as well as promoting health and well-being

(Kellert, 2005). It is important to note that biophilic design is not a design fad or trend but a design philosophy based on biological theory and supported by data from both psychological and health research. It is imperative to understand that the concept of biophilia coupled with harnessing the connection to nature covers a range of benefits relating to psychological wellbeing, stress reduction, cognitive functioning, productivity, human development and social behavior (Heerwagen, 2001).

THE BIOPHILIC DESIGN

Steven Kellert, a Professor of Social Ecology at Yale, has taken the biological theory of biophilia and applied it to the built environment, coining the term biophilic design. "The goal of biophilic design is to translate an understanding of biophilia into the design of the built environment, resulting in beneficial contact between people and nature within modern buildings and landscapes (Kellert et al., 2009).

Furthermore, biophilic design contains two main dimensions: what Kellert terms the „organic or naturalistic“ dimension (organic dimension) and the „place-based or vernacular“ dimension (vernacular dimension).

Organic Dimension

1) Direct connections to nature: unstructured contacts with natural elements (views, daylight, plants) Direct connections to nature within the built environment are relatively unstructured contacts with self-sustaining features of the natural environment such as views of the exterior environment, daylight, natural ventilation, plants, animals, natural habitats, and ecosystems (Kellert, 2005, p. 136-137; Kellert et al., 2009, p.5).

DEFINITION OF TERMS

Addiction

Addiction is defined by the World Health Organization as "repeated use of a psychoactive substance or substances, to the extent that the user is:

Periodically or chronically intoxicated,

Shows a compulsion to take the preferred substance(s), Has great difficulty in voluntarily ceasing or modifying substance use,

Exhibits determination to obtain psychoactive substances by almost any means, and

Tolerance is prominent and a withdrawal syndrome frequently occurs when substance use is interrupted.

Also, Addiction (from Latin, meaning, "sentenced to servitude") is the uncontrollable craving for a pleasurable activity or a habitual relieving sensation, the sustained use of a drug or unhealthy relief mechanism develops a physiological or emotional dependence. Addiction is also described as a "quick fix" which gradually makes the situation worse over the long run. Originally, the term was used in connection with heroin and the opiates, then expanded to include alcohol and other drugs, and finally broadened to cover all kinds of physical or emotional dependence.

Drug Addiction

Drugs are chemicals that tap into the brain's communication system and disrupt the way nerve cells normally send, receive, and process information. There are at least two ways that drugs are able to do this, by imitating the brain's natural chemical messengers, and/or over stimulating the "reward circuit" of the brain according to as explained by the National Institute on Drug Abuse (2015). Some drugs, such as marijuana and heroin, have a similar structure to chemical messengers, called neurotransmitters, which are naturally produced by the brain. Because of this similarity, these drugs are able to "fool" the brain's receptors and activate nerve cells to send abnormal messages. other drugs, such as cocaine or methamphetamine, can cause the nerve cells to release abnormally large amounts of natural neurotransmitters that prevent the normal recycling of these brain chemicals, which is needed to shut off the signal between neurons. This disruption produces a greatly amplified message that ultimately disrupts normal communication patterns.

1) Immediate views of nature out a window are also classified as **direct connections to nature**.



Plate 1: Direct connections to nature created by natural light and vegetation
Source:([https://www.archdaily.com/955940/biophilia in architecture](https://www.archdaily.com/955940/biophilia-in-architecture))

2) Indirect connections to nature: controlled contact with natural elements (potted plants, natural materials). Indirect connections to nature within the built environment are controlled or manipulated contact with the natural environment that requires ongoing human input to survive, such as a potted plant, a water fountain, natural materials, or an aquarium. Classifying indirect experiences with nature within the built environment typically is not black and white and involve a degree of personal judgment.



Plate 2: Indirect connections to nature by using natural building materials
Source: (<https://www.pinterest.com/pin/194428908900/>)

3) Symbolic connections to nature: representations of nature (images, patterns). Symbolic connections to nature within the built environment involve no actual contact with real nature, but represent the natural environment through image, picture, ornamentation, video, metaphor, and other techniques (Kellert, 2005, p. 143; Kellert et al., 2009, p.6). Kellert indicates nature can be symbolically experienced within the built environment in a variety of ways, such as decoration, ornamentation, pictorial expression, and shapes and forms that simulate and mimic nature (2005). Moreover, these symbolic representations of nature can appear in a wide diversity of building features such as walls, doors, entryways, columns, trim, casements, fireplaces, furnishings, carpets, fabrics, art, and sometimes even an entire façade. The symbolic expression of nature within the built environment can be experienced in both obvious ways and subtle ways. An obvious expression of a symbolic connection to nature could be the application of a pattern utilizing organic shapes.



