The Teaching Practice Reform Based on Virtual Simulation Technology

Take the Course of "Civil Engineering Construction Technology" as an Example

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Abstract. Civil engineering construction technology, a professional core course, is required of students majoring in civil engineering and construction cost, and students are also required to master the civil engineering of each type of work between the construction of basic common sense, basic principle and basic methods, the selection of construction schemes and the basic ability to solve the problem of civil engineering. Therefore, the course is comprehensive and practical to some extent. Given the current problem of pain points in the course of the major training, this article explores the use of virtual simulation technology and civil engineering construction course of organic integration, through professional curriculum classes of "theory teaching and virtual simulation training" mode of innovative teaching, classroom teaching reform in civil engineering construction technology, through reform of teaching practice. This essay aims to explore an efficient teaching method for civil engineering major suitable for our school, private universities and some newly built universities, and cultivate applied talents suitable for local industrial economy.

Keywords: Virtual simulation, Civil engineering, Teaching methods, Teaching reform

1 Introduction

Civil engineering construction technology, a professional core courses, is required of students majoring in civil engineering and construction cost. The teaching mainly combining with current construction specifications, standards, and construction quality acceptance specification on the construction technology of the main type of work project makes the students understand the civil engineering construction at home and abroad of new ideas, new materials, new equipment, new technology developments.

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Mastering the basic knowledge, basic principles and basic methods of civil engineering construction of various types of engineering construction can carry out the selection of various types of engineering construction scheme, and make the students have the basic ability to solve the civil engineering construction technical problems[1]. At the same time, this course has strong comprehensiveness, practicality and independence, and the teaching effect will directly affect the subsequent professional course learning.

2 Teaching Status of Civil Engineering Construction Technology course

To cultivate conforms to the local economic development targets of civil engineering applied talents, all civil engineering professional education, colleges and universities are the theoretical education and practical skills in parallel mode of education teaching, although this way fit for civil engineering professional talent training goal, but for college education cost is more and more high, Whether we can find a kind of not only can not increase the cost of the premise, but also can meet the goal of civil engineering professional skills training, is a problem that needs us to think deeply. At present, taking our university as an example, the civil engineering construction course technology teaching in private colleges or newly-built undergraduate colleges mainly has the following problems:

2.1 Teaching Tradition in the Process of Teaching Implementation

At present, multimedia teaching hardware facilities have been put into the classroom of colleges and universities to increase the diversity of classroom teaching. But due to the civil engineering construction the characteristics of strong theory and practice of the course, most teachers are used to "teachers teach, students passive infusion" of "cramming education", which is given priority, is still in the environment of the multiple teaching tool. In using the traditional education teaching idea in classroom teaching, students is not high because of the lack of professional learning enthusiasm. The effect is not good. Students do not fully understand the professional theory of civil engineering construction course and do not thoroughly analyze the engineering principle, which directly affects the continuous promotion of the subsequent professional course content.

2.2 Teachers' Teaching "Emphasizes Theory, Ignores Practice"

Civil engineering professional training goals should adapt to the needs of socialist modernization construction, morality, intelligence and physique, fatigue all-round development. Students should grasp the basic theory and basic knowledge of civil engineering disciplines, with solid basic theory and professional knowledge, strong practical ability and innovation ability[2], can undertake all kinds of projects in the field of civil engineering and related technology and management work, High quality

applied talents in civil engineering can meet the needs of construction engineering, highway and urban road engineering construction and development[3].

But in our school and the newly built undergraduate course colleges and universities, for example the civil engineering specialty of civil engineering construction technology in the teaching of the course, teachers can be strictly in accordance with the teaching syllabus, but because of strong theoretical course, it leads to excessive proportion of theory teaching, practice class, and the organic integration is not enough. As a result, students do not have a deep understanding of the construction technology, construction process and construction method in civil engineering, and it is difficult to use professional knowledge to solve practical engineering problems. As a result, students have weak engineering consciousness and low practical ability, which does not meet the training objectives and requirements of applied talents in civil engineering[4].

2.3 Practical Teaching Resources Are Not Rich

At present, according to the requirements of the civil engineering professional training program of our school, students have off-campus internship opportunities for cognitive practice, production practice and graduation practice. However, in the long-term implementation process, it is found that the long-term shortage of practical training resources affects the improvement of students' practical skills. After analysis, the main problems are as follows:

2.3.1 The project quantity in the professional field of civil engineering is large, and the engineering construction cycle is long. The short-term internship can only carry out the study of some partial and sub-project in civil engineering or partial engineering of a project;

2.3.2 For the sake of the safety of students and the convenience of the safety management of the project department, the enterprise and the project department will not accept or allow students to come for internship because of the many safety risks on the construction project site;

2.3.3 Due to the characteristics of periodicity and fluidity of construction projects, the internship projects of each class of students are not fixed, and the internship content does not match the course teaching progress, which makes it difficult for students to achieve the promotion goal of keeping pace with theory and practice.

To sum up, the above factors are the main reasons for the lack of abundant internship resources in civil engineering major of our university and new undergraduate colleges, the difficulty in carrying out practical work, and the unsatisfactory effect of students' internship.

