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The Construction of *Architectural CAD* Course Competition Integration Teaching Mode

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Abstract: *Architectural Computer-Aided Design (CAD)* is a basic course for architectural engineering majors in vocational colleges. The integration of competition into teaching will not only help stimulate the students' enthusiasm, but also help them improve their professional skills. However, there are still some problems in the teaching of *Architectural CAD*. Therefore, teachers must continuously optimize the integration of competition content into *Architectural CAD* classes through various strategies, so as to give full play to the value of competition content in classes. We explored and analyzed the problems in the integration of competition content into *Architectural CAD* classes, and proposed specific strategies, in hopes of improving the quality of *Architectural CAD* teaching.

Keywords: Architectural CAD course; Integration of courses and competitions; Construction strategy

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1. Introduction

The content of the *Architectural Computer-Aided Design (CAD)* course is relatively complex and dull. If the teacher only explains the content of the course through textbooks, it would be difficult to stimulate students' interest in learning. Therefore, teachers must be more innovative in teaching *Architectural CAD* courses, fully mobilize the subjective initiative of students through the integration of competition content. Through incorporating competition content, students can have a better understanding theoretical knowledge of the course, and their practical skills and creativity can be developed and improved.

2. Problems in the teaching of *Architectural CAD*

2.1. Disconnection between the syllabus and actual applications

In classroom teaching, teachers teach professional knowledge and technology most of the time, and students have less time for actual hands-on operation, which puts students in a passive position. It is difficult to improve the students' comprehensive quality when they can only accept what is taught by their teachers [1]. For example, when teachers explain about drawings in *Architectural CAD*, they usually directly explain the elements of plane layout and facade layout graphics and teach students how to read and analyze these elements. After completing the course, students will undergo internship only when they are about to graduate. However, during the internship program, because students learned from books and do not understand the specific work of related positions in the company, many of them are clueless on their tasks, which makes it difficult for them to adapt to their internship program. In traditional teaching, students are less enthusiastic and the rate of participation are naturally low, and the effect is not very ideal [2].

2.2. Disconnection between lessons

With the continuous deepening of education reform, the teaching of *Architectural CAD* should also be improved, but there are still some teachers who are less innovative in teaching this course. The problem is not only about establishing a teaching model of integrating competition content into lessons, but also the lack of systematic teaching. Usually, each knowledge point is explained independently in classes, which is not conducive to the improvement of students' architectural thinking and problem-solving ability [3]. The "*saike*" (class-competition) integrated teaching mode is a new teaching mode formed by integrating teaching content and related competitions. After the implementation of the education reform, the Ministry of Education has put forward new requirements for the teaching of *Architectural CAD*, requiring them to meet the development needs of the construction industry and improve students' professional skills. Therefore, in the teaching of *Architectural CAD*, the integration of competition content into classes is an inevitable trend. It can not only deepen students' understanding and mastery of professional knowledge, but also cultivate students' teamwork spirit and independence [4].

2.3. Architectural CAD contest

Architectural CAD competitions are sponsored by the Education Management Information Center of the Ministry of Education of China. The purpose of the competitions is to improve students' practical skills and information technology application. All students are allowed participate in the competitions [5]. As Architectural CAD competitions develop, not only can the professional ability of the participating students be showcased, but the competitions also reflect the quality of the schools, and competitions can also be a platform for companies to find talents.

The content of the Architectural CAD competitions mainly includes three modules. The first module is architectural construction drawing understanding and theory. This module focuses on the assessment of the ability to apply theoretical knowledge of architectural projection, drawing skills, and application of architectural theoretical knowledge. The second module is drawing construction drawings, which focuses on the assessment of the ability to use CAD software to draw construction drawings, modify construction drawings, mark construction dimensions, release drawings, and teamwork. The third module is to construct the building model, which focuses on the assessment of the ability to use CAD software to construct architectural models and the ability to understand drawings. The duration and weight of each module in a typical Architectural CAD competition is shown in **Table 1**.

