



Conventional visualization technologies versus digital visualization technologies in architecture design process.

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Abstract

Information technologies are intensively used in architectural design process today. However in architectural education today, the conventional tools are still used. The current hybrid education system today is considered as a transition process to digital technologies. The main objective of this paper is to present an action research conducted in a Politeknik Port Dickson in comparing the effect of using digital visualization technologies to the use of traditional visualization technologies in teaching architecture design process to the diploma students. For this conventional and digital visualization technology are used in design process being analyzed and compared. The study had been done for four semesters at Politeknik Port Dickson using case study. The products from both methods were compared and evaluated in measurement and questionnaire. An evaluation study was performed with 38 students. The field study was done with the same students starting from semester one to semester four for two successive years. This study shows that digital visualization technic produced better products in the design process compared to traditional visualization technic. The transition from traditional to digital technologies in visualization process is compulsory for the development of architectural education in Politeknik Port Dickson.

Key-word: - conventional visualization, digital visualization, design process

Introduction

Growing number of architectural designers start to abandon traditional visualization technic in the design process in favor of digital visualization technic using graphic design soft wares and various desktop applications like photoshop, sketch up, archicad and so on. Digital visualization technic are faster and provide an incredible amount of capability and flexibility for the designer to redraw, recompose or rescale their design, change their color schemes, and add various visual impacts in an instant (Isham et.al 2016). Furthermore digital visualization technics make it possible the designer to publish their works on clouds. Although digital visualization technique can produce faster media for the designer to enhance their ideas but this technique cannot offer the sensitivity of art and design creativity.

The digital design programs make it possible for the artists to publish their portfolios on their own sites. Digital media are faster and provide an incredible amount of capability and flexibility at the fingertips of designers, to redraft, recompose or rescale their artworks, change their color schemes, and add various visual impacts in an instant (Tayfun et.al 2012). However, what these programs cannot offer is artistic sensitivity and design creativity. Today if we searching for digital graphic design we will see many examples of tasteless digital visualization with many kinds digital trick but with no artistic value. This is contrast with the non-digital time in the past where designer at that time visual their ideas with stunning artistic characteristics. Many experiments of digital designers claim that the digital media can discard the conventional design technique however many conventional designers believe that the conventional visualization is indispensable for designer creativity.

The conventional designer believes conventional visualization technique created simple, clear and meaningful images by giving attention to the information required in explaining the design product rather than concentrating the graphic exploration of

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the design ideas (Tayfun et.al 2012). Since the comparison of digital visualization technique versus traditional visualization technique is debatable so research were carried out at Politeknik Port Dickson to compare the visualization technique in the architectural design process between digital visualization versus conventional visualization. This research can bring a hybrid training process for visualization technique in the design process with combination of digital and conventional technique.

This research hopefully can be a strong proof for Politeknik Port Dickson to put the important of teaching digital visualization technique compared to conventional technique in teaching architectural design process. It will also provide an opportunity for those who do not have talent in conventional artistic skill to learn architecture at Politeknik Port Dickson.

The Technique of Visualization in Architectural Design Process

The visualization technique in architectural design process consists of two dimensional graphics and three dimensional graphics. For the two dimensional graphics consists of conceptual diagram, site plan, floor plan and elevation. For the three dimensional graphics consists of interior perspective and exterior perspective. For better visualization in the design physical model also being used to visualize the overall shape of the building. For conventional visualization technique the drawings and the physical model being produced manually. For the digital visualization technique the drawings and physical model being produced digitally. The aim of this research was to compare the traditional visualization technique and the digital visualization technique in the architectural design process. This research revealed the superior and weak aspects of both techniques. This research also revealed which method can help the students to produce more creative product in the design process.

Research Methods

A pilot test carried out from September 2014 to January 2014 with 38 students from Politeknik Port Dickson. The reliabilities coefficient of the instrument is 0.835. Data from this pilot test not used for the final analysis. This research held from February 2014 to January 2017. The same students being monitored started when they were in semester one to semester four. This research focus on how the visualization technique helped the students in the design process. This field study was conducted with first intake students from the degree program at Politeknik Port Dickson. In this research, design visuals were evaluated in term of graphic realistic results, time need to produce the drawing, how easy to produce new ideas, how easy to amend, students' satisfaction and lecturers' satisfaction and the compatibility for mobile learning. The first stage of the study was conducted in first semester for degree program of 2014-2015 academic years. Utilizing the first semester design class students being evaluated based on the floor plan, sectional drawings, elevations, perspective drawings and 3D models. From the first semester to the third semester students involved in conventional visualization techniques in the design process. All the students' products from the first semester to third semester being evaluated based on the conventional visualization techniques. In the fourth semester students involved in digital visualization techniques in the design process. In the fourth semester design class students being evaluated based on the same requirement given to the students from first semester to third semester. At the end of fourth semester questionnaire and an evaluation study was conducted and an evaluation table was developed. During this process products produced using conventional visualization techniques and digital visualization techniques were compared in evaluation and questionnaire study.

