Journal of Architectural Research and Development, 2023, Volume 7, Issue 4
http://ojs.bbwpublisher.com/index.php/JARD
ISSN Online: 2208-3537
ISSN Print: 2208-3529

Research on the Reform of the Course "Reading of Concrete Structure Plan and Construction Drawings" Under the Background of "Promoting Teaching and Learning Through Competitions"

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Abstract: The inherent teaching approach can no longer meet the demands of society. In this paper, current issues within the teaching landscape of architectural engineering technology in higher vocational colleges as well as the policies and teaching demands that formed the basis of this model were analyzed. The study shows the importance of the implementation of the teaching model "promoting teaching and learning through competitions." This model puts emphasis on the curriculum and teaching resources, while also integrating the teaching process and evaluation with competition. These efforts aim to drive education reform in order to better align with the objectives of vocational education personnel training, while also acting as a reference for similar courses.

Keywords: Promoting teaching through competitions; Promoting learning through competitions; Reading of concrete structure plan method construction drawings; Course reform

Online publication: July 28, 2023

1. Introduction

Construction engineering technology is currently a popular subject in China's higher vocational education. It offers a wide range of employment opportunities, primarily in the field of civil engineering construction and management. For engineers, the ability to interpret architectural drawings is a fundamental skill which enhances the competitiveness of graduates in the workplace. Currently, most municipal buildings in China use reinforced concrete structure as the building load-bearing structure. Moreover, due to the increasing shortage of land and improvement of construction standards, building structures have become increasingly complex, which means its construction drawings have also become more complicated. Among architectural construction drawings, structural construction drawings are the ones that engineers come into contact with the most and are also the most difficult to comprehend. Therefore, it is necessary to be able to properly read concrete structure construction drawings.

Currently, there are still many shortcomings in the teaching of the course "Reading of Concrete Structure plan and plan Construction Drawings" in China. As China's vocational education system continues to evolve, the focus of the development of China's vocational education has also changed. The development of vocational colleges has become a major issue which has to be solved urgently. In the

process of educational reform, the curriculum and mode of teaching are the main starting points, and the approach of "promoting teaching and learning through competitions" should be employed to improve the quality of the talents produced.

Building upon this as a foundation, countermeasures to strengthen China's vocational and technical education system should be done in order to solve the problems existing in the current education system. By creating an environment that promotes teaching and learning through competitions, it becomes crucial to improve the students' professional skills and practical abilities. This can improve the quality of talent training and cultivate more high-quality skilled talents to meet the needs of society.

2. The teaching status and problems of the course "Reading of Concrete Structure plan and plan Construction Drawings" in higher vocational colleges

2.1. The course content is extensive and the class hours are short

The course "Reading of Concrete Structure plan and plan Construction Drawings" is usually offered in the first year of higher vocational colleges. However, students lack the necessary professional basic knowledge, and the course covers a wide range of topics. Because of this, it is very difficult for students to fully and accurately comprehend the content of this course in a short period of time [1]. To address this issue, arranging the course content to reasonably fit within a short learning period should be prioritized.

2.2. The content of the course is extensive but lacks practical training

The course on plan method construction drawing reading covers a wide range of topics and has relatively high requirements for fundamental mechanics and related design principles, making it relatively difficult. However, the basic concepts presented in the textbooks are difficult and complex, making it difficult for students to properly understand. Additionally, traditional teaching approaches have very little requirements for practical training. The lack of proper course design and practical activities makes it difficult for students to truly understand the underlying principles, making it more difficult for students to apply those principles to their subsequent construction drawing designs. Therefore, it is important to properly set up the curriculum to effectively strengthen students' understanding and application of basic knowledge.

3. The foundation for the implementation of the practical teaching mode "promoting teaching and learning through competitions"

3.1. National policy advocates vocational skills competition

In recent years, China has put more emphasis on vocational college education, leading to the reiteration of the slogan "general education has college entrance examinations and vocational education has competitions" [2]. It is reported that the "National Higher Vocational Graduate Skills Competition", a national higher vocational graduate skills competition led by the Ministry of Education and co-sponsored with relevant departments, was carried out nationwide. In 2014, the "Decision of the State Council on Accelerating the Development of Modern Vocational Education" [3] stated the urgent need to establish a modern vocational education system and cultivate high-quality talents. This indicates that the expedited reform of vocational colleges and implementation of vocational skills competitions is an essential measure to promote the reform of vocational education.

After more than ten years of development, the "plan method" has been widely recognized as a relatively scientific approach to reading construction drawings. Through the prioritization of curriculum in professional competitions, as advocated by national policies, students will have undergone training after many competitions. Consequently, this will improve the students' ability to use the "plan method" to read construction drawings and improve their competitiveness in the industry.

