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Application of Visualization Technology in the Teaching of Building Solid Model Making

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ABSTRACT. *Taking the major of architectural engineering technology as the experimental unit, this paper applies the technology of architectural modeling software to the reform of visualization teaching in the course of building entity model making, and formulates the design of visualization teaching process depending on the real project entrusted by the enterprise. The softwares of Sketchup and Revit are used to obtain the 3D data of the solid model, the material, the connection structure to complete the teaching. Based on the description of implementing of the project, this paper summarizes the results and explores the new ideas of teaching reform for the majors in architectural engineering.*

KEYWORDS: *Visualization technology, Architectural entity model, Practical teaching*

1. Introduction

The major of architectural engineering technology in higher vocational colleges is to cultivate high-quality applied talents, and its teaching system requires the strong ability of practical application. However, it is difficult to realize the practice teaching requirement of “What you see is what you get” under the restriction of complexity, danger and long construction period. In the teaching of many professional courses, due to lack of practice and vivid expression of architectural engineering entities, the contents of the courses become boring, and therefore students’ interest and enthusiasm in professional study cannot be aroused, then the teaching effect is greatly reduced. In order to break through the above shortcomings, the traditional teaching model should be reformed, especially in the part of the practice of visual teaching.

2. Implementation Process

As an example of the entity model making project in Shangen village, Ouhai District, Wenzhou, this practical activity was commissioned in conjunction with the real mission of the enterprise in the formulation of project implementation plan, enterprise task decomposition, team division of labor, evaluation of results. And the research and development and feedback teaching of the follow-up project and other aspects of the formulation are very cautious. The specific implementation steps are as follows:

2.1 Project Background

The project for the integration of Shangen village is based on Shangen village's comprehensive dem olition and renovation, great construction and beauty. With the help of the transformation of villages in the city, the old village will be combined with demolition and renovation. Through the preservation an d renovation of some old buildings and the construction of some new buildings, etc., the five blocks of college students’entrepreneurship alliance, design alliance, art district, creative residential, boutique hotel and other public support will be planned. According to the preliminary design, the project site covers an area of96 Mu with a total investment of about 250 million yuan. On account of the most very old original buildings and the wrong and incomplete information stored in the paper drawing, they need to be remapped and remodeled.

2.2 Committed Task

(1) The 3D effect entity model of the project is made according to the general plan and partial effect map of the project, and the surveying and mapping data provided by the enterprise.

ISSN 2663-8169 Vol. 2, Issue 2: 26-30, DOI: 10.25236/IJNDE.2020.020207

(2) Complete the modeling work of 61,000 square meters building, exert the creative thinking and try to replan the project of Mountain Root Village Integration from the perspective of the post-1995 generation.

2.3 Organization Mode

Based on the task entrusted by the enterprise, 19 sophomores were assigned to two groups: Design Group and Model Group to carry out the targeted technical service.

(task interpreted by the Teacher)

(Students working together)

(1) The students of the design group consult the technical data such as the general construction plan, the effect drawing, the single construction drawing and the on-site investigation provided by the enterprise for “the Shan Gen Project Integrated Tourism and Village “ , and divide the tasks according to the progress requirements of the enterprise, the completion of the sketchuph modeling of the buildings on the site block requires that the dimensions be precise. Otherwise it will directly affect the production of the solid model. Meanwhile, in the modeling, the students in the model group follow up assistance on-site mapping to ensure the accuracy of the modeling.

(Students in design group working)

(Students on-site mapping)

(2) The students of the model group are divided into four groups, and each group is equipped with one student from the design group. According to the modeling data provided by the students of the design group, the students of the model group prepare the model materials and assemble the construction model in proportion. At the same time, the design group is responsible for providing and checking the size data of the model.

(The students in the model group getting the model parameters)

(The students working in model group)

Although the above students are divided into 2 groups, they work at the same time, so that they contact with each other closely, have a clear division of Labor, professional complementarity and data retrospective. And the students realize the continuity and importance of each other's work, recognize their position in the team, and

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understand the importance of teamwork.

