



Application of Organic Architecture in School of Nature Design

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Abstract. The development of education in the room is the main factor for students to feel the boredom of learning in the room. Indoor education is rigid and formal, often causing saturation and boredom when carrying out the process of teaching and learning activities. Whereas to get education is very important. Therefore, a learning system is needed that can eliminate the impression of saturation in the room. Based on Organic Architecture in the design used in natural schools, it also impacts the application of the material used. These materials are often found in areas / areas that are directly adjacent to the construction site, so as to provide ease of adjustment of the material with the surrounding nature. The method used is direct observation and literature study. The data management results are used as a basis for designing activities combined with the theme of Behavioral Insight Architecture. Thus, it is expected to be able to create a school that is environmentally comfortable and safe for its users.

1. Introduction

School of nature is one of education system that develops in Indonesia. In school of nature, students learn more in plaza or outdoors that designed in this area. It can help sstudents to grow become a ccharacteristically human, be able to use around the nature area, to maintain nature in the next life also to love the nature. School of nature designed to cover elementary school levels, by maximising source of energy from nature and improving natural relations with other users

According to Carl Rogers (Sartika, 2008), in daily life, school of nature did not find a formal and conventional learning process. In natural school, sense of curiosity children may channelled. Everything that they want can be found, so children are given freedom to satisfy their curiosity without blocked by room class, uniform, regulation that can decrease their creativity or theacers control, so they can found an important something about them and world around their learning activity.

The nature school building must be designed according to user needs. To give comfort, it needs planning that notice materials also structure system that support the material. Choosing the material based on used application of organic. The materials based on natural materials around the locations in Malang City. According to Fahrudin (2009), there are several kinds of natural materials that available in Batu:

No.	Bahan Bangunan Alami	Kegunaan
	Bambu	Dapat digunakan sebagai dinding, pelat lantai, penutup lantai, konstruksi atap, penutup atap, pagar, jembatan, tangga, dan lain sebagainya
	Kayu Pinus	Cocok untuk bahan bangunan, kayu lapis, bahan pengepakan (pembungkus), batang korek api, pulp, papan gambar, dan pensil. selain itu, kayu pinus juga banyak dimanfaatkan sebagai bahan sumpit, papan laminasi, dan barang kerajinan (Surakartana, 1997)
	Batu Alam	Dipergunakan sebagai pondasi, penutup lantai, batu tempel/ batu hias, dan batu tonggak.
	Tanah Liat (Bata Merah, Genteng Tanah Liat), Pasir	Bata merah dapat digunakan sebagai bahan dinding bangunan, genteng tanah liat dapat digunakan sebagai bahan penutup atap, serta pasir dapat digunakan sebagai agregat halus pada campuran beton maupun pondasi

Figure 1. Natural materials diagram in Batu

One of the material applications used in natural school buildings design is using woods. Wood is the nature source which is learn be renewable by itself that will not run out if the processing is good frick (2004) the wood according to process and form it has spesific properties that is not easy replicated by other materials such as elastic properties, resistant to parallel and perpendicular stresses of fiber, when talking about the structured used in wood working. Karin Sandberg (2016) in her journal about Prefabricated Wood Elements For Sustainable Renovation Of Residential Building Facades, explained that a structure that has a connection in accordance with building requirements and can installed on used structure like wood, concrete and brick [1]. A building that their materials fit with size, terms and energy needs, so it makes results from the design will be usefully and efficient. It give an important point in design process a building that use some materials that have special treatment.

This statement show the perception of safe and comfortable in a building design that is used, so it needs emphasis where all give an obvious purpose. It shade bt a theme / understanding used in each statement. This understanding uses a theme Behavioural insight architecture. In her books, Joyve Marcella Laurens (2004), in Architecture and human behavior book says that looking at human psychology as the study of behavior, because behavior more easily observed recorded and measured [2]. The purpose of this natural school design to create a building block which supports an enviroment-based education system with the application of organic architecture so it create a safe and comfortable space for the user.

2. Methods

The method used is descriptive method that has the characteristics of describing the basic or fundamental data by looking for correlations, actual information, but identifying. The method process produces concepts that later will be used in the process of applying the shape. In the application of the shape, later can obtain material that is suitable for use in building design.