Plate 3: Symbolic Connections to Nature by using Biomorphic Forms and Patterns
Source: (Nature analogues ©terrapinbrightgreen.com)

DRUG ABUSE IN NIGERIA

Abdullahi (2003) in their examinations on the view of Illicit drug use among Nigerian students distinguished reliance and habit as one of the significant outcomes of substance addiction, portrayed by urgent medication hankering looking for ways of behaving that continue even notwithstanding unfortunate results. The individual may be at risk of harm as a result of these changes, which are ill-suited to the social or environmental setting and are maladaptive. All Nigerians, including the government, school administrators, religious leaders, and other non-governmental organizations (NGOs), ought to be concerned about the use of drugs by young people. Trying different things with drugs during youth (11 - 25 years) is normal. At this age, they attempt countless new things. They use drugs for some reasons, including interest, since it feels significantly better, to lessen pressure, or to feel grown up. Utilizing liquor and tobacco early on increases the gamble of utilizing different medications later.

According to one of the WHO's World Heart Foundation's data, tobacco use is prevalent among school-aged youth in Nigeria (22.1 percent), South Africa (19.4 percent), Ghana (15.1 percent), and Kenya (16.2%).

A greater part of the Nigerian young people obviously relies upon one type of medication or the other for their different day-to-day exercises - social, instructive, political, moral, and so on. Such medications include: Tobacco, Indian hemp, cocaine, morphine, Champion, Liquor, ephedrine, Madras, Caffeine, Paste, Barbiturates, Amphetamines, etc.

The public authority of Nigeria appears to fail to focus on its liabilities, however, it guarantees that tobacco ought to be directed in a market-situated outline work, which finds some kind of harmony and has to guarantee a solid workforce, the trepidation is that young people are tricked into early demise from cardio Vascular Sicknesses (CVD), cellular breakdown in the lungs and other tobacco-related illnesses. Given this peril, the Secretary-General of the African Heart Organization, Dr. Kingsley Akinroye encouraged Nigerians not to be associated with businesses that are damaging to them regardless of whether they can't forestall their foundation. This was in response to the multibillion-naira investment deal that the previous administration made with British American Tobacco (BAT) to build a tobacco plantation in Ibadan to produce tobacco-related products at the expense of Nigerians. As of now, Nigerian young people are being offered cigarettes through advancements and melodic shows. A few youngsters will investigate and stop, or keep on utilizing at times without critical issues. Others will foster enslavement, continuing toward additional perilous medications and causing critical damage to themselves and the general public at large.

Drug Rehabilitation

Drug rehabilitation (frequently alluded to as medication recovery or just recovery) is characterized by the Public Establishment on Chronic Drug Use (NIDA), as a term for the course of clinical or psychotherapeutic therapy, for reliance on psychoactive substances, for example, liquor, physician recommended medications and road medications like cocaine, heroin or amphetamines. The overall plans

are to empower the patient to stop substance misuse and to keep away from the mental, lawful, monetary, social, and actual outcomes that can be caused, particularly by outrageous maltreatment.

Psychological Dependency

Mental reliance is addressed in many medication restoration programs by endeavoring to show the patient new techniques for communicating in a medication-free climate. Specifically, patients are by and large supported, or potentially even expected to not connect with companions who utilize the drug. A twelve-step program urges fiends not exclusively to quit utilizing liquor or different medications, but to inspect and work on propensities connected with their addictions. Many projects underscore that recuperation is a super-durable cycle without a summit. For legitimate medications, for example, liquor, complete abstinence as opposed to endeavors at control, which might prompt backslide is likewise stressed (One is too much, and 1,000 is rarely enough.) Whether moderate is reachable by those with a background marked by misuse stays disputable, however is by and large viewed as unreasonable.

Types Of Treatment

Different kinds of projects offer assistance in drug restoration, including Addiction counseling, mental health, orthomolecular medicine, outpatient treatment, extended care centers, local support groups, residential treatment (inpatient), and medical care are all options. A study of treatment suppliers from three separate organizations; the Public Relationship of Liquor Addiction and Chronic Drug Use Guides, Reasonable Recuperation Frameworks, and Society of Clinicians in Added Substance Ways of Behaving in India, 1970 shows that successful therapy tends to the various requirements of the patient as opposed to treating habit alone. Likewise, The Public Organization on Chronic Drug Use (NIDA) suggests detoxification followed by the two prescriptions where material and conduct treatment, trailed by backslide anticipation. Effective treatment, according to NIDA, must include options for follow-up, such as community or family-based recovery support systems, in addition to medical and mental health services. Regardless of the method, patient motivation is crucial to treatment success. For people dependent on professionally prescribed drugs, medicines will quite often be like the individuals who are dependent on drugs influencing similar mind frameworks. Medicine like methadone and buprenorphine can be utilized to get habit remedy sedatives, and conduct treatments can be utilized to get fixation solution energizers, benzodiazepines, and different medications.