3. Implementation Results

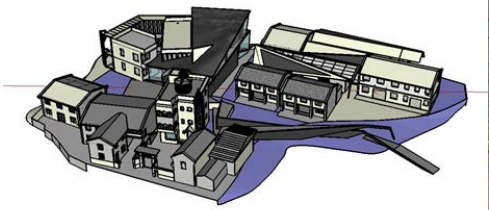
3.1 Enterprise Benefits

(1) To complete the 3D entity model of the project and accept the evaluation and valuation of the enterprise, complete the whole model of plot 1 and plot 2 of "the Shan Gen Project Integrated Tourism and Village ". The work is accurate in size, the site layout objective and true, the model beautiful in overall shape, the material durable and indicative and in line with the needs of the enterprise.

(1:50)Creative design of plot 2(1:50)

(1:50) Creative design of plot 4(1:50).

(2) To complete the architectural planning and architectural modeling of the Entrepreneurial Park of "the Shan Gen Project Integrated Tourism and Village ". The students combine the architectural style of "the White House" to carry out the site function planning and block modeling. The program has been partly adopted by the enterprise and received high praise from the enterprise for the enterprise to create a real benefit.



(The SketchUp result by Design team)

(Physical results of the Model Group)

3.2 Professional Benefits

(1) To deepen the understanding of enterprise's needs through the project cooperation. It is conducive to grasp the latest requirements and changes of professional skills of the industry, enterprises and posts, then we can keep up with the changes to adjust personnel training position and specification timely.

(2) It tests the effects of theoretical and practical teaching in the school, as well as the professional quality of these students. The whole process of project implementation shows the students' good and overall professional, Some students also have some problems, which are magnified in enterprises: low confidence in technology, poor adaptability in operation and too much emphasis on self and others in teamwork. These will provide a practical basis for the modification and improvement of the professional training program.

3.3 Teacher Benefits

Teachers connect the communication channels among school, enterprises and students, and feed back the demands of enterprises and students in time to ensure the smooth implementation of practical guidance. During

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the enterprise guidance period, do a good job of students' task layout and check, order list of the model material preparation and tool selection, and solve the technical problems of the students in the process of practice.

It is an effective and win-win implementation process of the project. from the perspective of cooperative depth, professional practicability, guidance strength and results in practice guidance. Through the implementation of the project, teachers have a deeper understanding of the project plan formulation, the process control of project implementation, the display of project effect and other links. And the abilities of their comprehensive application have been greatly improved.

4. Application and Promotion

Excellent teaching cases should embody typical, innovative, replicable and extendable practical experiences and innovative practices. Therefore, after fully summing up the innovation and replicability of the project implementation, combined with the characteristics of Construction Engineering Technology Courses, Take the lead in the promotion of 2014 graduation project of Engineering Technology Major. This series of graduation design works were also exhibited as excellent graduation design results in the "exhibition evaluation" meeting of the college, and were highly praised by employers and school leaders.

The specific method is to change the previous practice of construction organization design planarization in graduation design, guide the students to first use Revit software to build a real digital model of construction site layout, and then use integrated bamboo to make a solid model according to the proportion of 1:50. Through the implementation of the curriculum reform project, the students have a deeper understanding of the layout of arranging the traffic (temporary) road, construction material storage yard, office rooms for technicians, living quarters for workers, vertical lifting and other large construction equipment, water supply and power supply and communication pipelines, etc., and enhance the students' abilities of understanding and allocating the space on the construction site.


(Students' graduation works on display at "exhibition, evaluation and engagement" meeting of the college)

The harvest of project promotion is that through this form of graduation design guidance form, students have learned to comprehensively use the theoretical knowledge of building structure map recognition, surveying and setting out, component material selection, structure selection, structural node connection processing, the layout principle of construction plane, construction schedule, etc.to solve specific design tasks while cultivating the ability of graduates' team cooperation. In the past, it was impossible for students to complete their own graduation design tasks.

4. Concluding Remarks

Visual teaching emphasizes the use of visual technology to realize the transformation of abstract logical thinking concept or activity process into vivid thinking process. The application of this technology to the professional courses of construction engineering can maximize the use of its visualization, simulation, coordination and other characteristics, not only to meet the personalized needs of teaching design content but also to achieve the visualization requirements of students 'industrial practice and improve the teaching interest and vividness.

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