

Study on the Architectural CAD Teaching Reform in Polytechnic College Based on the Background of the Skills Competition

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Abstract

The "Architectural Drawings Recognition" competition held within the Higher Vocational Group of the National Vocational Student Skills Competition is an important traditional competition for civil engineering majors. The competition is based on the requirements of professional positions and requires participating students to complete two tasks within the specified time, architectural drawings recognition and creation. The competition starts from the requirements of students' future jobs, takes the actual project drawings as a carrier, and designs the progress in the order of the actual workflow. The competition focuses on assessing students' comprehensive skills in reading architectural drawings and using CAD software to make architectural drawings. Among civil engineering majors in Polytechnic College, architectural CAD is an important basic course closely related to the competition. How to combine the skills competition with the teaching process to achieve the goal of "promoting teaching with competition and learning in competition" is of great significance to promoting the reform of architectural CAD teaching in Polytechnic College.

Keywords

Skills Competition; Architectural CAD; Teaching Reform.

1. Introduction

The National Vocational Student Skills Competition is a public welfare comprehensive skills competition jointly organized by the Ministry of Education and several government departments of the State Council, as well as related industries, social groups, and local organizations. It has wide professional coverage with many participants and great social influence. The establishment of the "Architectural Drawings Recognition" competition of the Higher Vocational Group aims to further implement the principles of the relevant documents of the Ministry of Education, continue to deepen the teaching reform of higher vocational education, and actively promote the vocational education talent training model of school-enterprise cooperation and combination of work and learning. Deepen major build-up and curriculum reform as well as promote the innovation and application of curriculum and teaching methods [3]. The competition is organized at the level of colleges and universities and each team consists of 2 students. The content of the competition is based on professional requirements, and the contestants are required to complete two tasks within the specified time. The first is architectural drawings recognition. The contestants are required to consult the given architectural drawings, blueprint review records, design changes, and other materials, find errors and omissions in the drawings, and complete individually the questions on knowledge and skills of architectural drawings reading and creation. The second task is architectural drawings creation. Two contestants on the same team are required to cooperate and use the given architectural drawings, blueprint review records, design changes, etc. to make specified architectural drawings of architecture and structural engineering majors with

Zhongwang CAD software Education Edition [4]. In the end, the judges will rule on the results and determine the winning team based on the current national or industrial architectural design, drawing, construction specifications, and relevant technical standards.

Through the analysis of the questions in Architectural Drawings Recognition Competitions in recent years, under the situation that increasing attention is paid to the comprehensive ability of the contestants to read and use CAD software to make architectural engineering drawings, it is necessary to reform the teaching of "architectural CAD". It is important to guide and promote the construction of the course and the reform of education and teaching according to job requirements, and to accelerate the cultivation of high-quality skilled talents in civil engineering.

2. Problems in the Teaching of Architectural CAD in Polytechnic College

Architectural CAD is a highly professional and practical course. There are many problems in the traditional teaching process of higher vocational education. First, the vast majority of vocational students have a weak professional foundation and poor spatial thinking (two-dimensional and three-dimensional) conversion ability. Most of the students have not been exposed to CAD software before going to college, and they lack rigor in drawing as well as the initiative to study. Secondly, in traditional architectural CAD teaching, due to limited course time, tutors often focus on basic CAD operation skills and basic drawing knowledge, while seldom mentioning architectural drawings. Meanwhile, the existing training conditions of the courses are backward. In an era of rapidly developing information technology, AUTOCAD software is updated every year, with constantly improved functions and performance. Most vocational experiments are still using the 2010 version of AUTOCAD. The version is seriously behind that used in architecture companies and skill competitions. Finally, the overall level of the teaching staff is not high, and the teaching concept is out of date with one-way instilling knowledge and failure to grasp the actual learning condition of students. Some students with a weak academic foundation often find it difficult to keep up with the class. In addition, the tutors' insufficient awareness and ability of informatization teaching lead to a single course teaching platform and teaching resources, which is easy to make students tired.

3. The Reform Strategy of Architectural CAD Teaching in Polytechnic College Based on the Background of the Skills Competition

3.1. Optimize Course Contents

According to the requirements of the skill assessment and theoretical application ability of the Polytechnic College Architectural Drawings Recognition Skills Competition, it is necessary to start from the curriculum standards, break the theory-based chapter format of the original textbooks and redesign the curriculum teaching content. The total credit hours of this course are 48 hours, of which 32 are theoretical and 16 practical. The theoretical content is divided into 7 modules and mainly involves the introduction of the basic functions of AutoCAD, the reading of architectural drawings, the explanation of the drawing process and steps, and the guidance of related drawing skills. The practical content includes 4 tasks, the drawing of architectural plans, architectural elevations, architectural sections and architectural details. The graphic examples involved in the teaching vary step by step from simple to complex to ensure that students can easily get started. Through practical training cases and skill operations, students can master more architectural drawing skills and practical knowledge, and gradually improve their professional ability and comprehensive quality.