Types Of Behavioral Therapy

The sorts of conduct treatment include:

- I. Mental conduct treatment, which looks to assist patients with perceiving, keeping away from, and adapting to circumstances in which they are probably going to backslide.
- II. Multi-layered family treatment, is intended to help the recuperation of the patient by further developing family working.
- III. Persuasive talking, which is intended to increment patient inspiration to change conduct and enter treatment.
- IV. Persuasive motivators, which utilize uplifting feedback to support forbearance from the drug.

Counselling

Conventional habit treatment depends fundamentally on guiding. In any case, late revelations by NIDA, in 2004 have shown those experiencing enslavement frequently have compound irregular characteristics that make the recuperation cycle more troublesome. Guides help people recognize ways of behaving and issues connected with their habits. It tends to be finished on a singular premise, however, it's more considered normal to find it in a social environment and incorporate emergency directing, week after-week or every day guiding, and drop-in advising. They are educated to create recovery programs that aid in the resumption of healthy behaviors and provide coping mechanisms in the event of a risky circumstance. It's exceptionally normal to see them work likewise with relatives who are impacted by addictions of individuals, or locally to forestall enslavement and teach the general population. Guides ought to have the option to perceive what fixation means for the entire individual and everyone around the person in question.

Historical Approach To Substance Abuse Treatment

1) Two-Factor Programs

These programs are also known as the "Disease Model" and "12-Step Programs." The sickness model of enslavement has long battled the maladaptive examples of liquor and substance utilization shown by dependent people because of a deep-rooted illness that is organic in the beginning and exacerbated by natural possibilities. This conceptualization depicts the individual as frail over their tricky ways of behaving and unfit to stay sober by themselves, much as people with terminal sickness can't battle the illness without help from anyone else without medicine. Conduct treatment consequently, essentially expects people to concede their fixation, disavow their previous way of life, and look for a strong interpersonal organization who can assist them with staying sober (Wilson 1935).

Such methodologies are the quintessential elements of twelve-step programs, initially distributed in the book *Alcoholic Mysterious* in 1939. These methodologies have met significant measures of analysis, coming from rivals who oppose the otherworldly strict direction on both mental and legitimate grounds. In any case, notwithstanding this analysis, result studies have uncovered that alliance with twelve-step programs anticipate restraint accomplishment at 1 - year follow-up for liquor addiction. Various outcomes have been gone after different medications, with the twelve stages being less helpful for fiends to unlawful substances, and least gainful to those dependent on mentally compelling narcotics, for which upkeep treatments are the highest quality level of care.

2) Client-Focused Approaches

In his powerful book, *Client-Focused Treatment*, in which he introduced the client-focused way to deal with remedial change, clinician Carl Rogers suggested that there are three important and adequate circumstances for individual change: unrestricted positive respect, exact compassion, and validity. Rogers (2009) accepted the presence of these three things in the remedial relationship could assist a person in defeating any irksome issue, including liquor misuse.

Clients are directly responsible for determining the treatment's goals and objectives in a modified version of Rogers' approach. Client-Coordinated

3) Psychoanalytic Methodologies

Therapy, a psychotherapeutic way to deal with conduct change created by Sigmund Freud in 1996 and changed by Rogers in 2003, has likewise offered a clarification of substance misuse. This direction recommends the primary driver of the fixation disorder is the oblivious need to engage and sanction different sorts of gay and unreasonable dreams and simultaneously to try not to get a sense of ownership with it. Rogers further guessed that particular medications work with explicit dreams and utilizing drugs is viewed as uprooting from, and a corresponding of the impulse to jerk off while engaging in gay and unreasonable dreams.

The dependence disorder is likewise conjectured to be related to life directions that have happened inside the setting of traumatogenic processes, the periods of which incorporate social, social, and political variables, exemplification, traumatophilia, and masturbation as a type of self-relieving. Such a methodology lies as a glaring difference to the methodologies of social mental hypothesis to fixation and without a doubt, to conduct overall. Humans are held in this way because they regulate and control their own cognitive and environmental environments and are not just driven by internal impulses.

