Effects of Studio Based Learning Models on the Ability of Architectural Engineering Students

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Abstract: *This study aims to introduce and determine the effect of the Studio Based Learning model on the design ability of students at the Panca Budi University S1 Architecture , study program at the Architecture Design Studio Course. Samples were taken using cluster random sampling where the morning class as the experimental class applied Studio Based Learning models and afternoon classes as a control class using conventional learning models. The instrument used in this study consisted of 12 validated essay questions using content validity. The data in this study are quantitative data. The purpose of this study was to determine the effect of the Studio Based Learning learning model on the design abilities of students at the Panca Budi University S1 Architecture, study program at the Architecture Design Studio Course.*

Key Words: *Studio Based Learning, Ability of Design, Architecture Design Studio.*

1. PRELIMINARY:

In an effort to provide a learning to students, lecturers are required to be able to create learning conditions that are effective, efficient and optimal. In addition, lecturers always need to improve the quality of teaching in various appropriate ways. For this reason, skill needed and reliable human resources in the field so that the results obtained are in accordance with the goals. However, the expected demand for human resources in Indonesia is not in accordance with the reality. According to the 2013 version of the UNDP Human Development Report, Indonesia's HDI (Human Development Index) ranking is ranked 121 out of 187 countries. This shows the quality of human resources in Indonesia is still far below the average of other countries [1].

The focus of increasing human resources is in the education environment, as a university where the indicators are related to efforts to improve the quality of student learning outcomes. However, learning difficulties become an obstacle experienced by students in university so that the learning objectives cannot be achieved optimally. The difficulties of learning are one of the problems that are not maximally achieved [2].

The success of the learning process through the learning model is only possible when done by professional lecturers. The learning process tends to use oral and written learning often makes it difficult for students to understand complexity of concepts. To achieve the expected learning outcomes, a learning model must be used. According to Harahap [3] the learning model serves to provide a direction in design of learning in order to help students, as a result, students will achieve various goals and /or competencies [4].

Based on the online article https://teaching.unsw.edu.au/assessing-studio-based-learning, educators usually use studio-based learning in the fields of architecture, design, engineering, and creative arts and performances. Studio-based learning models always focus on learning through action, developing processes and creative performance and/or designs that can be assessed. Studio Based Learning initially educates students who have talent in the fields of drawing, painting, sculpture and architecture. Students learn in a studio / atelier until one day they can stand alone. Based on the results of research conducted by Rijal & Aldy [5] that the application of studio-based learning in the management and procedures of architectural design studio learning is able to improve assessment compared to previous architectural design studios. Relevant results are also obtained based on research conducted by Seleim & Mahmoud [3] states that learning using studio based learning is more effective than traditional learning on the development of students' knowledge [6].

Lecturers as the spearhead of learning are tasked with providing student-centered knowledge and facilitating the learning process and facing different abilities of individual students. This activity must be followed by an evaluation that aims to assess whether a program is carried out in accordance with appropriate planning and achievement, encouraging interaction between lecturers and students so that maximum learning is achieved [7].

2. RESEARCH METHOD:

This research was conducted at Panca Budi University, Jend Gatot Subroto Street KM. 4.5 Medan Sunggal, Medan City, North Sumatra 20122. While the research period was carried out starting from September - December 2017.

The population in this study were all students of the Panca Budi University - S1 Architectural Engineering Study Program who attended the Architectural Design Studio Course consisting of 7 levels of courses, while the sample in this study used two classes. The sampling technique is done by cluster random sampling, which is to determine the

research sample randomly and the sample has the same opportunity to represent the population. In this case, the sample is students who attend Architecture Design Studio IV (morning and afternoon classes) and Architecture Design Studio V (morning and afternoon classes). The experimental class are students who take morning classes and students who take afternoon classes as a control class.

The instrument of this study is used to measure design skills of students in the form of a test essay consisting of 12 questions designed based on Bloom Revised Taxonomy with psycho-motor domains. This domain was chosen because design skills are related to the skills students have. This test is used as a preliminary test to see students' initial design skills and final tests to determine the differences of the result in experimental class and control class design abilities.

3. EXPLANATION:
a. Conventional Studio and Studio Based Learning

Nowadays, teaching carried out by architectural lecturers tends to use conventional methods that are fixed with textbooks. The teaching is usually carried out in a monotonous manner and lacks in developing creativity in the development of design concepts, so the results issued by students usually have the same characteristics, and are afraid to improvise, while the output in the world of architectural education is quality design.