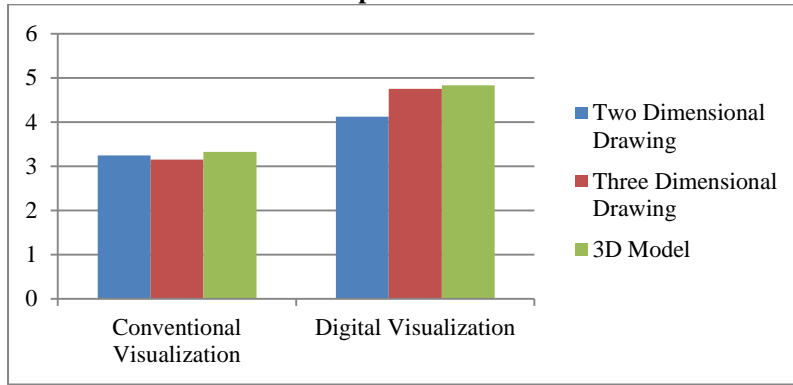
The Results

At the end of the research which lasted for four semesters, an evaluation table which compared the products produced in conventional visualization techniques and digital visualization techniques was developed. In the evaluation of all criteria lecturers and students were asked to conduct a questionnaire study which can evaluate each criterion. A five degree grade scale was used in questionnaire ranging from very poor equal to 1, poor equal to 2, moderate equal to 3, good equal to 4 and very good equal to 5. The results for all criteria are as shown below:

Graphic Realistic Result:

In conventional visualization technique for two dimensional drawings such as floor plan, elevation and section they were evaluated as moderate. In three dimensional drawings since it is quite difficult to bring the material effect on the drawings they were evaluated as moderate also. The same thing goes to physical 3D model since it was quite difficult to bring the real effect to the design product it was evaluated as low. On the other hand, in digital visualization since the digital effect can produce the good effect on the two dimensional drawings they were evaluated as good. Furthermore since it was easy to bring realistic materials effect on the perspective drawings they were evaluated as very good. The same goes to digital model since it was really easy to bring the realistic effect it was also evaluated as very good (Table 1).

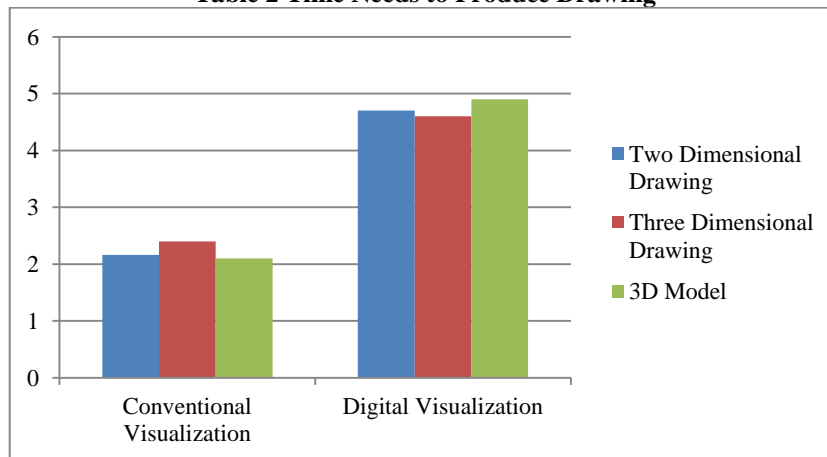
Table 1 Graphic Realistic Result



Time Needs to Produce Drawing:

From the evaluation we found through conventional visualization they were evaluated as low since the students had to work slowly to make more accurate two dimensional drawing. In addition for three dimensional drawings they were also evaluated low to create accurate drawing. The same thing goes to physical 3D model since it took long time to produce the 3D model it was evaluated as low also. It was observed in semester four they were able to make faster 2D drawing and 3D drawing through digital visualization technique through the precision of the computers. Furthermore the library provided by the software such as window, door and furniture shortened the time of the drawing production. Since the digital visualization technologies needed shorten time to produce 2D drawing, 3D drawing and digital models therefore students evaluated all aspects in time consumption on producing drawing as very good (Table 2).