The concept of building organic architecture is used as a reference design in design. The application of organic design will be combined with the concept of micro-building, namely the concept of Eco Building. The combination of the two concepts will produce a design that describes a building with special characteristics of the contoured area. The application of organic concepts contained in natural school designs is more indicated in the use of materials. The material used is material contained in nature. Such as the use of wood as a building structure, boards as walls and floors of buildings, as well as some elements of vegetation that will add atmosphere to natural schools. The following is the sequence of the use of concepts in the design of natural schools

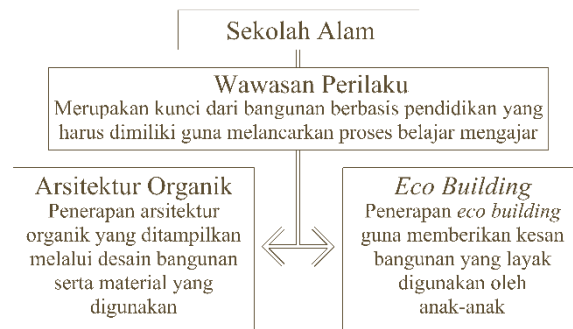


Figure 2. Design Concept Charts (Personal Document)

3. Result and Discussion

Organic Architecture according to the principle of Farnk Loyd Wright is the expression of spirit of human life with an organic form which is not interpreted as a form of imitation from nature but an abstract-basic understanding that from the principles of nature. The application of organic architecture is chosen based on natural conditions and the sustainability of the titles. It has an impact on designs that later will produce designs with characteristics that displayed in natural schools. The Organic Architecture concept applied to buildings is found in the material that used in the building. There is one of the designs of library buildings in the natural school, which is a building using wood materials and boards as walls.



Figure 3. Application of woods material in Library building design (Personal Document)

Not only wood material is the main attraction in buildings, but the existing trees use in the surrounding area has a very positive influence on the design. Buildings can be created using the existing one by letting the existing vegetation. Besides that, some vegetation of wild trees can be cut down by taking the wood benefits as a supporting pillar / column from the building. The column of course only aesthetic, but for the use of structural columns of the building itself is also still applied. As in the installation of a wall which will later use a practical column.

The wood installation itself is installed with a vertical and horizontal mounting system. In the horizontal is done on the wall there is a frame that is used as a support for the wall. Wood construction is carried out using a joint, nailed / screwed on a horizontal and vertical wooden frame. Installation of the wall will then use a board that must pay attention to the connection / connection between the boards so that rainwater does not enter. In addition, it must also pay attention to the nature of wood that can experience expansion and shrinkage.

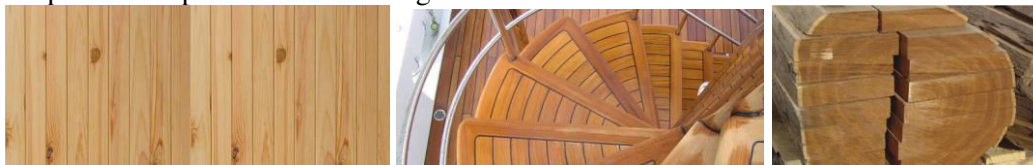


Figure 3. Woods type: 1) Belanda's Teak, 2) Processing Teak Wood, 3) Teak wood is ready for processing (Source: <http://custommebel.com/en/2018/02/05sekilas-tentang-kayu-jati-belanda-atau-kayu-jati-londo-2>)

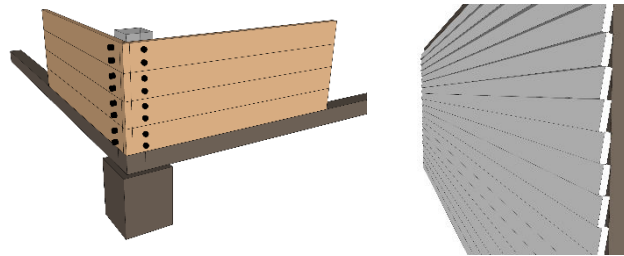


Figure 4. Instalation Woods (Source: Personal Document)

The design of the roof cover used in each building also uses materials of clay tiles. By using the jengki roof design, the structure is used of wood with a fussy combination that uses material from a wooden wall is arranged continuously so that it becomes fussy. The application of the jengki roof will also influence the entry of the air from the outside into the building. The use of structural systems in each building design uses a simple structure. It found in the pattern of the connections used in the structure. In addition, it also minimizes the difficulty of maintenance of some materials if there is a replacement due to damage or aging.