3.2. Skill competitions are an essential teaching practice at higher vocational colleges

The content of vocational technical competition is based on the students' daily learning content, however the current situation of many higher vocational technical education is not ideal. Firstly, considering the background of the student, the overall quality of graduates from China's higher vocational and technical colleges is generally low. Regardless, most college students are also full of energy, practical, and are eager to showcase their abilities. Schools can capitalize on this and improve the curriculum of the course by incorporating practical elements, integrating competitions into the course, and encouraging students to participate in various vocational skills competitions. In the process, the "plan method" should be applied to the reading of actual construction drawings, so that students' learning enthusiasm and initiative can be effectively harnessed. This approach will not only broaden students' horizons and improve their overall quality, it can also enhance their teamworking ability and competitiveness, which provides favorable conditions for their future employment [4].

Secondly, in terms of the structure of the teaching team, although many higher vocational technical colleges have made adjustments to the curriculum and teaching methods of this major, the desired results have not been achieved, thus there is an urgent need to address this concern. Incorporating competitions into the classroom and reforming the practical teaching method not only allow students to apply their acquired knowledge flexibly in the competitions, but also serves as a means to evaluate the teacher's teaching ability and teaching outcome.

4. The importance of the teaching mode of "promoting teaching and learning through competition"

4.1. Enhancing the integration of "teaching X course from the ideological and political perspective" in colleges and universities

Colleges and universities should incorporate the ideology of "teaching X course from the ideological and political perspective" into their school's development plan, with the fundamental objective of building morality and cultivating people. By doing so, schools can build a comprehensive teaching system which better integrates teaching with competition, in order to enhance students' enthusiasm for learning through competitions, and help them develop good communication skills and professional qualities. By combining "teaching X course from the ideological and political perspective" with competition-based training, colleges and universities can improve their overall teaching quality. It is necessary to strictly follow the structural construction drawings during the project preparation until the quality acceptance of the later construction. However, during competitions, students can use the "plan method" to read drawings, communicate effectively with team members, and promote the improvement of their ideological and moral standards.

4.2. Enhancing teachers' awareness of "teaching X course from the ideological and political perspective"

To improve the effectiveness of "teaching X course from the ideological and political perspective" teaching mode, it is important for teachers to grasp the key points and secondary content of teaching, in order to improve their evaluation methods and corresponding assessments. Performance evaluations and incentives specific to "teaching X course from the ideological and political perspective" are crucial for motivating professional teachers to fulfill their fundamental task of building morality and nurturing students. This approach improves the quality of ideological and political education and prevents ineffective lectures and redundant teaching approaches.

Furthermore, situational teaching can be employed to facilitate collaboration between teachers and experts from various fields, enabling them to analyze construction drawings together, expand their knowledge, deepen their understanding of professional subjects, and enhance their professionalism and

expertise. Teachers are the mainstay of course reconstruction and teaching reform. Therefore, teachers should closely monitor industry and commerce trends and conduct in-depth research in their respective fields [5]. Concurrently, actively participating in various teaching technology competitions, and can further benefit teachers, as they can gain insight into professional challenges during the competition. This will enable teachers to teach the course in a more targeted manner, improve teaching quality, and achieving favorable teaching results.

4.3. Achieving the comprehensive development of students' "learning X course from the ideological and political perspective"

Educational reformation with the ideology of "learning X course from the ideological and political perspective" overcomes traditional monotonous teaching methods, and maximizes students' enthusiasm for learning. The format, content and effectiveness of classroom teaching will significantly impact the quality of education. In order to enhance students' practical skills in architectural and computer drawing, and to break away from traditional teaching modes, colleges and universities can update the course to align with the drawing ability requirements of the professional position. Schools can redesign the training project to simulate real working environments, in order to achieve the teaching objective of "using actual engineering as the background, the teacher as the lead, and the students as the main body" [6].

During class, real engineering design drawings can be used to shift the focus from pure theory or knowledge points to the drawings, incorporating all relevant knowledge into the drawings. Specific knowledge points serve as an important content to guide students in reading actual engineering drawings. For drawing marks and symbols that they do not understand, students can actively search in the textbooks or ask teachers for guidance. The classroom experience is transformed into a working process, which turns the passive learning of students into an active task-oriented activity. To complement this classroom teaching method, a situational teaching component can be introduced. In order to complete an architectural engineering drawing, students can be assigned into groups that will play different roles: the designer, construction party, supervisors, and etc. The designer will first present an overview of the project, while the construction party and supervisor pose questions for the designer to answer. The teacher will be responsible for supervising the entire process while promptly answering students' questions. This practice will allow students to exercise their abilities in all aspects. By combining situational teaching and competition, students' teamwork and communication skills are enhanced, knowledge is applied flexibly, and their professional qualities are improved.