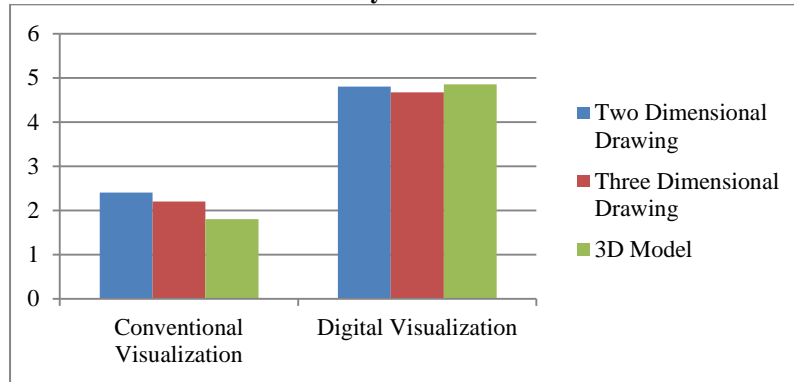
Table 2 Time Needs to Produce Drawing



How Easy to Produce New Ideas:

This item provides researcher with information upon how convenience for the designer to produce new ideas. Through the conventional visualization technique students consumed a lot of time to produce perspective drawing. Perspective drawing is one of the main tools in design process in order to produce creative. Since it is time consuming in producing perspective drawing students evaluated weak for all items evaluated on conventional visualization techniques. On the other hand students evaluated very good for all items evaluated on digital visualization techniques through its ability to help students produced new ideas in a short and easily (Table 3).

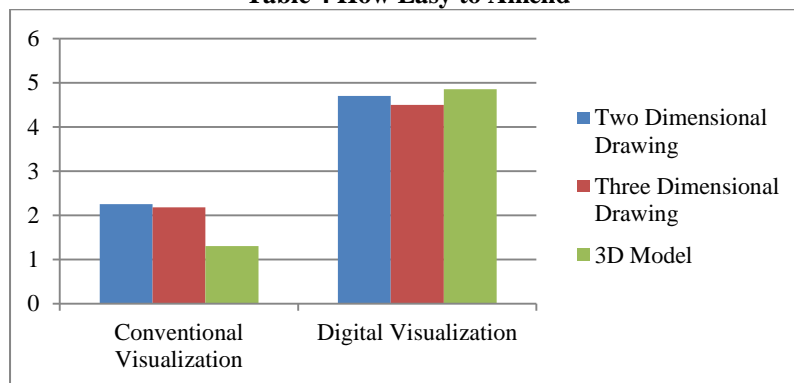
Table 3 How Easy to Produce New Ideas



How Easy to Amend:

In design process amendment is important for the modification of the design ideas. Through conventional visualization techniques when partial amendment made on two dimensional drawing such as floor plan, related section and elevation of the drawing should be erased and drawn again to accommodate the amendment of the design ideas. Since this process is time consuming for conventional evaluation techniques, so for how easy to amend aspect students evaluated as poor. For the three dimensional drawing such as perspective and physical model students evaluated this aspect as very poor. As for digital visualization techniques for how easy to amend aspect students evaluated this aspect as very good since digital methods allowed modification process to be done in a short time. Any amendment for 2D drawing through digital visualization technique can be done easily without time consuming. Furthermore a small modification in a 3D model automatically will occur in floor plan, elevation and section (Table 4).

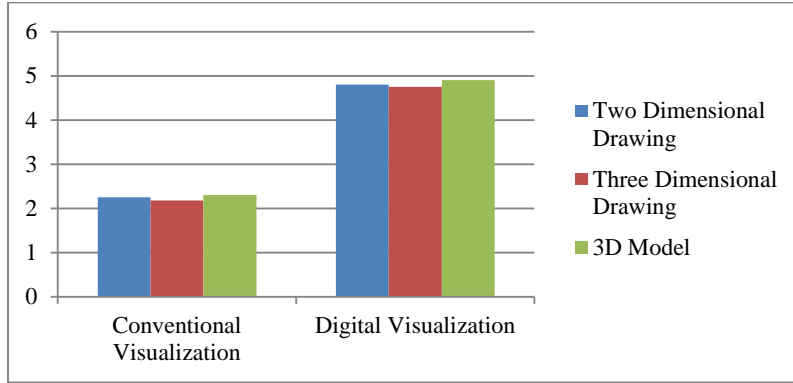
Table 4 How Easy to Amend



Students’ Satisfaction and Lecturers’ Satisfaction:

Students’ satisfaction and lecturers’ satisfaction were evaluated poor in conventional visualization technique. This is due to the conventional visualization technique required longer time in producing drawing either for 2D or 3D drawing. Furthermore any amendment to the ideas would be difficult for conventional visualization techniques compare to the digital visualization techniques. To produce new ideas in the design process also would be difficult for the conventional visualization techniques compare to digital visualization techniques since the option for simulation is limited. From this aspect students and lecturers evaluated very good to digital visualization for this criterion based on the advantages of this technique through time consumption, developing new ideas and amending the existing ideas (Table 5).

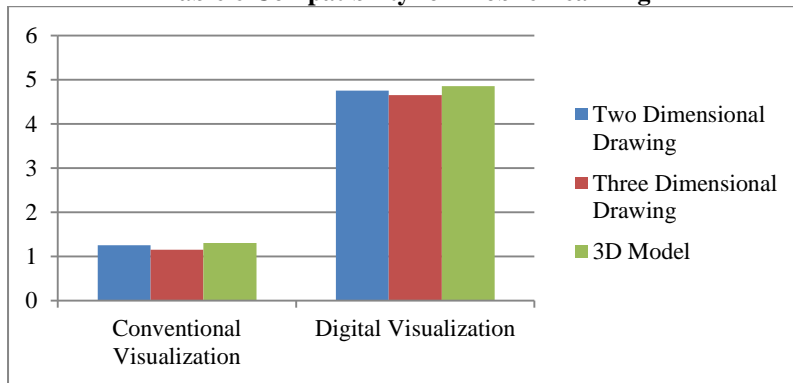
Table 5 Students’ Satisfaction and Lecturers’ Satisfaction



Compatibility for Mobile Learning

Since the mobile learning will require good digital environment for it compatibility so the conventional visualization techniques were evaluated very poor for the compatibility of this technique for mobile learning. For the digital evaluation techniques students evaluated very well for the compatibility of this technique for mobile learning (Table 6).

Table 6 Compatibility for Mobile Learning



Product Review

The results showed significant differences between the drawing products produced by digital method compared to the drawing products produced by conventional methods. The digital application helped the students to produce designs’ products in a short period of time with higher creativity. Some of the drawing products produced by the students as a result of this study are shown in Figure 1 and Figure 2



Figure 1 Conventional visualization techniques



Figure 2 Digital visualization techniques

Conclusion

Today digital visualization techniques are used in the design process at the architectural industry. However the teaching of architectural design process in Malaysia especially in Politeknik Malaysia still focusing on the conventional visualization techniques (Isham et.al 2016). Many educators still did not master these technologies in the design process. At early stage of the teaching of design process in politeknik still put a stress on the conventional method. Even the professional body that governs the educational curriculum of architecture in Malaysia still put the requirement where the students need to study the conventional method at their early year of study. From this study a mixed program which combined the traditional methods and digital methods shall be used in the training program even in the early year of study. For the future it is clear that digital methods going to take over each stage of the design process from design planning to production.

From this study many advantages can be identified on the digital visualization techniques of the design process over the conventional visualization techniques. It is clear that the development of design ideas and the modification of design ideas in the design process are performed in shorter time compare to conventional visualization techniques. This study also proved the digital visualization technique can produce more realistic produce compare to the conventional evaluation technique. From this study also found that the digital visualization techniques can help students to produce more new ideas since the production of ideas for this technique is not time consuming. More design alternatives can be produced with less effort in digital visualization technique. Furthermore the ideas for digital visualization techniques can easily amended compare to the conventional technique. Any amendment did to the 3D model for digital visualization technique will occur automatically on floor plan, elevation and section. Whereas any amendment did on any type of drawing on conventional visualization techniques need to be repeated by the designer on each other type of the drawing. This is the main advantage of digital visualization techniques compare to the conventional visualization techniques. Since the digital visualization techniques based on computer and allow the drawing to be kept in any digital data storage therefore it is clear that the digital visualization techniques are compatible for mobile learning. With all the advantages of the digital visualization techniques compare to the conventional visualization techniques it is supported by the satisfaction of lecturers and students on using the digital visualization techniques.

As a conclusion it was shown through this research that the training of architectural design process in the polytechnic system especially need to put a stress on the digital techniques. The transition of architectural education training is a must and need special attention from curriculum development unit of the polytechnic system. As a researcher the digital application need to be integrated at the early stage of the architectural education system.

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