

LEARNING MODIFICATIONS TO GROW CREATIVITY IN ARCHITECTURAL DESIGN

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ABSTRACT

Architecture, as one of the applied visual arts, is one of the mainstay creative industry sub-sectors of the Ministry of Trade of the Republic of Indonesia to answer the challenges of implementing a free market in the ASEAN region, which began in 2015. Architecture is one of the creative industry sub-sectors that is developed in Indonesia. The Architecture major is the one associated with institutions producing human resources in Architecture. One of the main subjects for an architecture student is Architectural Design. Students learn to design buildings, ranging from simple buildings to complex buildings. This subject requires the students to use high creativity and toughness in learning. However, currently the learning is still product-oriented, not process-oriented. Even though the results of the product-oriented learnings can be done by machines, the original process-oriented could only be done by a human creative thinking process. Therefore, the researcher aims to modify the Architectural Design learning in order to increase creativity, facilitate the architectural design learning process for students, and is hoped that creative humans will be born from this creative learning. The research method used is Classroom Action Research, which is divided into two cycles. The research is located at the Department of Architecture, Faculty of Engineering, University of Muhammadiyah Jakarta. The result of this study is the founding of modification for creative architectural design learning that can guide students to maximize their creativity in the process of thinking and the process of creating.

Keywords: *Keywords: learning, architecture, creativity*

1.0 INTRODUCTION

In 2015, the ASEAN zone started to adopt a free market which can be seen by the free flow of goods, services, investments, skilled labours and capital across the region. The creative economy strategy, which is by implementing the development of creative industries, is what Indonesia has done to face those challenges. This creative economy seeks to utilize and maximize renewable human resources unlimitedly, such as ideas, talents and creativities as a foundation on the development of creative industries. Furthermore, the Government through the Department of Trade of the Republic of Indonesia determined that there were 16 creative industry sub-sectors, one of which is the Architecture sub-sector.

In the world of Architecture studies, the government policy is one of the implementations of lifelong learning programs, where the Architecture learning continues and develops from university classes to employment. Creative industry policies, one of which is regarding Architecture, is the driving force for Architecture Development in becoming the master in its own country, which is Indonesian Architecture. (Andriyanto, 2018)

The specific objective of this research is to develop a Creative Learning Model for the Design of Dual-Function Single-Mass Buildings, in order to improve the design learning process in the classroom creatively, clearly and independently.

Architects work creatively to design buildings, ranging from simple to complex level of difficulty. The miniature of this activity is done by architecture students in the Core Architectural Design course (hereinafter abbreviated as AD).

In the syllabus of the undergraduate program at the Department of Architecture, Faculty of Engineering, Muhammadiyah University Jakarta, the tiered AD course starts from the 2nd semester. The students begin to learn to design in the AD I course, which focuses on studying the mass of a simple one-story building. 3rd semester students take AD II, designing the mass of dual-function buildings, such as shophouses and office houses. 4th semester students take AD III, designing large mass buildings with heterogeneous functions, such as schools, Islamic boarding schools and dormitories. 5th semester students take AD IV, designing single mass buildings with heterogeneous functions, such as offices and apartments. 5th semester students take AD V, designing high-rise buildings with multiple floors, such as hotels and rental offices. 6th semester students take AD VI, designing wide-span buildings with heterogeneous functions and complex structures, such as international stadiums and airports.

Therefore, it can be concluded that the Mass Design of Dual-Function Buildings is the process of designing a single mass building that has two functions, which is covered in the AD II course. The learning process starts from collecting data, which is obtained from client activities and the site as the input. Next is the processing stages, which are called analysis and synthesis. The result is the output in the form of a double-function building mass design drawn up in a blueprint.

In learning the design of simple single mass buildings, which was done in the AD I course, research and development of the learning programs have been done using creative thinking methods to improve students' abilities.

Architecture students as architect embryos must have the ability to be creative in designing architectural works, as a general competence that must be possessed by human resources working in architecture. Architectural works that are made with high creativity differ in value from works that are made perfunctorily. This provision of creativity can be obtained from the architectural creative learning process.

The learning process of simple to complex building mass designs are embodied in AD I to AD VI courses. However, based on preliminary research, the simple building design learning (AD I) is the only one that currently has ideal and complete learning components.