3.2. Reform Teaching Mode and Method

In the teaching process, we should actively innovate the current teaching concept and break through the constraints of the traditional teaching model. In the traditional "architectural CAD" course teaching, "teaching defines learning," and teaching content is arranged from the perspective of teachers while paying little attention to the student's way of thinking and the process of receiving knowledge. Based on the skills and theoretical application ability requirements of the skill competition, "architectural CAD" needs to start from the actual conditions of students, practice the principle of "students as the main body, teachers as the guidance" [5], and implement the project teaching method integrating theory and practice, i.e., the "architectural CAD" course is based on teaching with project cases and task-driven. This teaching method can provide more conditions and opportunities for students to learn and explore independently, and guide students to acquire knowledge and training skills through their efforts based on the actual situation of students.

In terms of teaching methods, the whole higher vocational architectural CAD course teaching needs to be carried out in the computer room. During the teaching, tutors can use the control system to control each student's computer and perform operation demonstrations while explaining. After the control is released, students use the computer to practice. Compared with the traditional method of "separation of teaching and practice", "integration of teaching, learning and practice" has the characteristics of strong interaction and fast information feedback, and the teaching effect is obvious. Secondly, we must pay attention to the integration of information technology means, and actively develop and utilize online course resources. Make full use of online information resources such as electronic textbooks, online quality courses and electronic forums to diversify teaching activities. Utilize online teaching platforms such as Chaoxing and Yunketang to publish and produce teaching videos, theoretical quiz pools, teaching slides, and students' works on the list, to integrate the competition projects into ordinary teaching, which not only improves the teaching effect of courses but also improves the annual competition results.

3.3. Promote the Construction of Training Conditions

Through the development of the Polytechnic College Architectural Drawings Recognition Skills Competition, the participating schools are urged to meet the requirement of the competition projects for training equipment and the needs of the teaching reform of the architectural CAD course and build relevant training rooms and upgrade the training facilities of the college to the industry standards to ensure the smooth progress of teaching. According to the project skills assessment requirements and theoretical application ability requirements of the Polytechnic College Architectural Drawings Recognition Skills Competition, three training rooms will be built: a virtual simulation training room for architecture, a BIM comprehensive training room, and an architectural model training room. The BIM comprehensive training room mainly carries out the course teaching of architectural CAD. It is equipped with BIM, Zhongwang CAD, and Zhongwang architectural drawing recognition training evaluation software. Students can use this training room to strengthen their architectural drawing recognition and creation ability. Through typical engineering cases, the students' ability to read construction drawings, structural drawings, facility drawings and comprehensive drawings can be systematically cultivated.

3.4. Improve the Quality of Teaching Staff

At present, Architectural Drawings Recognition Competition is a competitive platform with the highest level of professional skills for civil engineering students in domestic Polytechnic College. If you want to achieve good results in the provincial and national competitions, the teaching of the competition requires a team of tutors with Double Qualified Certification to be competent.

Driven by the competition, higher requirements are put forward for teachers' ability and quality. Tutors must actively get rid of the role of simply teaching. They should form a team and strengthen exchanges with teachers of similar majors in other schools. In addition, they are expected to engage more in school-enterprise cooperation, regularly participate in corporate training, learn the latest industry knowledge and skills. Active introduction of advanced concepts from enterprises is necessary. Establish a close relationship with the enterprise and invite the technical backbone of the enterprise to the school to guide the teaching work. Teaching staff should learn scientific theoretical methods, master modern educational ideas and technologies, be brave in innovation and practice, and consciously apply the laws of education and teaching to guide the practice of architectural CAD teaching. Carry out research on improving students' ability to recognize and make architectural drawings, cooperate with enterprise technical forces, complete the compilation of architectural CAD school-based teaching materials, and realize the integration of classroom teaching and practical training teaching content. The development of the skills competition could improve the quality and ability of higher vocational tutors.

4. Conclusion

To meet the requirements of Architectural Drawings Recognition Skills Competition, the architectural CAD course should be reformed and the architectural CAD teaching content was optimized. Students changed from "they want me to learn" to "I want to learn", which improved the enthusiasm of students for independent learning, reformed the teaching method, promoted the construction of training conditions, and improved the quality of teachers' dual-teacher. The problem of slow improvement of students' comprehensive drawing ability is effectively addressed and the aim of "promoting teaching by competition" is achieved.

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