Application Research of Building Model Based on BIM Technology in Curriculum Teaching

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Abstract. The method of combining BIM technology and handmade models are adopted this article. Based on the method of transforming theory and practical conversion training, it is taught in civil engineering courses. Through research, the building model has the advantages of more intuitiveness, three - dimensionalization, and authenticity. It can be used for civil engineering teaching, which can enhance students' interest in learning, improve students' theoretical knowledge application ability, practical operation ability, deepen students' teaching content of teaching content Understand, cultivate students' innovative thinking and innovative consciousness.

Keywords: BIM technology · Manual model · Combination of virtual reality · Innovative thinking

1 Introduction

The earliest use of the model in ancient times was the use of military generals to command war. It can be used by the use of terrain, enemy conditions, and combat plans. It has a huge role in promoting the strategy of organizational coordination. With the advancement of science and technology and the development of society, the application of models is no longer limited to military, and there are certain applications in the fields of education science, film, construction, and games [1]. At present, in the classroom teaching of civil engineering, architectural structure and internal reinforcement are explained by two-dimensional drawings. This teaching method is very boring and difficult to arouse students' learning enthusiasm. The model has intuitive, three -dimensional, and authenticity [2]. It is applied to teaching, which can stimulate students 'interest in learning, improve students' design level and space thinking ability, and the cultivation role of innovation and practical ability is also very obvious [3].

This article realizes the conversion of "theory-practice", "teacher-student-engineer", "2D drawing-3D model" based on BIM production models. "Engineering Practice-Science and Technology Achievement-Patented Technology", "Textbook Knowledge-Standard Atlas-Specifications", "BIM Model-physical Model", "Student Reviews-Teacher Comments" improves students' theoretical knowledge application Capability,

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practical hands-on ability, cultivate students' creative thinking and innovative consciousness, deepen students' understanding of teaching content, and improve students' learning effects.

2 Application Advantages of BIM Technology in Curriculum Teaching

In the traditional teaching process, the course is often completed in the form of two -dimensional form. It is difficult for students to truly feel the relationship between the components of the house building and their formation form [4]. From the perspective of teaching effectiveness, this boring teaching method not only makes students bored, but also loses interest in course learning. Building Information Modeling technology breaks through this limit. Based on 3D digital technology, it establishes a three -dimensional stereo model building component, which can draw the building structure with simple lines. Students should use a computer to draw a virtual model consistent with the construction engineering, and presented the wall structure, steel distribution, and skeleton structure of the construction engineering. Through this technical means, it is conducive to reducing the errors between the design plan and the actual model, preventing design problems, understanding the situation of the building structure visually, and improving the level of model production [5]. If it is designed based on BIM, students can realize the conversion of 2D drawings and 3D models. During the life cycle of conceptualizing, designing, implementing, and operating in BIM design, students' ability to draw and recognize drawings, as well as the efficiency and quality of model production, can be improved.

3 Innovative Teaching Reform of Virtual and Real Building Models Based on BIM Technology

3.1 The Content of Innovative Teaching Reform

First of all, check the literature and materials in the reform of architectural model teaching methods at home and abroad, comprehensively sort out, summarize, summarize relevant teaching results, and formulate preliminary implementation plans. Before the project was implemented, teachers used holidays to visit the actual engineering project, collecting engineering practical materials, scientific and technological achievements, patent technologies, etc. related to professional courses, and the first -hand practical data obtained in classroom theoretical teaching, and the textbook knowledge and standard diagram. The three combinations of sets and articles specifications, improve the theoretical knowledge system, and conduct the first round of project teaching to lay the theoretical foundation for practical operations, that is, the production model production.

Then, a questionnaire survey is prepared to investigate the students' mastery of professional knowledge, learning ability, and operation of BIM software. The results of the questionnaire survey for students of all grades are statistically analyzed, and an implementation plan for building model teaching is developed.

Finally, the building model is made. In practical operation, the theory and practice will be transformed through the selection of model materials, the determination of structural proportion, the production of BIM model to stereo model, project results display and other links. Take a holistic approach, step by step, and further improve the plan. At the same time, in the process of implementation, problems are found and constantly improved, and the content of the subject is deduced and summarized. Model production and integration of "teaching, learning, doing, and evaluation" is one of them [6]. Training students combined with the level of level 22G101 series of diagrams to realize the transformation of theoretical and practical, strengthen students' theoretical knowledge application ability, practical hands-on operation ability cultivation.