The stages of teaching that exist in conventional studios usually consist of analysis, the concept of analysis, and the composition of the united masses into one unit. So that this raises a concept that should be a core of building design, changing into a solution to the problems faced by the analysis. Analysis is an activity of an architect to know the condition of the land or building to get comfort for its users, while the concept is an idea in building design. In conventional studios there are also many cases where concepts with themes have the same meaning in a building. This becomes a problem because it will make students confused in distinguishing the actual concept from the analysis or theme in the building that will be designed.

In Studio Based Learning there are several learning processes that must be passed, both from recognizing the design process which in detail talks about the basic concepts that are the main benchmark in designing, analyzing (external and internal sites, environment, climatology, zoning, space, structure and construction organizations)) and the theme as a reinforcer of design identity which in the end with different design techniques, is more efficient and expected to be absorbed by students depending on the learning model.

b. Desain Introducing Design Process

Students in studying sustainable architecture design studio courses from the first to the last, in general often do not understand the basic understanding and usefulness of analysis, concepts and themes, which in the end they cannot produce an efficient and maximum design. Below are the results of the design process with a basic understanding and usefulness of each of the words "concepts, analysis and themes" obtained by researchers from the results of studies and experiences as academics or practitioners:
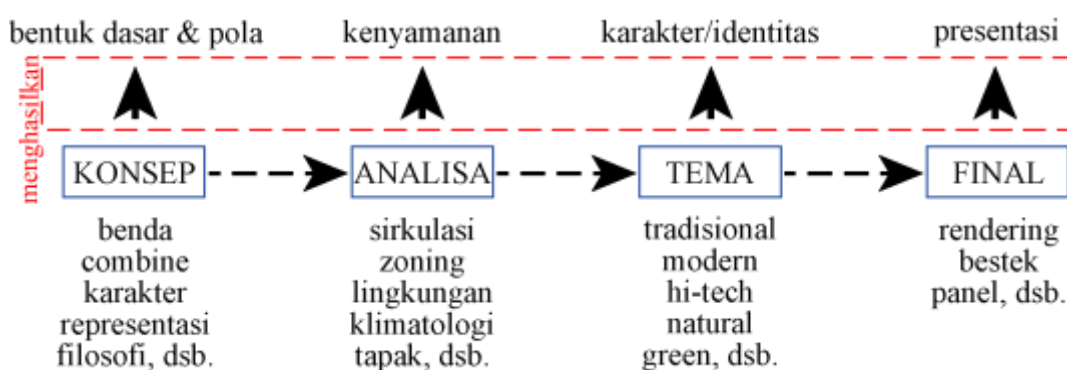

Figure 1. Diagram of Design Process

There is no wrong way to design, but rather it is more efficient and maximal in the implementation of the design process so that the results are more profound, more meaningful and the resulting design represents the user or owner both in function, form and philosophy.

Conventionally, the technique of designing in general emphasizes the word "analysis" as a basic reference before the design (problem / issue) is formed after getting the existing data in the field, after that there is a "concept" which is the answer to a design (solution) mixed in words "Concept" which the actual use according to the researcher is a reference to basic formations and patterns and the concept itself is the first step and the most important step. The basic formation and pattern itself becomes a reference for a designer / architect to determine the shape of the building, the shape and pattern of roofs, gates, landscape patterns, facade patterns to even the details. With an open-minded design

that emphasizes "concepts" as the main part in designing, it is expected that the results of the designs obtained will be of higher quality, because of ideas without being trained like frogs in the shell.