The learning process for designing a dual-function single mass building (AD II) should use an architectural creative thinking model that is in accordance with the difficulty level of designing a single-function double-mass building. It should also be done creatively and has a complete learning component, in order for the learning process of designing a dual-function single mass building to be done systematically, effectively and efficiently. Furthermore, this can improve the learning outcomes and develop students' creativity potential and produce creative architectural works. Therefore, in this research, Creative Learning Modifications for the Design of Dual-Function Single Mass Buildings (implemented in AD II course) will be carried out to improve students' ability to design single mass buildings with multiple functions creatively, clearly and independently.

One of the products of the learning system design is the learning program. The theory of the learning program is based on systems theory, communication theory, studying theory and learning theory. Systems theory contributes specifically to the steps that need to be taken in designing learning systems. Communication theory makes a valuable contribution towards the principles of designing messages, both verbally and visually. Studying theory can design an effective, efficient and interesting learning process. These theories are the basis for creating learning activities as expected. The contribution of learning theory focuses on making the learning process take place more optimally in oneself. (Pribadi: 2009).

1.1 Creative Learning

The creative learning process is a high order thinking process that is very suitable for learning Architectural design. According to Munandar, in the curriculum in Indonesia, Bloom's taxonomy is in the cognitive domain which includes 6 thinking ways, ranging from low to high. However, the learning process is actually generally limited to the level of introduction, understanding and application, while high order thinking processes (analysis, synthesis and evaluation) are rarely practiced (Munandar: 2012).

According to Uno and Muhammad (2012), creative learning is one of the learning strategies that aims to develop students' thinking skills. It mainly develops the right brain, whose main characteristics are thinking divergently, constructively, creative and holistically. This learning requires the teachers to be creative. Students can develop their creativity, which is the ability to create new things based on existing data, information, and elements. This can teach them to have high-level thinking skills and produce creative works obtained through knowledge or experience, moreover, be able to generate innovative creative ideas.

The teacher's role in creative learning is to motivate and evoke students' creativity during the learning sessions using various methods and strategies (Rusman: 2012).

Teachers are obliged to provide a place and lessons that can foster lifelong creativity by teaching students to take risks to innovate, experiment, and to create the right combination of didactic rules and activities to explore students' creativity (Design: 2010).

Students in producing work are related to the process of creating. The process of creating begins with the divergent stage, which is thinking about the solutions to understand the task (formulating). Next, the convergent stage, where students decide a solution to be used (planning). Then, the plan is implemented by constructing a solution (producing) (Krathwohl: 2010).

1.2 Architectural Creative Thinking

According to Guilford in Munandar, creative thinking can be possessed by someone through the categories of divergent thinking, by practicing aspects of fluency, flexibility, originality and elaboration to students (Munandar: 2012). According to Sousa, creative thinking is the ability to use divergent thinking to explore and find alternative solutions to problems that arise, without prevention (Sousa: 2012). Semiawan describes the creative thinking process, described by Clark from Jung's theory, as a relaxed condition of the ego which makes the subconscious function freely to develop ideas, so there is an integration between the life of imagination and the problems faced. On that basis, the awareness from the subconscious becomes the highest awareness while the creative process is ongoing (Semiawan: 2008).

The process of creating architectural works is always related to creativity. Creating is the highest cognitive process as stated in the structural changes of Bloom's taxonomy revised by Krathwohl and Anderson (Anderson: 2001).

Creativity is an inherent ability of a person. Creativity is related to the ability to think creatively, implemented to get new ideas, new possibilities, new creations and can be formed into real or abstract ideas (Iskandar: 2009).

As stated by Buzan, the characteristics of creative thinking are fluency, flexibility, and originality. Fluency is the quickness and easiness of generating new creative ideas. Flexibility is the ability to see and consider other points of view by taking old concepts, rearranging them into new ways, flipping and twisting existing ideas. Originality is the core of all creative thinking and represents a person's ability to come up with unique, unusual and eccentric ideas. Originality is often the result of a large amount of directed intellectual energy, which indicates the ability to concentrate greatly. To be original, it is necessary to move away from the norms (Buzan: 2010).

Architectural activities really require creativity because it is closely related to the activity of creating or initiating. Sularto also added that creative thinking for an architect is the effort to create a work that is recognized, has meanings, and can satisfy or please the users of the building. The trait of the creativity in an architect can give a distinctive and unique influence to the environment (Tutut: 2001).