The above four pain points make the practice effect of civil engineering students not ideal. In order to improve this situation, some colleges and universities in China have adopted two ways: increasing practical training input or adopting virtual simulation

technology to improve the practice situation and enhance students' practical skills[5]. However, by increasing the traditional training input, we can indeed expand the cooperation between universities and enterprises from the perspective of increasing the capital input, and effectively alleviate the problem of insufficient internship resources. However, this method ignores the integrity of project construction, and will bear greater risks for universities, engineering construction enterprises or project departments. In view of the above reasons, we use the virtual simulation platform of architectural engineering in our school to reform the teaching method of civil engineering major, aiming to improve the situation of insufficient student practice and poor effect through virtual simulation technology.

3 The Construction of Virtual Simulation Software Platform

In order to improve the professional and technical ability of civil engineering students in our school, with information teaching means as the breakthrough point, our school uses virtual simulation technology to build a virtual simulation teaching platform for civil engineering construction courses suitable for the learning situation of our students.

3.1 The Platform Has the Following Features:

(1) To master the construction site technology and management process as the core points, emphasize the accurate mastery of the construction process sequence and standardized operation, post connection of construction management. The construction process of data management and quality control, aim at training quality, technology, management of professional and technical personnel.

(2) The system uses 3D simulation technology, based on Unity 3D technology, through a complete set of Cad drawings simulation interaction to realize the construction process of the whole project, and each construction process is connected with each other, forming a complete set of construction and management process.

(3) Use the keyboard keys and mouse control to realize three-dimensional field roaming, interactive, simple and easy to learn.

3.2 The Platform Mainly Includes the Following Modules:

(1) Teaching module: Teachers can lead students to carry out relevant construction operations under the prompts of intelligent voice area;

(2) Teaching resource module: This module has abundant and easy construction-related resources, which can facilitate students to carry out different teaching tasks, including material library, machine library, database, etc;

(3) Evaluation module: After students carry out the simulation operation of human-computer interaction, the teacher can evaluate, guide and feedback the implementation behavior of students, and formulate targeted improvement measures;

4 The implementation of Virtual Simulation Technology + Civil Engineering Construction Course Teaching Process

The introduction of virtual simulation technology into civil engineering construction course teaching can improve the current shortage of traditional practice teaching, so that students can realize the practice operation of the whole life cycle from the decision-making stage to the use stage of engineering construction project, and improve students' ability to judge, analyze and solve engineering practical problems. As far as schools are concerned, the practical training funds can be reduced without affecting the teaching effect.

The teaching practice process of civil engineering construction technology course is as follows:

4.1 Classroom Theory Teaching Stage

Before the theory teaching, it is necessary to have effective emotional communication with the students of the class, and lead the students into the classroom situation of civil engineering course through language interaction. Through the multimedia with pictures and pictures, the course teaching content to heuristic questions lets the students with questions find the answer, which effectively improve students' learning interest and learning enthusiasm. At the same time, the most popular and understandable way should be adopted in the teaching (for example, the life scenes that are familiar to everyone and can improve the classroom atmosphere, etc.) to explain the raw and boring theoretical knowledge, so that students will not be afraid to understand the theory.

4.2 Virtual Simulation Practice Phase

According to the requirements of the teaching syllabus, students should log in the virtual simulation software without going out of school during the practice operation stage. In the "teaching mode" of the software, teachers lead students to conduct practice teaching guidance of the whole process of actual engineering projects. Through three-dimensional roaming technology, students can comprehensively inspect the

construction site and construction process of construction projects, so as to prepare for their own operation.

Students under the "simulation model", relying on the software of human-computer interaction technology, through the interactive operation, complete the different partial cognition and task of engineering process, complete mastering scene construction project construction technology, operating requirements, operation process and matters needing attention after construction. Through the actual construction project construction process, students are deeply involved in the construction projects of the whole cycle, and can find practical engineering problems. Also, through the theoretical knowledge, students can find out the measures to solve the problem, and further puts forward an idea. Students can have their own personal idea project construction technology improvement measures, and improve their professional skills and engineering ability to find and solve problems.

By the repeated operation and practice on students in software, the teachers through software "evaluation model", can realize the operation of construction project; through the system feedback of students as a result, the operation targets vulnerable places for students "theory + operation" speech, further improve the students' understanding of theoretical knowledge and the ability to use theory to solve practical engineering problems[6].

4.3 After Class Reflection and Summary Stage

After learning the theoretical knowledge and using the virtual simulation software, the weak points of students' professional knowledge are identified according to the practical training report completed by students and the analysis of the results of software operation. The teaching method and content of the course are adjusted in real time according to the results, so that students can change from passive indoctrinate to active inquiry.

Through the exploration of this kind of teaching practice, it is found that the application of virtual simulation technology to the classroom teaching process can make the teacher from a knowledge impostor to the inspiration and motivation of students' learning activities, and let the students get the active knowledge inquiry from the passive indoctrinator of knowledge.

5 Conclusion

Virtual simulation teaching means to assist classroom teaching is the basic means of civil engineering construction technology course to realize education and teaching information work, and also conforms to the development strategy of "education informationization drives education modernization" in the 10-year development Plan of education Informationization[7]. Through practice, it is found that virtual simulation technology has many advantages, such as "openness, economy, flexibility and security", so that students can feel the engineering construction process and technological process without going out of school, better realize the "integration of teaching", and

help students comprehensively master professional theoretical knowledge and operation skills.

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