

The Practical Exploration of Teaching Reform in Architectural Courses in Higher Vocational Colleges

Yanan Yi, Yingjia Wang*, Wei Wang

Chongqing College of Architecture and Technology, Chongqing, China

*Corresponding author

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Abstract: In recent years, with the continuous development of the construction industry, the requirements for the practical ability and operational ability of graduates in related majors have gradually increased. For applied undergraduate education, it is necessary to optimize talent cultivation models and teaching methods in line with social development needs. Therefore, this paper takes the "Construction Technology" course of the Engineering Management major in applied undergraduate colleges as the object of exploration, and conducts research on teaching reform from the aspects of teaching objectives, content, and methods, hoping to improve the course structure and enhance teaching quality.

1. Introduction

In residential construction, construction techniques play a crucial role. Construction Engineering Technology is a compulsory course for undergraduate students in the civil engineering major. The teaching content of the construction engineering major includes load-bearing systems, concrete structures, foundation engineering, earthquake resistance, etc., which is a comprehensive science with significant representational meaning. Architecture is the basic frame of a building, and it is the solid and lasting foundation of the construction. To enable students to better adapt to society and meet society's demand for construction talents in the future, universities should strengthen their focus on "Construction Technology" knowledge and continuously enhance the cultivation of students' practical abilities. The teaching reform of the "Construction Technology" course is an important link in the construction engineering major of higher education institutions and is a matter of urgency[1].

2. The Necessity of Construction Technology Course Reform

2.1 The Need to Cultivate High-Quality Talents

At present, the education of construction technology courses in China's education system mainly cultivates excellent talents with technical, practical, and theoretical knowledge, who have engineering practical ability in the construction industry and a certain innovative consciousness to meet the talent needs of modern social development. However, currently, in most teaching of construction engineering technology majors, teachers only focus on theoretical courses and neglect actual operation, which to some extent restricts the development of engineering technology majors. At present, there is still a significant difficulty in the domestic construction industry for high-quality, high-level professional technicians. Therefore, a comprehensive teaching reform of the construction engineering technology major has been carried out in China based on a new round, providing a new path for the cultivation of high-quality applied talents. Improving the comprehensive quality of construction personnel promotes the development of construction enterprises[2].

2.2 Conducive to Stimulating Students' Interest in Learning

In the process of development, the development of network technology in China has had a certain impact on teaching quality. Therefore, using network technology to present textbook

knowledge content in the form of videos or pictures in a way that can teach students effectively attracts them. It allows them to better play their role in the classroom, thereby better enhancing their interest in learning English. On the other hand, some teachers in the construction engineering technology major have used information technology to build an educational platform that allows students to learn about construction engineering technology related content through the network and can communicate with teachers in real-time. In the education process, it is necessary to reduce the constraints of time and space to a certain extent to continuously improve students' learning ability and their overall learning quality, which is beneficial to the development of China's construction technology courses[3].

2.3 Conducive to Creating an Efficient Learning Classroom

When carrying out construction technology education for students, schools can use information technology to effectively improve teachers' teaching levels, enhance students' interest in learning, thereby improving classroom teaching efficiency, and cultivating excellent talents. At the same time, in the teaching process, through the use of modern scientific and technological means, teaching methods have been innovated, and a comprehensive change has been made in the teaching mode of construction engineering technology majors, thereby creating an efficient learning classroom. This can improve their interest in English. Therefore, in the context of new period development, we should use modern scientific and technological means to carry out a comprehensive transformation of China's construction engineering technology majors to meet the needs of talent cultivation in the construction engineering profession in the new era. This is to cultivate practical talents and promote the development of the national construction industry[4].

3. Reform Ideas for Teaching Construction Technology Courses in Higher Vocational Colleges

3.1 Strengthen Textbook Development and Select Teaching Content

The compilation of textbooks should follow the principles of practicality and applicability, organically integrating theoretical knowledge with practical operation to better meet the needs and interests of students. Emphasis should be placed on selecting teaching content to ensure the authority, systematicness, and forward-looking nature of the teaching content, providing students with accurate, comprehensive, and in-depth knowledge systems. At the same time, when selecting textbooks and teaching content, the latest developments in the construction industry should be fully considered, and the teaching content should be updated in a timely manner to maintain the currency and cutting-edge nature of the textbooks. Furthermore, attention should be paid to the operability and practicality of the teaching content. Through practical case analysis, experimental teaching, and other forms, students should be equipped with more practical experience to enhance their problem-solving and innovation abilities, thus better adapting to the future development of the construction market.

3.2 Improve Multimedia Teaching Methods

Improvements in multimedia teaching methods should include the following: Firstly, new teaching methods and approaches should be explored, such as VR/AR and other emerging technologies, to increase student engagement and attractiveness, making the teaching content more real and intuitive. (See Figure 1 below). Secondly, critical thinking and problem-solving abilities should be enhanced in multimedia teaching content. Through multimedia teaching, students can gain more room for reflection, analyze and solve practical problems in a targeted manner, and improve their theoretical thinking and operational skills. In addition, emphasis should be placed on interactive elements in multimedia teaching, such as online quizzes, roll calls, etc., to motivate students to actively participate, making the teaching more effective, and deepening students' knowledge. In summary, improving multimedia teaching methods aims to make the classroom more lively and interesting, allowing students to actively participate in the teaching process, thereby achieving better teaching results.