5. The implementation process of "promoting learning and teaching through competitions, and combining competitions and lessons" for course reformation

5.1. Integrating curriculum and competition projects

To integrate curriculum and competition projects effectively, industry experts and teachers from relevant universities can be invited to analyze the competition's content and requirements. This analysis can then be refined through practical work and transformed into a comprehensive teaching plan. This will allow students to fully understand the cutting-edge concepts of the competition and the advanced equipment used. Moreover, it helps cultivate students' abilities in reading structural construction drawings, steel bar lofting, and steel bar engineering acceptance. By enhancing these skills, students can improve their competitiveness in future employment opportunities. Additionally, teachers should actively develop various teaching resources to make the content of the competition more popular. It is also important to integrate the proper standardization requirements of the competition into every course and project.

5.2. Integrating teaching resources and competition resources

To facilitate the integration of teaching resources and competition resources, relevant departments should provide students with more training equipment after the competition to ensure that students can get more practical training. Each competition should reflect the industry's development status. Taking the various competitions as opportunities, integrating the scientific layout of the experimental training base, the competition equipment, teaching and training equipment, and management equipment with the management facilities of the enterprise should be done. Concurrently, by improving the application and management of related equipment, a good practical teaching environment can be cultivated for the students. Moreover, the schools should ensure that there are enough equipment and activities, so as to improve students' practical application skills and ensure the learning outcome of professional skills courses [7].

Furthermore, to support the organization of competitions, the influence of experienced coaches should be leveraged to expand the scope of the knowledge with each knowledge point. All teachers should actively participate in competitions as an integral part of their professional development. By engaging in competitions and educational practices, teachers can enhance their teaching abilities and overall professional qualities.

5.3. Integrating teaching process and competition process

(1) Implemention of subject competitions

In recent years, a shift has been made from traditional classroom teaching to the implementation of subject competitions, which replaced traditional examinations with competitive assessments. The competition method is based on the specific situation of the class (either team competition or individual competition system), and is done to examine whether the students have achieved the teaching objectives of particular stages. By doing so, a more comprehensive evaluation of the students' practical application ability and mastery of knowledge can be obtained. This approach allows for better adjustment of teaching tasks and enhances teachers' teaching quality [8].

(2) Implementation of technical competitions

The colleges and universities can hold a professional technical competition annually to showcase the school's educational achievements. These competitions serve as a platform for colleges and universities to engage in meaningful discussions with enterprises regarding the competition's content and employers' talent requirements. This will allow the school to establish corresponding training objectives, enabling a joint formulation a set of more scientific and reasonable competition standards and rules. For example, the competition can focus on various aspects, such as staking out the steel bar according to the drawing. This allows the cultivation of the students' ability to identify issues in steel bar construction from the structural construction drawings, and through practical application, propose effective solutions.

(3) Implementation of training competitions

On the basis of the outstanding players in college-level competitions and according to the wishes of the students, the competition team can be expanded to establish a training team. This initiative encourages students to actively participate in training and fully immerses them in the competition experience. Concurrently, regular training competitions should be organized, so that students can not only learn professional skills and enrich their own knowledge system, but also conduct multi-faceted inspections. Concentrated training methods can be employed, where a large number of students will become the backbone of the team, cooperate with teachers who will give technical guidance, and promote the collective improvement of all students [9].

5.4. Integrating teaching evaluation and competition evaluation

In teaching, it is crucial to improve the teaching evaluation system based on competition standards. The evaluation system should emphasize on accessing students based on the degree of the students' mastery of knowledge and skills, through the administering of tests with various topics. Furthermore, the emphasis should be on the students' ability to analyze and solve problems according to job requirements and the actual scenarios. It should also focus on the quality of students' practical skills, innovative thinking skills and teamwork spirit, so as to comprehensively improve the students' vocational skills [10].

6. Prospects for the practical teaching mode of "promoting teaching through competitions and promoting learning through competitions"

Currently, various industries are witnessing an increased number of competitions, prompted by China's call for participation. Through competitions, there has been progress in the reformation of the curriculum and teaching method for the course "Concrete Structure Plan Method Construction Drawing Reading". Simultaneously, the overall quality of teachers, as well as the professional skills and practical hands-on capabilities of students have greatly improved. There is a dire need for teaching reform in modern higher vocational schools, and although results have been achieved in the process of implementing this change, there is still room for improvement. It is essential to ensure the smooth continuation of this reformation to achieve the desired objectives.

Disclosure statement

The author declares no conflict of interest.

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