A Review of biophilic design at Kuttikattoor school for the children

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Abstract: The objective of this paper is the creation of a school to help the children of Kutikatoor live a more accessible and simpler life: students in the concentration range from 4 to 16 (Play School – Grade 10). The proposed location, which is around 18.3 acres in size, lies in Kuttikattoor, Kozhikode, and Kerala. The land is surrounded by greenery and situated in a mountainous area. The study will concentrate on how biophilic architecture and design may enhance students' lives. This paper will discuss how biophilic design may benefit schools by creating circulation and spatial connections between the built and natural environments. The biophilic design can have quantifiable beneficial effects on student performance and well-being by including natural components. It is necessary to thoroughly analyze the biophilic design in relation to the learning environment for students, using ideas of ecological, visual, and spatial integration. By fostering a soothing atmosphere, lowering anxiety, and boosting physical fitness, biophilic design, which incorporates natural light, greenery, and nature vistas, can increase attention, decrease stress, stimulate creativity, and improve academic accomplishment. The school's design will be implemented by incorporating the architectural design into the contoured regions and using the idea of biophilic design patterns. Depending on the climate and the site's orientation, the design will be implemented such that locally accessible materials are employed in a hilly area. This detailed analysis of the case study and literature review for the school design will help us to design and conceptualize as an architect. Further, the study will also emphasize biophilic design which is aligned with the built environment in school design.

1 Introduction

The motivation of this study is to design a nature-connected built environment for students. The rationale for choosing this issue is to draw attention to the children of Kutikatoor who must travel a long distance to school. Kuttikatoor is a village in the Kozhikode district. As an outcome, children living in Kuttikkattoor would have to travel approximately 30 minutes to school, and they would be late due to traffic congestion. This thesis topic is about the children of Kutikatoor and the establishment of a school for them to make their lives easier and more accessible. Since the site is hilly, there is a one-meter contour variation between the lowest and highest points, which are 104 and 190 levels, respectively. A seven and eight-meter-wide road winds through the property, which is covered in trees and other vegetation. In terms of sensory perception, the region is totally calm and devoid of any vehicle noise, with the exception of the sounds of birds and crickets because the highway is approximately ten kilometers distant from the surrounding spot. This location is filled with the scent of mango and banyan trees, leaves, and bougainvillea, along with a view of lush vegetation and trees. The Government Medical College of Kozhikode and the IIM Kozhikode are visible from the site.

The wellness of the kids and how they may learn in a setting that is related to nature are other major topics of this research report. The layout will center on the 14 biomorphic patterns, which will foster a positive atmosphere and give students a sense of belonging while allowing them to study in a peaceful environment. It is encouraged by biophilic design to incorporate natural problems into man-made spaces. Since children spend a large portion of their time at schools when not at home, schools present a chance to improve by using evidence-based design that links biophilic settings to advantages for health and cognition. By using design methods that encourage early academic achievement and ignite a good trajectory in a young person's life, learning spaces have the power to affect generations positively. (Determan et al, 2019).

2 Aim

To create a pleasurable educational environment for kids by utilizing biophilic design, to combine the space with nature, and to make it easily accessible, with a focus on the children of Kuttikkattoor.

3 Research question

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1. How can the lives of students be improved by bringing a school to Kuttikattoor?
2. How do students find easy accessibility and circulation to the school?
3. What is the reason for choosing a hilly area site in Kuttikattoor?
4. How biophilic helps in the impact of student's wellbeing?
5. In what ways do biomorphic patterns contribute to the school for improving the performance of the school and the children?

4 Objectives

1. To study and understand how to design the hilly areas through site analysis.
2. To understand how biophilic design can contribute to the school by connecting the physical and natural environment through spaces and circulation.
3. To create an educational environment based on concepts of spatial, visual and ecological integration.
4. To build the design based on the local materials available and through biomorphic patterns.

5 Background study

Calicut (Kozhikode) is a coastal city in the south Indian state of Kerala. It was a significant spice trade center known for its greenery. The site selected is in Kuttikkattoor which is located in Kozhikode city. Calicut is a coastal city/district in the south Indian state of Kerala. It was a significant spice trade center and was also known for its greenery and also famous universities.

The students aged 6 - 16 in the Kuttikkattoor area face very much difficulty traveling to the schools, which is around 30 km and they always arrive late due to the traffic congestion on the Mavoor junction. The study will focus on how to improve their lives by designing a school that is nearest for their easy accessibility.

The design concept will be based on the Biophilic design patterns. Biophilic helps in connecting the natural and physical environment, and also it reduces the stress of the students when they are connected to the environment. It also gives them a visual connection with nature and also increases their performance inside the classroom. Biophilic design, incorporating natural light, greenery, and nature views, can enhance focus, reduce stress, boost creativity, and improve academic achievement by promoting a relaxing environment, reducing anxiety, and promoting physical fitness.

