
Research and Application of SketchUp in Architectural Design Teaching in Higher Vocational Education

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Abstract

As traditional colleges and universities increasingly incorporate SketchUp into their curriculum, it is important to understand the benefits that may accrue to the faculty who teach in those programs, particularly those that influence pure two-dimensional blackboard and ppt teaching. The purpose of this study was to provide a greater understanding of how the SketchUp teaching influenced teaching effect in teaching practice across computer assisted instruction. Four existing issues emerged: 1) lack of sense of space, 2) traditional performance techniques are too weak, 3) plane, facade, profile is too abstract, and 4) detail is difficult to understand. Correspondingly, four advantages of SketchUp had an impact on the themes: 1) easy to learn, 2) real-time display, 3) multi-faceted profile generation and presentation functions, and 4) completely free of charge.

Keywords

SketchUp; Teaching in higher education; Teaching innovation; Architectural design teaching.

1. Introduction

With more 3D technology available than ever before, teachers are able to help their students visualize content in new ways [1]. The preliminary course of architectural design is the compulsory basic course of architectural design specialty in higher vocational colleges. Non-architectural design teachers cannot stick to the traditional teaching methods. Traditional teaching methods are based on theoretical explanation that mainly accompanied by a large number of real pictures and hand-painted copy which is through the traditional drawings of the tool drawing. Practice has proved that there is a certain aesthetic basis of the basic skills of students to be further strengthened through the traditional method. However, students' learning and efficiency are often not proportional to non-architectural design students. It should be a useful exploration of SketchUp teaching. Students' understanding of architectural space and composition needs to be enhanced, and their ability to grasp the architectural form and scale needs to be improved through the popular software SketchUp.

2. The Present Situation and Existing Problems of Architectural Design Course Teaching

Architectural design courses involved in architectural history, architectural composition, architectural drawings and architectural performance and other aspects of the content, the author in many years of teaching practice, found that students mainly exist the following questions.

2.1 Scale and Lack of Space

In the traditional teaching teachers mainly use real photos and flat profile paper on the theoretical parts such as architectural history, architectural masterpieces to explain. It is difficult for students to

understand the relationship between the drawings. Their understanding of the architectural scale and the overall shape stays on the surface in the process of copying and small-scale building case design. Teachers simply teach some of the standard data and cannot solve the students in the design of the problems encountered. And students are more difficult to build a sense of space in the face of many plane drawings. The lack of imagination in three-dimensional space limits their depth of understanding of the building.

2.2 The Reality and Contradiction of Traditional Expression Technique

Drawing drawings has always been one of the important learning methods for architectural design. Its importance is undeniable, but the limitations of traditional performance techniques with the rapid emergence of new technologies are becoming increasingly apparent. Traditional copywriting such as architectural background, character drawing, drawing basics and perspective techniques covers a wide range of content and objects and takes a lot of time and little effect.

2.3 Abstract Understanding of Architectural Flat Profile Drawings

Teachers on a large number of building plans, elevations and sections of the drawings to explain the process in detail is often more tedious in the architectural drawings of reading teaching. Many students are excluded because of the boredom of boring drawings, especially in the illustrations. It is difficult for a student to establish a correspondence between a profile and a floor plan and an elevation view because of a lack of overall understanding of the building. This kind of teaching is often less effective.

2.4 The Three - dimensional Composition of Architectural Space is Complicated

The composition of architectural space is an important idea and technique of architectural design. The traditional teaching method is based on the entity model. Model production is not only cost the material and the production cycle is long, some students are more emphasis on the use of materials and ignore the composition of space. Substantial model making ideas and changes are extremely inconvenient to lead to students building space to improve the sense of the effect of slow.

3. The Characteristics of SketchUp

SketchUp is also called "sketch design master". The focus of BIM education within CEM programs should be on BIM trends and processes, not on BIM software such as Revit, AutoCAD, or Google SketchUp. Teaching students how to create 3D models of building systems in a virtual world is not a true BIM education [2]. It is a set of design for the design and design of three-dimensional creativity and development of the design tool, but also excellent three-dimensional rapid modeling software. Its creative process is in line with the designer to create design ideas. The design step is to create a rough outline of the building or the environment in SketchUp and then go deeper. With the design concept of continuous clarity, design details continue to enhance, until the completion of the entire design of the architectural design process. And SketchUp that is seen that the interface is to see the final effect of the work of the characteristics of the interface for the designer to build exchange bridge a very convenient interaction for the customers.

4. The Application and Advantages of SketchUp in the Teaching of Architecture

4.1 Simple Operation and Quick Model Creation

In the process of modeling can be the same as the actual model from the angle of any observation, the three-dimensional model can also be placed in the three-sided projection system to observe, so that students can easily from the vertical direction of the projection plane to understand the projection Of the process, and can deepen the understanding of the third part of the process of projection mapping. SketchUp provides wireframe, blanking, coloring, texture mapping and monochrome display, which can be analyzed in color mode or wireframe mode, and then used in blanking mode for drawing

exercises. For non-visible lines in a body projection, the model can also be semi-transparent in X-ray mode. In this mode, the unsatisfactory line display is reduced, but the invisible line cannot be displayed as a dotted line in SketchUp. Students in the drawing process in the teaching process, from the three sides of the projection is the shape of the body and draw the shape of the body shape mapping process has been plagued by many students, the lack of spatial imagination makes learning difficult. 3D projection can be drawn in SketchUp, and then rotated to the three-sided projection system angle, through the test of the establishment of three-dimensional model of the experimental process, help students analyze the problem, to find the required three-dimensional body.