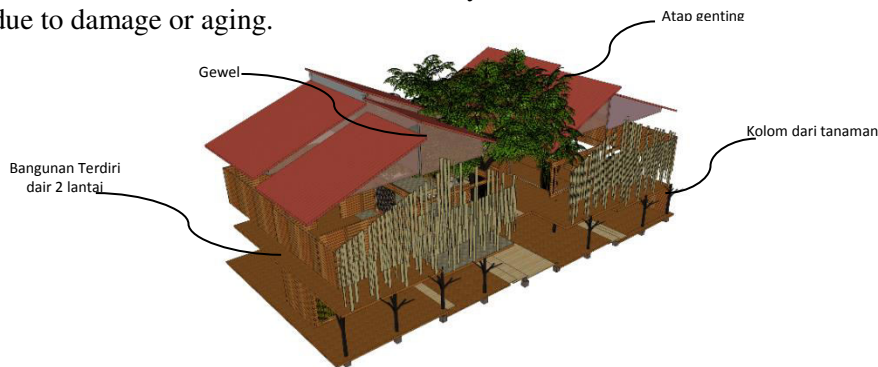


Figure 5. 1) Materials Application, 2) Sains Building (Source: Personal Document)

So that the application of natural school building design uses natural ventilation. Maximizing the design of buildings that can also directly become air circulation in and out of buildings. The application of ventilation uses cross ventilation. This is because of the influence on a design that adapts to the natural surroundings, so that the design influences the systematic science used in buildings.



Figure 6. Outdoors Enviroment at Nature School 1) Library, 2) Education Building (Source: Personal Document)

The concept of organic architecture in natural schools is a combination of the enviroment given to the school area. Natural school designs that use materials from nature will add a supportive enviroment with nature, so that more learning is provided in the outdoor along with the nature provided. Article 31 of the Convention on the Rights of the Child (1990) states: "The right of children to rest and relax, play and participate in recreational activities that are appropriate to the age of the child concerned and to participate freely in cultural and artistic life [3]." So that in the application of space design used by children, learning also requires a communal area that they can use as a resting area. So that in presenting the space must use materials that are safe and comfortable to use for children.

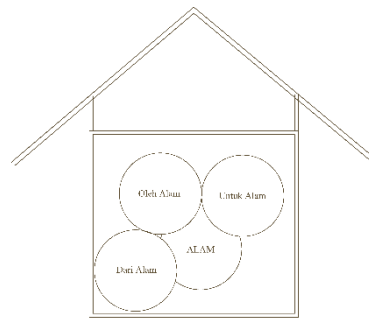


Figure 7. Figure of Nature School Design (Source: Personal Document)

In applications, continuity on nature with childrens will make the main key for learning process in scope of nature provided by God and redesigned by the developer. So children can play also learning to know about whats in nature from their age and the stages they went through.

4. Conclusion

Natural schools are school that use outdoor methods / in plaza area that designed in school area. Many natural activities become education activities in school, so it' s need outdoors facility which the presentation from indoor is very difference, like garden, farms, plazas, and some outdoor spaces-based class. So it needs safety and comfortable places for the users. Application of organic architecture in the design of nature school in the use of goods from nature, which later to used for nature and building users. It also includes the use of energy sources arounds the school, including air and lighting.

5. References

- [1] K. Sandberg, "Prefabricated Wood Elements For Sustainable Renovation Of Residential Building Facades," 2016.
- [2] M. L. Joyce, *Arsitektur dan Perilaku Manusia*. Jakarta: Grasindo, 2004.
- [3] "Pasal 31 Konvensi Hak-Hak Anak," 1990.