3.2 The Implementation Process of Building Model Production

(1) Selection of making materials
Before selecting production materials, it is necessary to fully understand the characteristics of various materials and use them reasonably and skillfully. The most basic constituent element of architectural models is the material, and there are many professional materials for making building models and various available materials, such as ABS boards and paper, which can be used to express the shape. This article adheres to the concept of green environmental protection with sustainable development, and chooses a large number of waste materials in life without being fully utilized, such as wires, network cables, wire, packaging paper and other materials. The choice of waste materials not only reduces the production cost of building models, realizes the recycling of resources, and improves students' environmental awareness and social responsibility.

(2) Determination of basic information of the model
Through the distribution of questionnaires, combined with the actual conditions, finally determine the scale of the model and model types. In order to highlight key knowledge, the production of building models adopts unequal scaling. Different colors and materials will be selected to produce different types of steel bars in the model, which is convenient for students to quickly identify the types of steel bars and further understand the names and uses of steel bars during classroom explanations.

(3) Group cooperation determines the model of the model
It is difficult for one person to complete the model production, so we introduce a team cooperation approach in the model production process, where team members can discuss with each other, exchange learning, and improve design skills. The team first self-tests whether the model design is reasonable through Building Information Modeling and completes the preliminary design. Then, different teams question and discuss with each other, identify issues, modify, and finally determine the model production plan.

(4) Building model production
In this article, materials such as electric wires are used to replace steel bar cutting in the production of building models. By simulating the on-site reinforcement workers binding the steel bar skeleton, the planar structural components in the structural construction

drawings are transformed into more intuitive three-dimensional models. Through the production of models, students can help read the structural drawings, experience the hardships and fun of labor, and enjoy the joy of harvest. By cultivating virtue, strengthening intelligence, and strengthening the body through labor Cultivate beauty through labor, thereby promoting the comprehensive development of students [7].

(5) Achievement display, review model

After completing the design, students will present the results, and students and teachers will comment on each group's results in class. In the comment, the relationship between the teacher's "introduction" and the "exploration" of the student, improve the disadvantages of students' design, improve the concept of two -dimensional to three -dimensional three-dimensional design concept, help students cultivate the correct design thinking methods, and stimulate design innovation [8]. In the model display, let students show the design of their group in groups, which can improve their language expression ability. Finally, students are encouraged to send the results of their own groups to their social platforms, such as Weibo, Friends Circle, and QQ Space, so that their classmates, friends, and relatives can comment and receive praise and encouragement. Further improve model design skills through comments from friends and family, enhance self-confidence, and acknowledge your efforts, thereby continuing to work hard to learn professional knowledge.

3.3 Teaching Effect

This article explores the teaching mode of the combination of virtual and real building model auxiliary teaching. It has initially formed a system. It can be operable, borrowed and sustainable, and can better improve the comprehensive quality of students. Students design models with virtual and practical methods, not only exercise students 'software operation ability, but also improve students' hands -on ability, experience the hardships and fun of labor giving, enjoy the joy of harvest, and increase their wisdom To promote the comprehensive development of students with labor and strengthening the beauty.

In the process of building model production, students are familiar with the job skills of reinforced engineering and construction workers, transform theory and practice, strengthen their practical ability, and improve their teaching results. It was tested through the method of questionnaire survey, and it was found that students generally accepted the form of auxiliary teaching in architectural models combined with BIM technology and manual models. 90% of students believe that after using the building model, they deepen their understanding of teaching content, improved their hands-on ability, and to a certain extent change the students' design thinking. The three -dimensional design ability is generally enhanced.

Students also participated in a number of BIM competitions and won multiple awards after the classroom. One, two most popular awards; the second prize of the 14th Shandong Provincial College Student Science and Technology Festival-College Student BIM Applied Skills Competition.

4 Conclusion

This article continues to excavate theoretically, integrates engineering practice, scientific research projects, and patent results into classroom knowledge, and then use the theoretical knowledge learned to make models. The model integrates BIM technology into the teaching classroom, and converts the traditional two-dimensional teaching method into a three-dimensional recognition learning, which is conducive to the learning space perception of students in civil engineering, shaping the simulation space, and it is conducive to improving the integrity of the design scheme. At the same time, the conversion training of theory and practice can specify the knowledge of flat abstraction. While improving students 'interest, it will fully optimize the content of curriculum teaching content, stimulate students' learning interest, improve classroom efficiency, and cultivate more applied skills. The research results of this article can be used for the construction of multiple courses, or for the training of pre-job training, budget -owned steel bars computing training, can be replicated and promoted, and the application prospects are very extensive.

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