6 Literature review

Reference 1:

Table 1 : Study about how biophilic design contribute to student stress

PURPOSE/OBJECTIVE OF STUDY
To examine what extent the biophilic design can contribute to student stress reduction and learning outcomes. Testing through HRV
LIMITATIONS
Potential confounding variables that can affect student results, such as academic achievement, socioeconomic characteristics, or environmental factors, should be taken into account in this study.
RESULTS
Biophilic environments contribute to less anxiety, reduce stress, and create a good learning environment.
RESEARCH GAPS
Compared to standard classrooms, a biophilic classroom offers natural vistas, dynamic sunshine, and biomorphic patterns that improve learning outcomes and help students reduce stress.

Reference 2:

Table 2: Study to improve the performance of classroom through biophilic

PURPOE/OBJECTIVE OF STUDY
To improve the performance of educational institutions and schools, considering sustainability concepts and biophilic designs has become an urgent necessity within the Scandinavian countries and in the world in general.
LIMITATIONS
Based on student self-reported data, the study might be biased or erroneous. It was primarily concerned with physical space design, ignoring other critical elements influencing learning results.
RESULTS
Students prefer lectures in planting spaces and integrate natural elements into school spaces, dividing classrooms into various forms for better enjoyment and collaboration.
RESEARCH GAPS
After COVID-19, creating comfortable classrooms necessitates using biophilic design patterns that use open spaces and natural elements to boost learning outcomes and elevate educational establishments.

Reference 3:

Table 3: Study about examining DQ quarters for achieving Biophilic

PURPOSE/OBJECTIVE OF STUDY
To study and examine how biophilic criteria approach Riyadh City by taking DQ as a case study and to determine to what extent the DQ achieves Biophilic Criteria.

LIMITATIONS
The Delphi technique is a long-time process method by taking surveys from 25 experts.
RESULTS
The best seven biophilic planning and design parameters for the Dubai Water Quality (DQ) in Riyadh City were determined using the Delphi approach.
RESEARCH GAPS
The goal of Saudi Vision 2030 is to enhance urban areas while advancing health care and sustainability. Evaluating the biophilic approach as a case study in the Diplomatic Quarter in Riyadh.

Reference 4:

Table 4: Study about how nature plays role in Biophilic

PURPOSE/OBJECTIVE OF THE STUDY
To achieve sustainability, the research intends to investigate the function that nature plays in architecture and biophilic design as a theoretical framework.
LIMITATIONS
The authors' selection criteria may have excluded relevant literature that was not published within the specified time frame or did not meet other criteria.
RESULTS
The study explores biophilic design in buildings, highlighting its benefits for well-being, sustainability, and health, incorporating plants, landscapes, natural materials, light, and air.
RESEARCH GAPS
The research on biophilic design requires interdisciplinary collaboration involving architecture, psychology, ecology, and other relevant fields.

7 How can the lives of students be improved by bringing a school to Kuttikattoor?

The opening of a school in Kuttikattoor will benefit students in their quality of life. The closest school is around 20 minutes away from Kuttikattoor, therefore students will be running late since they have to pass the government medical college and Mavoor Road, which sees the most traffic during school hours. This has therefore been a problem for everyone in the region, not only the Kuttikattoor but also the locals.

8 How do students find easy accessibility and circulation to the school?

For students, hilly places necessitate ingenious ways to commute. It is possible to increase student productivity and well-being in schools by creating a well-designed circulation system. Concise design, distinct zones, spacious hallways, ample natural light and airflow, group work areas, ease of access, designated areas for drop-off and pick-up, adjustable furnishings, use of technology, and active student participation are some of the best practices. Together with flexibility, these tactics foster safety.

9 What is the reason for choosing a hilly area site in Kuttikattoor?

Hillsides provide several advantages, such as better health, less urban distractions, chances for outdoor learning, cultural relevance, environmental consciousness, natural beauty, and a sense of community. These places offer an all-encompassing educational strategy that considers the community, culture, and environment. For both teachers and children, schools in hilly regions can foster the development of a feeling of community, cultural pride, and support networks.

10 How biophilic helps in the impact of student’s well-being?

Biophilic design in schools fosters a human-nature bond in addition to lowering stress, improving focus, boosting creativity, raising productivity, promoting mental health, promoting physical well-being, encouraging outdoor activities, promoting social interaction, and adhering to sustainable practices. Its design is uplifting and fosters a sense of community and environmental responsibility.
The Biophilic School in Kuttikattoor provides easy access, a natural location, and amenities including a playground, amphitheater, gymnasium, and entertainment. Learning, listening, creativity, cognitive function, and stress reduction all enhance when patterns are followed.