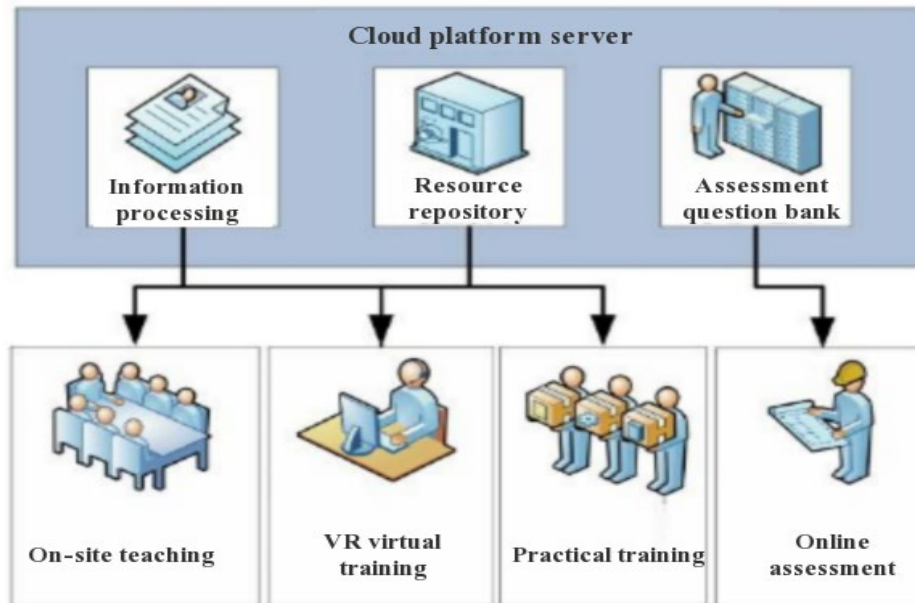


Figure 1. VR Teaching System for Construction Technology Course

3.3 Reform Traditional Teaching Models

Exploring a case-based teaching model can guide students to understand and master relevant knowledge through concrete examples, enabling them to better comprehend course content and apply it flexibly in practical operations. Engineering practice and other methods can also be employed to directly involve students in real working environments, enhancing their practical abilities and problem-solving skills, while also establishing connections between students and market demands. Additionally, innovative teaching methods can be adopted, such as remote teaching through online videos, team projects, etc., to enhance student interaction and practical operational abilities, thereby achieving better teaching results. In conclusion, reforming traditional teaching models is necessary to better meet the needs of current students and continuously improve the quality and effectiveness of teaching construction technology courses in higher vocational education.

3.4 Transform the Teaching Environment and Strengthen Practical Training

Schools should improve the facilities in laboratories and internship bases, enhance the intelligence and automation level of equipment, standardize laboratory management systems, and strengthen laboratory safety education to create a favorable experimental environment. Furthermore, the duration and intensity of practical training should be increased, providing students with more opportunities for hands-on practice, allowing them to acquire practical skills and experience. Simultaneously, during practical training, students' autonomy and innovation awareness should be continuously stimulated, encouraging them to explore and experiment in laboratory operations. Additionally, close cooperation with enterprises should be established to carry out off-campus practical operations, enabling students to truly understand the actual work situation and cultivate their practical abilities. These efforts contribute to expanding students' practical field, enhancing practical operational experience, and better adapting to the future development of the construction market. In summary, transforming the teaching environment and strengthening practical training aims to integrate theoretical knowledge with practical operations, allowing students to better grasp knowledge and skills through practical practice and adapt to the needs of the future construction market.

3.5 Reforming Curriculum Design Content

The curriculum design content of construction technology courses in higher vocational colleges

should be more diverse and emphasize comprehensiveness and practicality to meet market demands and the future development needs of students. Here are several specific improvement directions: Firstly, elective courses should be added to provide students with more autonomy and cater to their individualized needs. Additionally, schools can offer elective courses in new areas and specialized knowledge based on market demands and industry trends. Diverse courses should cover knowledge and skills related to construction technology, with scientific classification to enable students to master the required core knowledge in a targeted manner. Moreover, emphasis should be placed on the practicality and practicality of the curriculum, allowing students to gain more practical experience and enhance their problem-solving and innovation abilities through case analysis, engineering practices, and other forms.

3.6 Enhancing Teaching Effectiveness through School-Enterprise Cooperation

Joint training programs should be established with ongoing or completed engineering projects, and dedicated internship bases should be established to integrate theoretical knowledge with practical operations. This allows students to acquire relevant skills in a real work environment and better adapt to the future demands of the construction market. Collaborating with external companies and institutions to carry out educational projects, introducing high-quality faculty, providing students with more educational resources and employment opportunities, can also enhance students' overall qualities and professional competitiveness. Additionally, organizing student participation in industry exchange activities on a regular basis, understanding the latest industry trends, and enhancing students' awareness and understanding of construction technology.