Based on the opinions above, it can be concluded that the sign of creativity is fluency, flexibility, originality and elaboration. This creativity can be developed by various individuals, by bringing up those four behaviors. From the description above, the importance of creativity for an architect in his work can be defined. Architectural works that are full of creativity can be grown and appear through four behaviors, which is the fluency, flexibility, originality and elaboration in the creative thinking process. Creative thinking is a creative learning process to find many possible answers to solve problems. Ideally, creative thinking can be implemented in the architectural learning process,

especially in the architectural design courses (AD) as a miniature of the actual architect's activities. Architectural learning, which is always related to problem-solving activities, is expected to be able to run smoothly and improve the ability to design architectural works if students have the ability to think creatively.

Creative thinking is needed in architecture students to produce creative works, especially in the learning process related to the creation of architectural works. The following are findings related to creative thinking and architecture.

Firstly, Lawson uses the Kneller formula to explain the stages of the creative thinking process in architectural design, which is collecting facts (first insight), finding problems (preparation), incubation, finding ideas (illumination), and verification (Lawson: 2005).

Secondly, Kiswandono formulates the relationship between creative thinking and architectural thinking to train architectural thinking skills in the form of a training program. The stages are sequential and alternate in order to know when to think creatively and when to think rationally. Each cycle of the creative thinking process consists of two phases, namely divergent and convergent thinking (Kiswandono: 2000).

Thirdly, the Transformatic Concept Formulation, created by Lie Tjun Tji in 2005. Through the development of his research in 2009, Lie Tjun Tji found a formula to simplify the transformation process. The formula was patented and distributed in the form of a module entitled "Transformatics Towards Innovation". The transformative concept is defined as the science of one's intelligence in terms of thinking and acting in order to produce new T2 findings resulting from the goal-setting process (t), transformation method (f) in the form of substitution, integration methods, combination methods, and modification (m) of previous T1 findings. The transformatic formula is used with substitution, integration and combination methods (Tjie: 2009).

Fourthly, in 2015, the way of creative thinking for AD I learning for beginners to design simple buildings was founded by Dewi, which makes it easier for beginner students to transform ideas into works in learning simple building design. The learning process begins with the preparation of space introduction activities, the process of transforming activities into space zoning, processing the space zoning into building mass, modification process, and documentation process. Furthermore, Dewi completed her findings with the Architectural Creative Thinking Model for learning Architectural Design Studio for Beginner Level, resulting in a combination of Architecture and Educational Technology. These findings were applied in AD I for Beginner Level. Dewi found the Architectural Creative Thinking Model as a result of the combination of Lie Tjun Tjie's transformative process (A), how the creative thinking brain works (B), and the method of accelerating creative thinking (C).

In conclusion, Lawson and Kiswandono's creative thinking formulas have something in common, which is using the 5 stages of thinking from Kneller. The challenges that were experienced in the Kiswandono formulation is not knowing when to think creatively and to think rationally. Furthermore, Lie Tjun Tjie at each stage of his transformative concept also uses divergent-convergent thinking patterns. The differences between Lawson and Kiswandono is that the incubation process is replaced by a substitution, combination and integration process of changing concept into a design, in order to overcome the uncertainty of the length of time the idea turns into a work. Furthermore, Dewi developed the concept of creative thinking for beginners by using the concept of Lie Tjun Tjie's transformation on the learning process. At each stage, it uses the divergent-

convergent brain and methods of accelerating creative thinking (bio drawing or sketches, mind maps, and 3D studies).

1.3 Dual-Function Building Mass Design

The main activity in architecture is designing space. The main actor on designing is called an architect. Studio is a space where an architect works, while the object being worked on is an artificial environment. The built environment requires the services of an architect to be able to be managed and inhabited comfortably by humans. Architectural works are the result of the creativity of an architect. Architectural works are produced through a long and complicated process. They are derived from thoughts, intention and feelings that are made into blueprint drawings in the form of building drawings. It is in 3 (three) principals, consisting of floor plans, views, sections, and explanatory drawings, such as site plans, building block plans, and perspectives. In the real world, images are built and it produces three-dimensional real buildings. Whereas in the world of education, the images are created in three dimensions in a form of perspective drawings and building mockups.

In producing architectural works, there are two important processes, which are the planning process and the designing process. The designing process is part of the planning process. An input planning process is processed to produce an output, and the output becomes the input for the next process. In the designing process, the data obtained as input is processed. This process stage is called analysis. The result is the output in a form of design (Sutedjo: 1982). Designing, in the context of architecture, is the main proposal that changes something that already exists for the better. Design can be considered as a process consisting of an initial state, a transformation process, and a future state (Snyder: 1989).