RESEARCH METHODOLOGY

This study employed a qualitative research approach, including a review of literature, case studies, and site analysis. The research questions focused on exploring biophilic design principles in drug rehabilitation centers, proposing a befitting design framework, and demonstrating the application of biophilic principles in contemporary rehabilitation centers. Research has shown that contact with natural environments and features has a positive impact on human health and wellbeing (Kaplan & Kaplan, 1995; Sullivan et al., 2001). Biophilic design principles, based on the theory of biophilia, aim to reconnect humans with nature (Wilson, 1984). This design approach has been applied in various architectural designs, including healthcare facilities, to promote healing and wellness (Ulrich et al., 2008).

The data for the study came from both primary and secondary sources. Descriptive analysis was used to examine the data acquired.

1) Primary Data Collection Case Studies

This method involves paying personal visits to similar structures to obtain direct experience. This research aimed to find out what concerns were specific to the building type and location. A selection of local and international buildings with similar building typologies and programs were chosen as case studies. The case studies were conducted to better understand the building's architectural techniques and approaches to drug rehabilitation spaces. The comparisons between these buildings were made in order to explore and comprehend different design strategies that could be employed to create adaptable spaces for rehabilitation in various surroundings and contexts. As a result, a design plan for a drug rehabilitation center that incorporates the use of biophilic design application was adopted.

2) Secondary Data Collection

During research on the existing types of proposed drug rehabilitation center, the secondary data collection method was used to collate information from the internet sources, literature materials, and internet case studies, to have a better knowledge on how to improve during design implementation of proposed project. Just like Primary data collection method, case studies were extracted from internet sources on media Center such as the Beit Halochem rehabilitation center, SAX Rehabilitation Center, Rehabilitation Centre Groot Klimmendaal The information extracted from both primary and secondary data were very important as it provided the idea of such a project.

FINDINGS

The study found that incorporating biophilic design principles in drug rehabilitation centers can enhance wellness and support the recovery process. The proposed design framework includes natural building materials, wall artworks, courtyard systems, and connections to nature. The application of biophilic principles in contemporary rehabilitation centers has shown positive outcomes in promoting healing and wellness.

Biophilic design is based on the biological theory of biophilia, which suggests that humans have an inherent affinity for nature (Wilson, 1984).

The goal of biophilic design is to translate this understanding into the design of buildings and landscapes, resulting in beneficial contact between people and nature (Kaplan & Kaplan, 1995).

Biophilic design has two main dimensions: the organic or naturalistic dimension and the place-based or vernacular dimension (Kellert, 2005).

The organic dimension involves direct, indirect, or symbolic connections to nature, such as views, natural light, plants, and natural materials (Kaplan & Kaplan, 1995).

The vernacular dimension involves the use of local and regional materials, forms, and patterns to create a sense of place and cultural identity (Kellert, 2005).

Biophilic design contains six main elements: environmental features, natural shapes and forms, natural patterns and processes, light and space, place-based relationships, and evolved human-nature relationships (Kellert, 2005).

These elements can be expressed through 72 biophilic design attributes, such as natural light, ventilation, and materials, as well as the use of colors, patterns, and textures found in nature (Kellert, 2005).

Biophilic design can be applied in various settings, including healthcare, education, and workplaces, to improve human health and well-being (Kaplan & Kaplan, 1995; Sullivan et al., 2001; Ulrich et al., 2008).

Examples of biophilic design include the use of green walls, natural ventilation, and daylighting in buildings, as well as the incorporation of natural materials and patterns in interior design (Kellert, 2005).

Biophilic design can also be used to create healing spaces that promote recovery and well-being, such as in hospitals and rehabilitation centers (Ulrich et al., 2008). Art therapy and color therapy can also be used in biophilic design to promote emotional and psychological well-being (Lusebrink, 2004).

CONCLUSIONS

Drug rehabilitation centers in Nigeria have neglected the importance of wellness and biophilic design principles in their design approach. This study has proposed a framework for incorporating biophilic design principles in drug rehabilitation centers to enhance wellness and support the recovery process. The application of biophilic principles can lead to improved health outcomes, reduced stress, and increased productivity. It is essential to prioritize biophilic design in drug rehabilitation.

