The Effect of Computer-Based 3D Visualization

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Abstract. Along with the development of technology, the world of architecture is making rapid progress, including in the technique of making images. There are many 2D and 3D based computer application programs. In this research, 3D application program was chosen to determine its effect on the design work and see how the images produced by this application. This study used descriptive qualitative method with references to journals, books, and previous studies. In addition, 3D image creation is done using an application to see the results of visualization using a computerized method, the AutoCAD application is used to create a basic image then the Lumion application is chosen as a second party application to see the final result. The advantages of making computer-based drawings are to cut work time, simplify the presentation of images, and simplify work, while the drawback is that it is unflexible to make sketches such as drawing manually using a pencil, besides that the application does not guarantee data stored in situations such as a computer that suddenly lose power when working. Unmanaged work occurred due to the inactivity of the autosave feature on the computer. The result of making this 3D image is a building that is easy to be given material and color, and the resulting image looks quite real.

1. Introduction

An architect as well as architectural student are required to give a presentation on the results of a building design to clients and examiners. There are design stages that must be carried out between them, including concept, design, material collection, making, testing, and distribution [1]. The design stage is long enough to require an architect & student of architecture to make a design drawing quickly. One of the methods used is to create a visualization of design drawings using a computerized system. Today, the development of information technology has changed the image of the world into the cyber world [2]. Research has shown the effectiveness of computer data-based design approaches for fairly complex tasks [3]. Development and utilization of 3D images is currently becoming a trend and is widely used [4]. Google SketchUp and Lumion applications were chosen as the most widely used applications in realistic 3D design presentations. Realistic 3D visualization allows users to sink into it and guarantee the reliability of design simulations [5].

Visualization is one of the forms of delivering information that is used to explain something using images, animations or diagrams that the data can be explored, calculated, and analyzed [6]. 3D visualization is a form of delivering 3D images that aims to provide image information in three-dimensional form. SketchUp is a three-dimensional graphics program that currently have the most users. More than 30 million SketchUp users were recorded in 2014 and continue to grow until now. The SketchUp application was created in 1999 by a company called Last Software, which was then purchased in 2006 by the Google search engine with the aim of integrating SketchUp with their ambitious project, Google Earth [7]. Google SketchUp is a 3D graphics program developed by Google which combines a set of tools that are simple, yet reliable in making 3D graphic designs using
computers. SketchUp is an easy-to-use application and the results in 3D modelling were amazing [7]. In addition to its easy-to-use features, Google SketchUp is also available free of charge (except for the Pro version) for anyone interested in learning the 3D graphics world, according to the tagline carried by Google SketchUp, which is ‘3D Modelling for Everyone’ [8]. There are several supporting applications in making 3D object modelling in SketchUp, including Lumion, 3D Warehouse, and Vray for SketchUp [9]. SketchUp is widely used in multi-object image modelling compared to single objects [10]. Lumion is a program that makes it possible to create 3D scenarios with good quality real-time rendering that allows us to enter objects and settings from other programs such as Google SketchUp. Lumion and SketchUp really help architects and students who need a quick presentation with results that tends not to disappoint.

Along with the development of technology, the world of architecture is making rapid progress, including in the technique of making images. There are many 2D and 3D based computer applications. Computer applications, especially 3D applications are considered as applications that facilitate design visualization, easy to use and quite efficient in its use. One of the applications with the most users is Google SketchUp so that Google SketchUp is chosen to determine its effect on the design work. The advantages of making computer-based drawings are to cut work time, simplify the presentation of images, and simplify work, while the drawback is not free to make sketches such as drawing manually using a pencil, other than that the application does not guarantee data stored in situations such as a computer that suddenly dies when working. Unmanaged work occurs due to the inactivity of the autosave feature on the computer.

2. Method
The method used is the study of pre-existing journals and the practice of using SketchUp and Lumion directly. 3D image creation is done using an application to see the results of visualization using digital means, the AutoCAD application is used to create a basic image then the Lumion application is selected as a rendering application to see the final result.

3. Results and Discussion
As explained in the introduction, 3D visual modeling can use the Google SketchUp application, which is one of the favorite among sketch makers today. Its complete tools make Google SketchUp a prima donna, making it easier for both professional and novice users to use it.

In the Google SketchUp application, there are several command buttons (tools) that are usually used in making designs, these buttons are also not buttons that are unfamiliar to connoisseurs of art, because of the icon and terms in the button that is already quite familiar.

Such as 'select tool' to selecting object, 'eraser tool' to delete some object, 'rotate tool' to rotate objects, 'move tool' to move objects, etc. (See Figure 1).
Existing tools in SketchUp can be simplified by using shortcuts, shortcuts allow us to type letters on the keyboard to run commands, in addition to being easier it also speeds up work. Examples of shortcuts that exist in Google Sketchup can be seen in Figure 2.
At this stage, a cafe building design is created using the SketchUp application by utilizing various existing tools. The result is a 3D image of a building that shows the shape of the building complete with the material used. But at this stage, the picture doesn't look realistic (See Figure 3 and 4).

**Figure 2. Shortcut in Sketchup**
The image is then rendered using a second-party application, Lumion. This application added supporting materials such as furniture, plants, and humans. The result is a pretty good atmosphere simulation. The texture of the image is smooth and looks more realistic than before (See Figure 5 and 6).

**Figure 3.** SketchUp Modeling Results

**Figure 4.** SketchUp Modeling Results
Figure 5. The results of rendering the outer space of the building using Lumion

Figure 6. The results of rendering the outer space of the building using Lumion

Not only the outside space that can be rendered using this application, but the space in the building can also be given material and can be rendered with results that are not different (See Figure 7).
Figure 7. The results of rendering space in buildings using Lumion

The time period for drawing using a computer application only takes about 1 day. With so many features that support modelling, it makes work time fast so modelling using computer applications is very interesting to use.

4. Conclusion
Based on studies and experiments that have been carried out, the final results regarding the performance of digital applications SketchUp and Lumion have the advantages of being easy to use, simple and attractive to use, speeding up the work, and realistic final drawings made it helpful for design simulation. Images can be exported to various application formats, drawings can be saved automatically with the automatic storage feature, and with many features can help architects and designers to improve the performance of design presentations. Besides having the advantages of digital applications, Sketchup and Lumion certainly have the drawbacks include that the drawings and lines are stiff, and it is difficult to make advanced modeling. In addition, the automatic storage feature must always be active to ensure data is not lost.

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