The Influence of Technology on Architecture Design 4.0

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Abstract. The purpose of this research is to find the trends in the use of building design visualization or visualization technology. The world of architecture is experiencing significant developments, especially in the context of visual presentations. Digital technology is constantly being updated, touching the technical realm of the visualization, which previously done with sketching, modelling, and rendering techniques. This research used literature review from related research and interviews with students majoring in Architecture. The results of this study are the trends in the use of special architectural software among students majoring in Architecture engineering. Mastery of special architectural software will help facilitate the development of building designs, especially in the face of the technology era 4.0.

1. Introduction

Technological progress in the era of globalization covers the world. The progress is often interpreted as modernization, making it easier for humans to control nature, science, improve welfare, and increase student effectiveness through technological features. With the development of IT, humans can do things that have never been imagined. Architecture world is also inseparable from the influence of technological development, apart from being a residence, building is an art that can become the identity of a nation, and can foster a sense of nationalism. On the other hand, that point can also attract local and foreign tourists for observation, travel, or even research, but Architecture is not only about building, but also social art. It is our responsibility to ensure architecture is not only a functional comfort but also a spiritual comfort. Architectural design must be relevant to the community and provide a good solution for the community's needs. Architecture is a reflection of the culture in which it was founded. Form and composition contain philosophical values and specific purposes.[1]

"Green architecture" is a solution of design that minimizes effects on human health and the environment. Green architecture seeks to preserve water, air, and earth to be sustainable by choosing eco-friendly building materials in construction [2]. Eco-friendly architecture is one of the main factors for architects to create a better life in all aspects of human activity in a relatively long period of time. This reason is the background why green architecture is the main goal of today's architecture that is carefully thought out [3]. 10 years ago, these various environmental issues were not effective enough to simply be solved, most of students at school become victims of pressure because of their many assignments. This has an impact on performance degradation even academic grades create stress on students [4]. Environmental issues, particularly global warming, are becoming topics that have emerged along with the rapid advancement of technology. An international study has found that patterns of human activity have caused global warming, at least in the last two centuries. Mathiesen has written about climate change in Climate Home News, he addressed to Professor Nerilie Abram (Associate Principal Researcher at The Australian National University) who have pinpointed the moment when the earth’s
The temperature began to rise because of human greenhouse gas emissions to between 1830 and 1850 [5]. It was one of those moments where science really surprised us.

The use of software for building design development is increasingly intense, because there are various facilities. Among these are able to shorten the time of making designs, and depictions that increasingly resemble the original shape and environment. The client will get a complete depiction of the design plan that will be made. The process of correction and discussion is faster and clearer. One of the softwares is SketchUp application which can help students’ spatial visualization abilities at universities as an alternative to making geometry or buildings in higher complexity easier, as well as being a media presentation to clients about an architectural design. [7]. However, with the presence of IT application software, students and practitioners are now more helped in working on assignments to construction projects [8-10].

The purpose of this study is to describe and analyze the impact and level of effectiveness of the use of Information Technology (IT) on the world of Architecture. This research used literature review from related research and interviews with students majoring in Architecture.

2. Method
This research uses descriptive and interview methods. Descriptive method is used to describe the significant influence of the use of Information Technology (IT) on the world of Architecture, especially softwares that has been used in the last two decades. Interview method is used to find out which Architecture software is popularly used to help work assignments and studios. This interview address to 100 samples of architecture students of Universitas Komputer Indonesia.

3. Results and Discussion

3.1. Supporting Software of Architecture
The use of software to the world of Architecture is quite diverse. From 110 respondents, 275 inputs were obtained. The inputs were filtered because some software is not related to design of architecture and some other software only has such a small frequency. Software data that is popularly used after the being classified were:
• Architectural Modelling Software:
  AutoCAD first launched in 1982, it is generally popularly used to make 2D plans which are often used as reference material in field construction projects, especially in Indonesia [8]. AutoCAD is one of the most popular software among architects. Display that resembles a work image was created manually, making this software can still be easily understood by users (see Figure 1).

Figure 1. AutoCad
Other software is SketchUp, which was released in August 2000 as a general-purpose 3D content creation tool. This application won the Community Choice Award at an exhibition in 2000. The reason respondents chose this software is because SketchUp features are intuitive and supported by accurate dimensions. Besides being able to export and import 2D images in various formats and vectors, SketchUp can also exchange 3D model files with other applications in several formats, such as DWG and 3DS [6] (see Figure 2).

![SketchUp](image1)

**Figure 2. SketchUp**

Drawing with SketchUp can make the picture looks more realistic. This software also easy to use, even for first time user. The next software is Revit, reborn in 2012, an application that has advantages in making 3D parametric which includes geometric and non-geometric designs and construction cost information, also known as Building Information Modelling (see Figure 3).

![Autodesk Revit](image2)

**Figure 3. Revit**
According to reviews.financesonline.com, Autodesk Revit is a multi-discipline BIM software with toolsets for architectural design, MEP and structural engineering, as well as construction. This software can provide the composed of architecture, engineer, and construction. The other software is 3dsMax, reborn in 2005 into a 3D vector graphics and animation software (Interior Architecture). This software used for modelling and animation, especially for game developers, visual effects artists, and graphic designers (see Figure 4).

Figure 4. 3DxMax

Creating massive worlds, stunning scenes, and engaging Virtual Reality (VR) experiences, can be created by this software.

- Rendering Software of Architecture:
  Photoshop was developed by Thomas and John Knoll from the United States in 1987. To do image editing or photo projects that are done to make it look more realistic according to the final results they want (see Figure 5).
Figure 5. Photoshop

Vray, an alternative rendering plugin application used in graphic design processing applications. The main reason respondents use it is because the Vray rendering results are sometimes better than the default rendering so that many users use it (see Figure 6).
3.2. The Most Used Application of Architecture

From the results of interviews with respondents, AutoCAD software was most often used by students and practitioners of architecture. While for rendering, Photoshop became the most favourite (see Figure 7).

Figure 6. V-ray
Figure 7. Percentage from Respondent used Application of design

4. Conclusion
Information Technology (IT) plays an important role in the world of Architecture from modelling to visual rendering so that the design work becomes more effective, efficient, and communicative in helping to create a better life for the community.

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