3.7 Reforming Teaching Methods Based on University Teaching Characteristics

3.7.1 Integrating Theory and Practice in Teaching

Due to the theoretical nature and diverse structural requirements of construction technology courses, relying solely on theoretical explanations can be monotonous. Furthermore, students often have a weak foundation in mechanics, making it challenging to achieve good teaching results solely through theory. However, practical internships are not offered for this course, making it difficult for students to apply what they have learned to actual projects. Therefore, in the classroom, teachers should consciously integrate theory and practical teaching using various methods.

Three approaches can be attempted: (1) Using virtual simulation platforms: Although there are good intuitions and effects in practice, the required operations and time consumption are significant. Therefore, virtual simulation platforms can be used to conduct experimental simulations. This enables students to understand various structural forms, layout characteristics, component manufacturing, and testing operations, stimulates students' learning enthusiasm, strengthens students' sensory understanding of professional knowledge, and cultivates their engineering awareness. (2) Throughout the semester, provide open-ended design themes to students through program assignments. For example, after teaching the construction component method of "reinforced concrete," students can be asked to find or draw a layout drawing of a building and then undergo training in construction layout based on this drawing. Subsequently, select a beam or slab element and create a simplified component as an ordinary score. This approach encourages students to connect what they have learned with real-world projects, systematically combine and apply their professional knowledge, effectively improving their educational quality. (3) Encourage students to actively participate in school-level, provincial, and national structural design competitions. During the competition preparation, guide students to use their knowledge of construction technology to complete structural model design, model production, component installation, and other tasks. While ensuring safety and durability, encourage students' creativity and innovation, and try to reduce the weight of the model. This process allows students to have a deeper understanding and mastery of the knowledge they have learned.

3.7.2 Implementing Student-Centered Teaching Models in the Era of Smart Education

An excellent classroom teaching method can effectively stimulate students' enthusiasm for

learning, thereby enhancing their psychological satisfaction. Considering the rich connotations and practical nature of construction technology courses, cultivating students' independent thinking and critical thinking skills necessary for autonomous learning is essential to achieving systematic construction knowledge among architectural students. Therefore, in the classroom teaching process, the combination of online course resources should be implemented, adopting problem-based, student-centered, and heuristic teaching methods, minimizing the phenomenon of lecturing to a passive audience. Introducing wild suspense in teaching can stimulate students' divergent thinking and active thinking, which is an effective approach. For example, before each class, set a theme for students to reflect on. Based on this theme, ask students questions and connect them to form a complete course outline. Emphasize continuous thinking activities based on the teacher's ideas and divide everyone into small groups for active discussions. Encourage students to express their viewpoints and allow different learning groups to complement, refute, and evaluate each other. This creates a lively classroom atmosphere and enables students to have a deeper understanding and memory of the issues.

3.7.3 Introducing Models into Extracurricular Activities

Model teaching is a commonly used teaching method in university classrooms. Exemplar activity-based teaching refers to the use of relevant examples related to the course to enhance students' understanding of the subject. This method introduced a new course in the second year of university, which meets the practical operational skill development needs of second-year students without occupying regular class hours. In the model activity teaching method, the teacher first provides a brief introduction to the projects involved in the course, then analyzes the structure of buildings, explains the calculation methods of relevant parameters in detail, and finally assigns group design tasks after class. This approach allows students to better understand building structures while creating models, deepening their theoretical knowledge and developing their practical skills. Practical skills and hands-on abilities are essential elements in cultivating the qualities of university students. Building a model can make abstract problems concrete and intuitive, significantly improving teaching effectiveness.

3.8 Emphasizing Assessment Method Reform and Strengthening the Examination of Theory-Practice Integration Abilities

The evaluation of the course should have flexible arrangements and topic formats. In daily teaching, familiar buildings such as classrooms, school gyms, and libraries can be used as examples to illustrate relevant issues. Classroom teaching should closely link to practical engineering problems and combine them with real-world test questions, accounting for 30% of the exam paper, emphasizing the understanding and flexible application of knowledge. The author of this paper has changed the previous approach of relying solely on final exams and shifted the focus to process evaluation of students. The assessment is divided into 70% for daily exams, 30% for assignments, and 50% for practical components. This approach places more importance on regular exams, ensuring that students do not adopt a last-minute approach during final exams.

4. Conclusion

In summary, the construction technology course is of great practical significance for students in engineering management and related disciplines. Structures are the foundation of construction, making it crucial for students in this field to grasp construction technology knowledge. This paper explores teaching methods in the "Construction Engineering Technology" course based on the current teaching situation and the author's teaching practice. However, teaching reform is a long process that requires adjustments based on practical circumstances. We must reflect on our teaching results and find key points that can stimulate students' interest and creativity. By turning construction technology knowledge into a sharp sword that helps students in engineering management and other related disciplines construct high-quality buildings, we can cultivate solid and innovative modern applied talents.

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