Concepts can be found from various sources both from objects, deepening of analysis (external and internal sites, environment, climatology, zoning, space organization, structure and construction), mapping, symbols, details, formations, philosophy, characters, functions, representations, merging in part or as a whole. Overall everything must go through a transformation process whose results can be more simple or complex depending on the designer itself. To simplify the creation of a concept, it starts from the basic mindset that is formed through a diagram as shown in the picture:
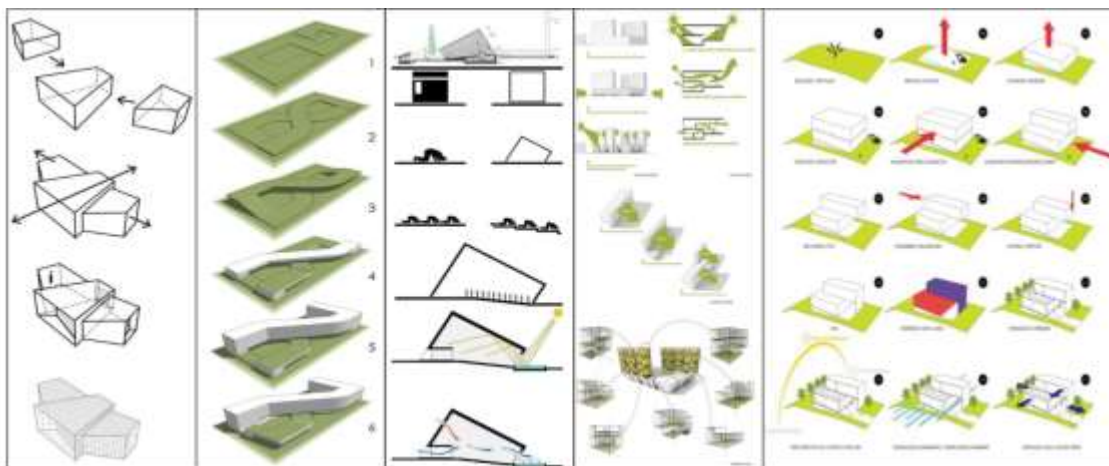

Figures 2. Examples of Basic Mindset Diagrams Creating Concepts

The development of mindset is focused at the beginning by determining one word obtained from the site itself, it can also be based on the function of the building to be designed, logos, symbols and so on which are further developed and the development can continue to be limited by the designer himself. The next step, the designer can choose which one will be developed from one to infinity to be used as a basic concept, of course, still have a mutual correlation between them and combine them all through the transformation process.

In analyzing (external and internal site, environment, climatology, zoning, space organization, structure and construction) technically nothing has changed from time to time (textbooks) from the existing data collection to finding problems / issues and providing solutions offered. The end result of an analysis is creating user / owner comfort which is the obligation of every designer / architect as well as a doctor who has the obligation to treat patients.

The concept that produces a mass composition and a transformed pattern adapts to the analysis obtained but still will not change the basic form obtained from the concept as shown in the picture below:
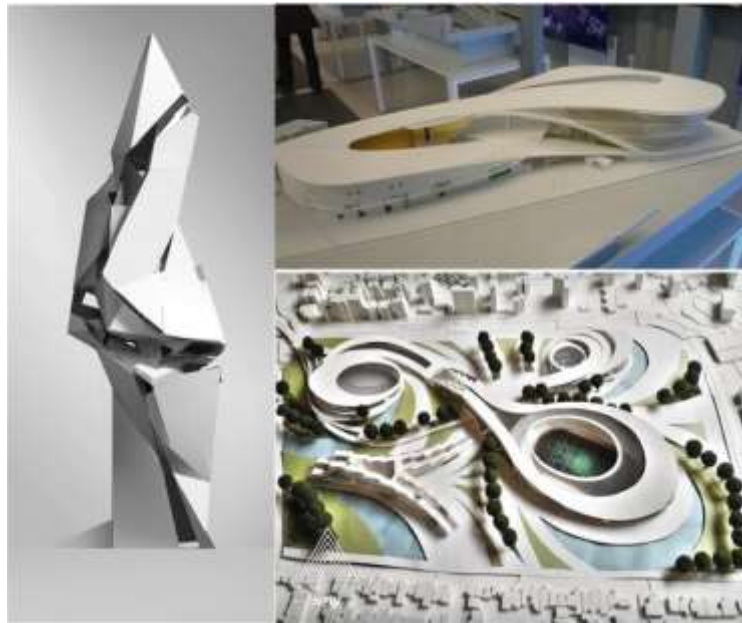

Figures 3. Examples of The Concepts of Transformations of Analysis

c. Use of material

After experiencing changes in the conceptual transformation of the basic forms and patterns for the analysis obtained, the next step is to determine the theme to be able to strengthen the concept of the concept.

The use of materials, buildings, interiors and landscapes is used to show a particular theme even though sometimes this theme can stand alone without any correlation with concepts but can strengthen from another perspective on design, one example is in strengthening the identity of functions, user characters, user activities and everything else depends on the designer / architect. Themes can also be created at the beginning of a design before deciding on a concept, but during the learning period, students are advised to keep following these basic techniques to design. Below this is one of the building designs that represents between concepts and themes or not.

Figures 4. Examples of Themes That Can Not Be Related to Concepts.

Figures 5. Examples of Themes Related to Concepts.

In the first picture above, it can be explained that the concept is clear but it may be that the theme has not yet been created or not seen, it is different from the second picture above where the concept is expected to explore what has been explained by the instructor / lecturer, but there are differences in the method taught to students from each process a clear solution between concepts, analysis and themes.