The main activity in Architectural Design is essentially the activity of creating, which is a process that connects an idea with its realization into a real physical form. A number of knowledges that can support the redevelopment of an architectural design are related to structure, construction, material technology, engineering mechanics, lighting, airing, etc (Admodiwirdjo: 2009).

2.0 METHODOLOGY

This research is an initial research for Creative Learning Model for Children with Visual Art Talent, which was conducted on 11 students majoring in Architecture at Muhammadiyah University Jakarta.

The research method used in this study is a qualitative research method with action research. The Action Research Spiral model from Kemmis and Taggart is used. It has a spiral-shaped form, starting from planning, action, observation, and reflection (Wiriaatmadja: 2008). Therefore, this study will observe the student learning process on designing a dual function building with two cycles.

3.0 FINDINGS

The creative learning design model has been found for simple single building design learning in previous studies. In this study, the learning design model was tested for a single building with multiple functions. From this research it can be known whether

the creative learning design model can still be used or if it needs adjustments according to changes in the designing object. The results of the study are described below.

3.1 Modification of Architectural Creative Learning

The architectural creative learning design model is a learning method designed by using architectural creative thinking models. This architectural thinking model is the basic core and basic concept of architectural learning strategies.

1st Cycle

There are 5 stages in the 1st cycle, which are:

3.1.1 Dual-Function Single Mass Building Space Introduction Stage

From the results of this first cycle of research, it was found that mind maps for understanding Vertical and Horizontal spaces can still be used as comparative studies, for activities to find information forming vertical and horizontal elements of space. This information is a provision to start the dual-function single mass designing activity.

In one of the student assignments, it was seen that students could directly apply the Space Observation mind map with the Space Formation Mind Map of Horizontal and Vertical Elements in accordance with the object of the dual-function single mass building assignment.

The Mind Map of Space Feeling Training can still be used to train students' sensitivity to space with a dual-function single building mass object. It can be seen in one of the student assignments that the use of a Mind Map of Space Feeling Training eases the students to train their sense of space.

3.1.2 Observation of the Transformation Process in Architectural Works

Observing the Transformation Process in Architectural Works by three creative ways, which are substitution, integration, and combination, can still be used to observe designs from well-known architects with dual-function single mass objects.

3.1.3 Transforming Activities into Zoning Space Stage

The results of observations of a dual-function single mass object, using an example of a house and a commercial function in one building mass. This client data collection mind map needs improvement, fixed ideas, and growing profiles because there are multiple clients and it is assumed that there are owners, users and visitors. Client activities in a dual-function single mass building are complex, so it needs to be separated into personal activities, visitor activities and group activities.

In the Mind Map of Client Data Collection, further development is needed. This stage needs improvement in the second cycle.

In collecting client data, the results of the development need to be tested in the next cycle. Activities are not for each person, but some are grouped based on personal activities, group activities, and outside party activities as well as other activities.

Based on spatial relationships, physical space requirements, and space properties for finding space zoning, the mind map of spatial studies requires development because buildings can be planned for more than one floor.

3.1.4 Space Zoning Transformation Into Building Mass Stage

The results of observations on student assignments show that the Mind Map of Site Condition Observation is still relevant and can be used to find information on site conditions for the mass of a dual-function single building, and there were no changes.

Mind map for Observing Site Conditions into Site Zoning is still relevant and can be used to map prosper conditions and should be avoided for the mass of a dual-function single building, and there were no developments.

The Mind Map of Transforming Space Zoning and Site Zoning into Building Mass is still relevant to be used to transform space zoning and site zoning into building mass. The development of the roof has not been maximized and it needs to have recurring tests in order to get the layout of windows, doors, and the shape of the roof.

3.1.5 Building Mass Modification Stage

The dual-function single-mass buildings transformation process, from the mass of the building into a sketch of the bluprint can still be done. However, it is necessary to introduce additional building and structure modules, also vertical circulation paths for buildings with more than one floor. Development will be done in the second cycle.

Transforming Building Masses Into Cutout Sketches is done by cutting the building masses and drawing them into drawing pieces. There was no development in this step.

There was no trouble in developing the transformation of the Building Mass into a Visible Image Sketch. Development was done in the second cycle.

In the Pre-Design Drawing, there were still many mistakes in the layout of the drawing, the notation, the procedure for the cutted and visible drawings, and the understanding of the architectural detail drawings. There needs to be development in the second cycle. Likewise the results of the mock-up study are still not complete. It needs more variety of materials, hence improvement in the second cycle.