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REFERENCES

1. Kaplan, S. (1995). The restorative benefits of nature: Toward an integrative framework. *Journal of Environmental Psychology*, 15(3), 169-182.
2. Kaplan, S., & Kaplan, R. (1995). *The experience of nature: A psychological perspective*. Cambridge University Press.
3. Kellert, S. R. (2005). *Building for life: Designing and understanding the human-nature connection*. Island Press.
4. Lusebrink, V. B. (2004). Art therapy and art making for stress relief. In G. H. G. H. R. R. R. R. R. R. R. R. (Ed.), *The art of art therapy* (pp. 67-80). Charles C Thomas Publisher.
5. Rogers, C. (2009). *Sober and Relapse Strategies*. Washington, DC: Island Press.
6. Sullivan, W. C., Kuo, F. E., & Brunner, R. L. (2001). Views of nature and self-discipline: Evidence from inner city children. *Journal of Environmental Psychology*, 21(1), 49-63.
7. Ulrich, R. S., Zimring, C., Quan, X., & Joseph, A. (2008). *The role of the physical environment in the hospital of the 21st century: A once-in-a-lifetime opportunity*. Center for Health Design.
8. Wilson, E. O. (1984). *Biophilia*. Cambridge, MA: Harvard University Press.
9. Sigmund, F. (1996). *Substance Abuse: Survey for General Addiction Studies*.
10. *Journal of Rehabilitation for Drug Addicts*, 60(6), 25- 40.
11. Stake, R. (1995). *Case Study Methods in Educational Research: Seeking Sweet Water*.
12. *American Educational Research Association*. Washington, DC: Island Press.
13. Stebbing, P. D. (2003). *A grammar of visual composition and its biological origin*.
14. Stewart-Pollack, J. (2006). *Biophilic design: For the first optimum performance home*.
15. *Ultimate Home Design*, Issue 04, August, 2006. 6
16. Kim, J. J., & Rigdon, B. (1998). *Introduction to Sustainable Design*. College of Architecture and Urban Planning, The University of Michigan Press.
17. Klepeis, V. E., Weinger, I., Kaczmarek, E. et al. (2001). *Resource of Assessing Exposure to Environmental Pollutants*. *Ultimate Home Design*, Issue 03, April, 2001.
18. Kopec, R. (2010). *The Human Behaviour and Cognitive Performance*. *Journal of Environmental Psychology and Behavioural Assessment*, 15, 5-20.
19. Lynn, G. (2009). *Animate form*. Princeton, New York: Architectural Press.
20. Lynn, G. (2011). *Folds, bodies and blobs*. Brussels: La LettreVole"e.
21. Malthrop, M. (2011). *Building Sick Syndrome: Ecosystem Purification Process: (6th Edition)*. 10-12. San Diego, CA: Academic Press.
22. McDonough, S., & Braungart, M. (2002). *Cradle to Cradle: Remarking the Way We Make Things*. Washington, DC: Island Press.
23. Mithen, S. (2008). *The prehistory of the mind*. London: Thames & Hudson.
24. Neutra, S., & Richard, P. (1989). *Nature near*. California: Copra Press.
25. Onoche, N. (2008). *Rehabilitation of Drug Addicts*. *Journal of Addiction and Psychological Well Being*, 80(2), 24-40.

26. Orians, G. H. (1980). *Ecology Aspect of Social Development*. Washington, DC: Island Press.
27. Orians, G. H. (1986). *Human Evolution and Savannah Hypothesis*. Washington, DC: Island Press.
28. Parsons, R. (1991). The potential influence of environmental perception on human health. *Journal of Environmental Psychology*, 11, 1-23.
29. Piano, R. (2007). Arts and Entertainments of the Kanak. *Journal of Art and Culture*, 12, 3-9.
30. Pliska, N. (2005). *Building Sick Syndrome: Ecosystem Purification Process: (2nd Edition)*. 6 8. San Diego, CA: Academic Press.
31. Portoghesi, P. (2000). *Nature and architecture*. Milan: Skira.
32. Relph, E. (1976). *Place and placelessness*. London: Pion.
33. Robinson, A. (2006). Evidence of Addiction: Survey for General Addiction Studies. *Journal of Rehabilitation for Drug Addicts*, 60(6), 115-124.
34. Rogers, C. (2003). *Substance Abuse*. Washington, DC: Island Press.
35. Rogers, C. (2009). *Sober and Relapse Strategies*. Washington, DC: Island Press.
36. Salingaros, N. A. (2004). *Anti-architecture and deconstruction*. Solingen, Germany: Umbau Verlag.
37. Shavelson, J. (Eds.). (2002). *Scientific Research in Education*. Washington DC: National Academy Press.
38. Sigmund, F. (1996). Substance Abuse: Survey for General Addiction Studies. *Journal of Rehabilitation for Drug Addicts*, 60(6), 25-40.
39. Stake, R. (1995). *Case Study Methods in Educational Research: Seeking Sweet Water*. American Educational Research Association. Washington, DC: Island Press.