4.2 Demonstrate the Formation and Content of Architectural Drawings

Architectural Design Course construction drawing knowledge map has been part of student learning difficulties. The reason is that students always face in the study of two-dimensional drawings, the need to map the corresponding way in the minds of the construction of various parts of the building model, requiring students to have a good space imagination, many times the students cannot imagine the actual building look. Through the application of SketchUp software, in the teaching of AutoCAD drawings can be imported into the software, and then the entire building three-dimensional model of the establishment. This can not only build the facade of the building, but also can be a detailed representation of the internal space within the building, and even can use the model library to join doors and windows, furniture, sanitary ware and equipment and other details. In the process of building the model need to conduct a comprehensive analysis of the drawings, in determining the basis of the body to read the size of each part. After the model is built, the user can roam within the real perspective to enhance the intuitive understanding of the drawings. The cross-sectional and cross-sectional views of architectural drawings are more abstract and difficult to understand for students. SketchUp has a simple and easy way to create profiles, which can be viewed horizontally or vertically at any position, see Fig. 1.

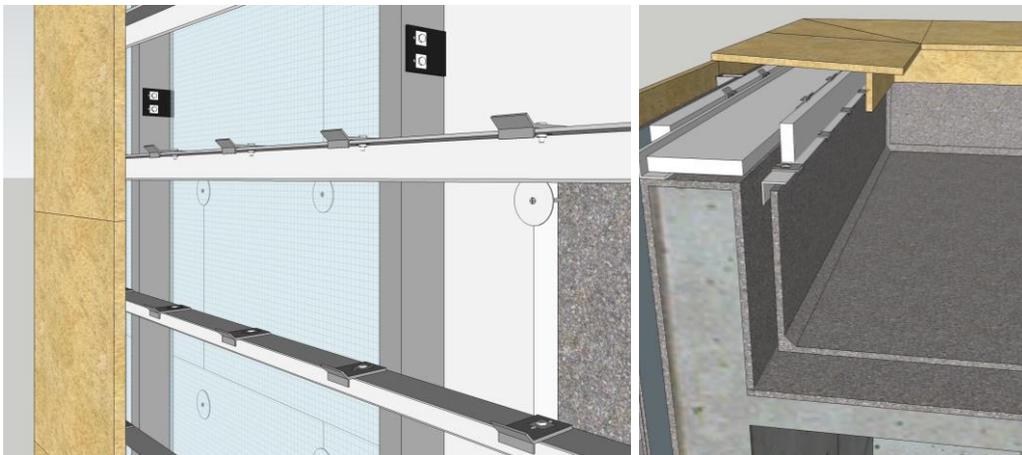


Fig. 1 SketchUp tectonic model

4.3 The Application of SketchUp in the Teaching of Architecture Design

4.3.1 Easy to learn

Fast is one of the biggest features of SketchUp. The interface is simple, easy to learn and use, can quickly get started. This is also one of the important reasons why it can quickly reach the design community. For teachers and students, especially for the computer is not very familiar with the newborn, it has a great advantage. In general, if the learning method properly, a few days will be able to initial entry. For the teaching of the functions used in a more simple, serious to do a few models, fully able to cope with teaching problems, and interesting, and soon be able to enjoy it.

4.3.2 Real-time display and communication

SketchUp modeling at any stage can be used as intuitive three-dimensional products, can solve the problem of timely communication with students. At the same time in the interactive interaction, SketchUp can easily communicate between teachers and students through roaming animation, or by changing the perspective of the environment, because SketchUp using a special 3D engine, its real-time display to avoid a long rendering wait, convenient Fast, real real-time display, real-time communication[3].

4.3.3 Multi-faceted profile generation and presentation functions

SketchUp's real-time cut-off feature makes it easy to create sections of any direction, and can form a profile animation for presentation, demonstrating the formation of geometric shapes or architectural sections in teaching, and making it easy to provide students with intuitive feel , To improve teaching effectiveness.

5. The Disadvantages of SketchUp in Architectural Design Teaching

5.1 Need Computer CPU Fast Enough

Making model is an important method in teaching students in sophomore class how to design architecture, which can help students to design with solid concept. But there are some limitations in model making by hand[4]. Software compared to some of the two-dimensional software, the larger space, the computer configuration requirements are higher, especially the memory and CPU, or use SketchUp rendering garden three-dimensional image is very slow, cannot fully reflect the characteristics of its software quickly.

5.2 Need to Be Used in Conjunction with Other Software

The software comes with a large number of plants in the material library, in the selection SketchUp floor plan will appear when the plant into a line or sheet, not in line with the actual situation. Therefore, to be exported and other graphic effects, such as Photoshop used in combination, the effect is better.

6. Conclusion

After the above analysis, SketchUp in architectural design teaching has a greater advantage. At the same time, it can do a good job for the follow-up teaching, especially for architectural design and graduation design after mastering Sketehup's basic operations.

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