The difference in Studio Based Learning learning techniques with conventional techniques lies in directly training how to imagine more broadly from each of the three things, especially in the "concept" section, because to create an innovative concept, it must be profound and represent various related aspects with design, although in the end it does not rule out the possibility of the design being simpler.

To open up students' imagination more broadly, solving basic ideas from a concept can start from an object, deepening of analysis (external and internal footprint, environment, climatology, zoning, space organization, structure and construction), mapping, symbols, details, formations, philosophies, characters, functions, representations, partial or overall incorporation, etc., must be practiced directly by students with the translation of their transformations which are finally presented to expand design references. The activity of students and lecturers is needed here, indirectly, creating a healthy design competition.

d. Results of Experiments with 2 Learning Models

To be able to find out how the effects of learning outcomes differ between Studio Based Learning learning models that are applied in the morning class as an experimental class with conventional learning models in the afternoon class as a control class in the Architectural Design Studio course, instruments are needed consisting of 12 validated essay questions use content validation by giving an assessment of 5 ranges of very unsatisfactory, unsatisfactory, moderate, satisfying and very satisfying. The following below are 12 essay questions given as research instruments:

Table 1. Research Instrument with 12 Essays

No	Equations	Result Value
1	Draw a combined sketch of 2 famous designs into one design without reducing each of the themes and concepts that exist in each design? Give the necessary explanations	Impersonation
22	Draw a sketch of adjusting the concepts and themes of one of the well-known designs and making a new design that fits the concept and theme	Impersonation
3	Draw a sketch by changing one of the famous designs into a much simpler design without losing the character and concept	Impersonation
4	Sketch the design of a design that is more dominant than 2 famous designs into one design but still retains the characters and concepts of the two famous designs	Manipulation
5	Draw a sketch that manipulates drastically from the merger of two well-known designs and your own design into a completely new design without leaving the specific forms of each design. Give the necessary explanations	Manipulation
6	Draw a demonstration sketch with a transformation technique combining two well-known designs and your own design into a completely new design without leaving the specific forms of each design. Give the necessary explanations	Manipulation
7	Draw a combination of 2 famous designs into one design without reducing each of the themes and concepts in each design by packing several different techniques into one and the same design.	Experience
8	Draw a combination of 2 famous designs into one design without reducing each of the themes and concepts that exist in each design by combining different design techniques	Experience
9	How to rotate 3 concepts of famous design words or what you know into 1 synonym and 1 antonym	Experience
10	Give examples of ways to match the level of a design concept with other concepts and designs from the level of complexity and complexity	Articulation
11	How do you weigh the assessment of a design from two different designs	Articulation
12	Give a design by sharpening the concepts and themes of an existing design	Articulation

The assessment is divided into 5 ranges of very unsatisfactory, unsatisfactory, moderate, satisfying and very satisfying can be determined from the value:
1 - 2: Very unsatisfactory
3 - 4: Not Satisfying
5-6: Medium
7-8: Satisfying
9-10: Very Satisfying

Psychomotor tests conducted on 2 (two) classes namely conventional class and studio based learning class were divided into 4 (four) psychomotor categories consisting of psychomotor imitation, manipulation, experience and articulation.

4. CONCLUSION:

From the studies that have been conducted, it can be concluded that the results of the study regarding the effect of the studio based learning model on the design skills of architectural engineering students, namely:

- Studio Based Learning. is a learning model in the fields of drawing, painting, sculpture and architecture. Studio based learning is an architectural design studio learning procedure that is able to improve the assessment and results of the design of its students, compared to previous architectural design studios.

- In studio-based learning techniques there are several learning processes, both from knowing the design process which in detail talks about the basic concepts that become the main benchmark in designing, analyzing (external and internal site, environment, climatology, zoning, space, structure and construction organization)) and themes as reinforcement of design identity with different techniques. Studio based learning learning models focus more on open-minded design that emphasizes "concepts" as the main part in designing, it is expected that the results of the designs obtained will be of higher quality, more efficient and maximized in the implementation of the design process so that the results are deeper the resulting design represents the user or the owner both in function, form and philosophy.

- Based on valid calculation results, learning models using studio based learning are more efficient and provide better design results, compared to learning using conventional techniques. In the tests that have been conducted, students with studio-based learning are more capable of completing their tests with a much higher value compared to conventional classes. This shows that, the studio based learning model is appropriate to be applied to architecture students.

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