11 In what ways do biomorphic patterns contribute to the school's improvement?

By encouraging artistic expression, building a bond with nature, reducing stress, improving focus and attention, displaying adaptability, offering cognitive benefits, inspiring unique learning spaces, celebrating cultural identity, and encouraging creativity, biomorphic patterns can improve the learning environment in schools. Apart from improving concentration and focus, these patterns can strengthen an individual's bond with the natural world. These all contribute to the development of a supportive learning environment.

12 Site analysis

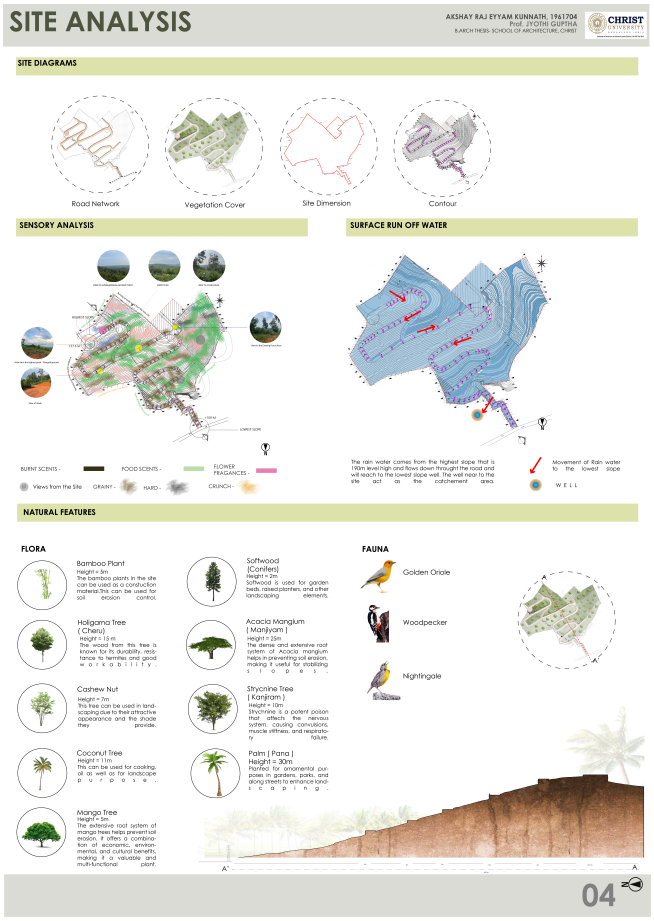

Fig. 1. Analysis of natural features and sensory map.

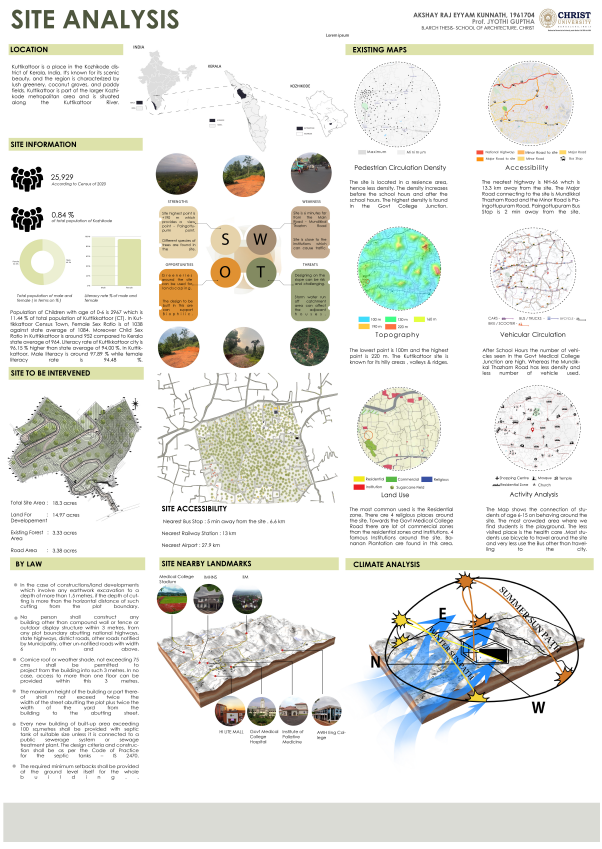

Fig. 2. Kutikattoor site analysis.

13 Conclusion

The main objective of the author is to study the biophilic design. The study started with answering the research question which includes improving the life of the students in Kuttikattoor, studying their psychological behavior, accessibility, and sensory. Additionally, a detailed literature study was done for the patterns of biomorphic and biophilia. The study area is located in Kuttikattoor, a hilly area. The reason for choosing this site is due to its scenic beauty, connecting natural features, viewpoints, Privacy, and Security, The purpose of this learning space is to include sustainability with improved indoor air quality within the learning space. Additionally, this research is reviewed along with 5 research papers from eminent scientists. However, the study continued with the visit to school buildings in Calicut and Kolkata to study architectural and biophilic design. Further, the study will also emphasize biophilic design which is aligned with the built environment in school design.

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