Table 1. Architecture CAD competition time and weight

Architectural CAD competition modules	Duration (minutes)	Weight (%)
Construction drawing knowledge and theory	120	20
Drawing construction drawings	210	55
Building architectural models	120	25

Architectural CAD competition is a team competition where each team consists of 2 people. The content of the competition is completed by computer. The seats for the competition are generally determined by drawing lots. The first module of the competition, that is, the theoretical knowledge assessment module, is completed independently by each participant, while the other two modules are completed by both members of each team. The content of the first module is mainly objective multiple-choice questions, including single-choice questions and multiple-choice questions. The scores of each participant will be calculated automatically on the spot. The other two modules need to be completed using the standard software provided by the competition, and the scores will be given by referees.

3. Strategies for the integration of competition content into the syllabus of *Architectural CAD*

3.1. The syllabus should be modified according to the requirements of Architectural CAD competitions

To cultivate talents with Architectural CAD skills, colleges and universities should focus on the development of practical skills when teaching *Architectural CAD* and reduce the emphasis on theories. Architectural CAD competitions were introduced to improve the learning of this course [6]. The competitions require participants to be able to use CAD software flexibly. In the past, too much attention was given to the systematic explanation of theoretical knowledge, while the relationship between theoretical knowledge and practice was ignored, and the teaching objectives failed to meet the needs of relevant jobs. Therefore, when integrating competition content into *Architectural CAD* lessons, teachers should strengthen their connection with relevant professionals in enterprises, conduct comprehensive market research, reasonably adjust the teaching syllabus according to the requirements of Architectural CAD competitions, and improve their practical lessons. The ratio of post-work tasks should be taken as the basis of practical teaching [7]. Practical lessons can be improved through case-based teaching. Besides, it is necessary to ensure that the teaching objectives are consistent with the job scope of relevant positions, so as to provide high-quality talents for the society.

3.2. Design of teaching content

The teaching activities in *Architectural CAD* courses cannot be limited to software operations alone. Some students do not understand the architectural structure, legends, and dimensions when they are learning to draw construction drawings. Therefore, teachers need to pay attention to the professional knowledge related to architecture, which is also needed in Architectural CAD competitions. Teachers should organically include knowledge of architectural structure and architectural drawing in the syllabus of *Architectural CAD*, and simplify the previous teaching content, so as to improve the practicality of the syllabus [8]. The topics involved in Architectural CAD competitions are usually highly practical, and the topics will change along with the development of the industry. Therefore, teachers should make students pay attention to Architectural CAD competitions and follow the development of the industry to understand the latest updates on the industry. At the same time, teachers should also simulate situations in a real job for students. Some *Architectural CAD* teachers become lecturers right after graduation, thus they lack corresponding practical experience. There are also some teachers who only pay attention to the explanation of the content in the textbooks and pay little attention to the development of the industry. The topics of Architectural CAD competitions are usually based on actual situations in enterprises. Teachers can introduce some cases from Architectural CAD competitions into their lessons, so as to increase the practicality and the students' interest towards *Architectural CAD*. The teacher should also participate in the case studies and discuss with the students. In this way, teachers will better understand the problems encountered by the students when completing their tasks. While carrying out targeted teaching activities, the quality of teachers can also be improved to a certain extent [9].

3.3. Strengthening the reform of teaching methods through introducing competition content

The evaluation criteria in CAD competitions are usually based on the job requirements of certain positions. Therefore, teachers integrated competition content into the syllabus on the basis of cultivating the students' abilities. The reform of the school makes students interested in Architectural CAD. Through the simulation of the competition projects, the students' practical skills and teamwork spirit can be cultivated [10]. Teachers can use the project teaching method to realize the integration of theory and practice. For example, teachers can separate the students into groups according to the rules of Architectural CAD competitions and then assign project tasks. Students in each group can formulate project plans by searching for relevant

information and discussing. Teachers can then guide their students by explaining important and difficult knowledge according to the plans made by the students in each group, and the students can make corresponding improvements. The students can then implement the project plan in a cooperative manner. Finally, each group of students will present their completed works and conduct self-evaluation, and other groups give their comments. Teachers need evaluate the work of each groups based on a rubric. When setting project tasks, teachers need to follow the basic principle of step-by-step, from simple to difficult, and be in line with the students' learning progress to avoid affecting their self-confidence.

3.4. Promote the development of teaching activities through diversified forms of competitions

Competitions are an effective way to improve students' Architectural CAD skills. In addition to encouraging students to participate in Architectural CAD competitions, teachers can also organize competitions [11]. Competitions are naturally dynamic, which can improve the students' application of knowledge, test the students' mastery of knowledge, and their learning ability. To stimulate the students' competitiveness and encourage them to participate in competitions, teachers can also organize Architectural CAD skills competitions with other institutions, so that students can learn from each other through the competitions. To make the competitions more standardized, teachers can learn more about relevant competitions, rules, and evaluation standards of the competitions.