3.2 Modification of Architectural Creative Learning 2nd Cycle

There are 4 stages in the 2nd cycle, which are:

3.2.1 Transforming Activities in Zoning Space Stage

In the Mind Map Development of Client Data Collection for Dual-Function Single-Mass, client activities in dual-function single mass buildings began to be more complex, such as personal activities, visitor activities and group activities. The results are more clear and mapped in this second cycle.



Image 1 The Development of Client Data Collection Mind Map for Dual-Function Single-Mass Building by Roby

Source: *Happy's documentations*

The transformation of activity into space for the dual-function single-mass building has been divided so that it is clear on which of the space is used for personal activities, group activities, outside party activities and other activities.



Image 2 The Mind Map Development Transforming Activities Into Space By Roby

Source: *Happy's documentations*

The Development of a Mind Map of Spatial Studies Based on Spatial Relationships, Physical Requirements of Space and Space Characteristics for the Discovery of Spatial Zoning, is done because the building is planned to be more than one floor.

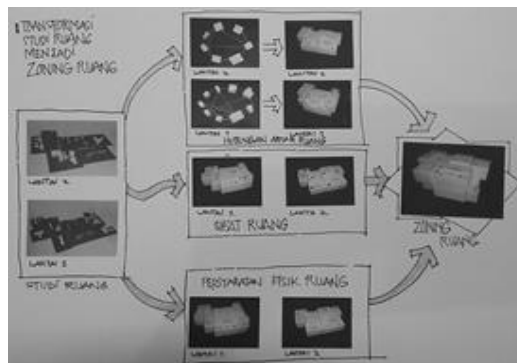


Image 3 The Spatial Study Mind Map Development for Spatial Zoning Discovery By Roby

Source: *Happy's documentations*

3.2.2 Space Zoning Transformation Into Building Mass Stage

There were recurring testing of the building mass against the actual site in order to get maximum results for the placement of openings and the shape of the roof of the building mass.



Image 4 The Mind Map Development Transforming Space Zoning and Site Zoning Into Building Mass By Roby

Source: Happy's documentations

3.2.3 Building Mass Modification Stage

The development of the Transformation of Building Mass into a Sketched Designing Plan is processed after making the building grid, adding improvements to the structure, building materials, and placing a new vertical circulation path followed by making a designing sketch.



Image 5: Mass Study By Roby
(Source: Happy's documentations)

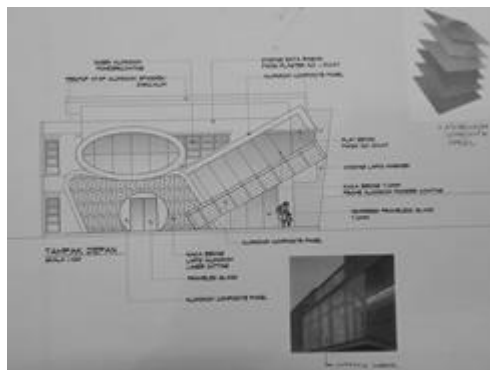


Image 6: Installation of skin / building facades
(windows, door ornaments, etc.) By Roby

Source: Happy's documentations

From the three images above, it was found that there was no trouble in developing the transformation of the Building Mass into a Visible Image Sketch.



Image 7: Creating visible sketches of buildings and building materials by Roby
Source: Happy's documentations

3.2.4 Documentation Stage

In the second cycle, the results are complete and the use of notation is complete. In the second cycle, the making of the mock-up is getting better and more complete.

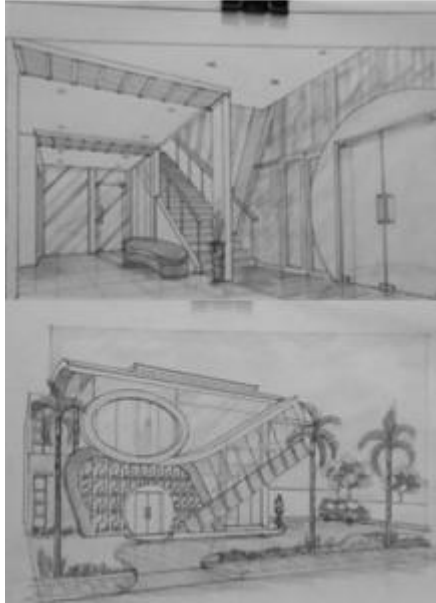


Image 17: The Development of Modification Results Into Interior Exterior Drawings and Architectural Details (Pre-Design) By Roby

Source: *Happy's documentations*

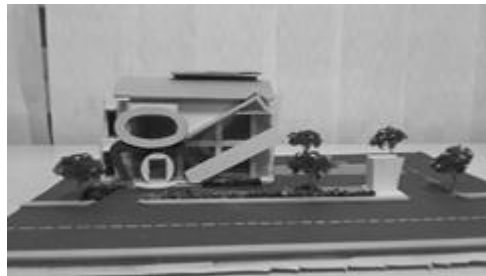


Image 8: The Development of Pre-Designed Drawings into Three-Dimensional Mock-ups
By Roby

Source: *Happy's documentations*

4.0 CONCLUSIONS

The first founding is the Creative Learning Modification. It is used for Designing Dual-Function Single-Mass Buildings using creative thinking, which are Observation, Activity Transformation Stage into Spatial Zoning, Space Zoning Transformation Stage into Building Mass, Building Mass Modification Stage and Documentation Stage. It is proven to accelerate the process of producing Architectural Design works for Architecture students from the Faculty of Architectural Engineering, working on designing objects. The second founding, students can then consistently maintain the design concept to produce pre-designed blueprint images, such as site plans, block plans, floor plans, sections, looks, exterior drawings, interior drawings, and architectural detail drawings. The third founding is the learning modification with creative thinking, which can increase students' independence in solving design problems creatively, clearly, and independently.

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REFERENCES

- Anderson, Lorin. W. and Krathwohl, David. R. (Eds) (2001). *A Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives*. New York: Longman.
- Andriyanto, Tri. (2018). *Konsep Pendidikan Pranatal, Postnatal, Dan Pendidikan Sepanjang Hayat*. Lampung: Mahasiswa Pascasarjana Institut Agama Islam Negeri Metro Lampung.
- Atmodiwiryo, Paramita. Yandi A. Y, dan Amita R. P. (2009). *Lilin Lestar*. Depok: Departemen Arsitektur FT-UI.
- Buzan, Toni (2010). *Buku Pintar Mind Map*. Jakarta: Gramedia
- Design, Bruce Mau (2010). *The Third Teacher*. New York: Abrams.
- Happy Indira Dewi (2013). *Pengembangan Cara Berpikir Kreatif untuk Program Pembelajaran Studio Perancangan Arsitektur*, Jakarta: LPPM-UMJ
- Iskandar (2009). *Psikologi Pendidikan: Sebuah Orientasi Baru*. Ciputat: GP Press.
- Kiswandono, Istiawati (2009). "Kreatif Suatu Pendekatan Menuju Berpikir Arsitektural". *Jurnal Dimensi Teknik Arsitektur Vol 28*.
- Lawson, Bryan (2005). *How Designers Think*. Oxford: Architectural Press
- Munandar, Utami (2012). *Pengembangan Kreativitas Anak Berbakat*. Jakarta: Rineka Cipta
- Pribadi, R. Benny Agus. 2009. *Model Desain Sistem Pembelajaran*. Jakarta: Dian Rakyat
- Rusman (2012). *Model-model Pembelajaran*. Depok: RajaGrafindo Persada
- Sousa David A (2012). *Bagaimana Otak Belajar*. Jakarta: Indeks
- Semiawan, Conny.R. (2009). *Kreativitas dan Keberbakatan: Mengapa, Apa, dan Bagaimana*. Jakarta: Indeks
- Sutedjo, Suwondo B. (1982). *Proses Perancangan yang Sistematis*. Jakarta: Djambatan.
- Snyder, James C. dan Anthony J. Catanese. 1989.
- Tji, Lie Tjun (2009). *Transformatik Menuju Inovasi*. Tangerang: Transformatik
- Tutut, Ahmad dan Junianto. (2001). *Karya Arsitektur Undagi Robi Sularto*. Malang: Pusat Studi Tata Lingkungan & Bentang Alam Jurusan Arsitektur Universitas Merdeka.
- Uno, Hamzah B. dan Nurdin Mohamad (2012). *Belajar dengan Pendekatan PAIKEM*. Jakarta: Bumi Aksara.
- Wiriaatmadja, Rochiati (2008). *Metode Penelitian Tindakan Kelas Untuk Meningkatkan Kinerja Guru Dan Dosen*. Bandung: PT Remaja Rosdakarya.