3.5. Promoting the formation of high-quality teachers through the integration of competition content into classes

The construction of a teaching mode that integrates competitions into the syllabus of *Architectural CAD* also puts forward higher requirements for teachers. In addition to professional and theoretical knowledge, teachers also need to have certain practical experience and excellent practical skills and be familiar with the requirements of relevant jobs. Therefore, teachers should take the opportunity to improve themselves in the process of building a teaching model that integrates lessons and competitions. While encouraging students to participate in Architectural CAD competitions and other related competitions, teachers will also need to actively participate in various skill certificate examinations. This will not only set an example for students, but also improve the quality of teachers. Institutions also need to actively encourage teachers to participate in such competitions. In addition, colleges and universities should also strengthen cooperation with related companies. In addition to providing students with more internship opportunities, teachers should also be given opportunities to undergo training in companies. This will not only keep teachers updated on industry developments, but also enrich their practical experience. In this way, when teachers integrate competition content into the lessons, they can ensure that the activities designed are more in line with the current industry development.

4. Conclusion

In conclusion, *Architectural CAD* competitions can not only provide a platform for students to showcase their knowledge and skills, but teachers can also understand the weaknesses of their students through the competitions discover the problems in their teaching methods and the impact on students' learning. Subsequently, more targeted reforms and innovative teaching activities can be made. The integration of competition content into the lessons can also train and develop students' professional ability and their knowledge application ability. In addition, it is also a good opportunity for teachers to improve their own professional abilities. Teachers can also participate in various related skill certificate examinations and competitions, so as to enrich their own practical experience, improve their teaching skills, and their ability to stimulate the students' interest in learning, resulting in a better learning effect of *Architectural CAD*.

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References

[1] Wang K, Luo H, Zhang L, 2022, Course Reform and Construction of "Building Structure CAD" Based on Graduation Design. Talent, 2022(27): 154–157.

[2] Wang J, 2022, Research on the Reform of Teaching Method Based on BIM 3D Visualization Technology—Taking the "Architectural Drawing and CAD" Course in Higher Vocational Colleges as an Example. Science and Technology Vision, 2022(15): 128–131.

[3] Pan J, 2022, A Preliminary Study on the Teaching Reform of Architectural CAD Course under the 1+X Certificate System. Scientific Consulting (Technology·Management), 2022(03): 186–188.

[4] Liang Q, Li S, Ye F, 2021, Research on the Application of Online and Offline Hybrid Teaching in Higher Vocational Colleges Based on the BOPPPS Model—Taking Architectural CAD Courses as an Example. Journal of Jilin Agricultural Science and Technology College, 30(06): 115–119.

[5] Zhang S, 2021, Research and Practice on the Standardization Construction of Higher Vocational Architectural CAD Courses. Southern Vocational Education Journal, 11(05): 37–43.

[6] Liang Q, Li S, Ye F, 2021, Innovation and Application of Online and Offline Hybrid Flipped Classroom Teaching of Architectural CAD Course Based on OBE. Journal of Zhejiang Institute of Water Conservancy and Hydropower, 33(03): 81–86.

[7] Zhu P, 2019, Discussion on the teaching reform of "Architectural Drawing and CAD" course based on skill competition. Journal of Science and Education, 2019(13): 112–113.

[8] Ma X, 2023, Research and Practice on the Training of Applied Talents in Architectural Engineering Graphics Based on the Advanced Graphics Contest. World Home, 2023(4): 145–147.

[9] Zhang L, 2023, Research on the Teaching Mode of Mechanical Drawing Course in Higher Vocational Education Under the Background of Intelligent Manufacturing. China Machinery, 2023(1): 102–105.

[10] Ge H, 2022, The Practice of Integrating Elements of Skills Competition into Architectural CAD Course Teaching. Journal of Hubei Open Vocational College, 35(6): 173–175.

[11] Hu Y, 2022, Teaching Research on Basic Courses of Modern Apprenticeship in Higher Vocational Colleges—Taking Architectural CAD Course as an Example. Model World, 2022(24): 160–162.