

Information Teaching in Computer-Aided Design Course

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Abstract. In view of the characteristics of computer-aided design courses and the particularity of teaching objects, information teaching is integrated into the teaching process, and a series of reform measures related to teaching content, teaching methods, practical teaching and assessment methods are proposed, and practice shows that students' enthusiasm for learning is greatly improved and the teaching effect is significantly improved.

1 Introduction

Computer-aided design referred to as CAD, refers to the use of computer software system to help designers draw graphics, and help to undertake calculation, information storage and drawing and other work, computer software system than the traditional manual drawing tool drawing convenient, easy to modify, easy to operate, easy to store and call, easy to modify and communicate and other obvious advantages, coupled with the software system is constantly updated, the design process tends to be more automated and convenient. Now CAD has been widely used in electrical, mechanical design, clothing design, civil engineering, industrial modeling, architecture, and other fields. Therefore, this course is offered in most universities in related majors, and mastering CAD drawing is an important and practical skill^[1].

2 Innovation of Practical Teaching Methods Aiming at Professional Quality

At present, all schools are actively exploring the reform of course teaching content and classroom teaching mode, although most of the computer software courses are taught in the computer room, the classroom generally adopts a combination of theoretical teaching and student practical exercises, but the knowledge intensity in classroom teaching is high, mainly based on teacher teaching and courseware demonstration, instilling knowledge to students, while students passively listen, passive looking, insufficient awareness of independent learning, low classroom participation, resulting in low learning enthusiasm and initiative, and unsatisfactory teaching effect^[2]. Nowadays, in the era of information explosion, the place where students obtain information extends from the traditional classroom to the Internet, and the carrier of information has also developed from a

single form such as books and broadcasts to multimedia forms such as mobile phones and computers, such as video and animation, and the use of these multimedia is more conducive to students' understanding of difficult points and mastery of knowledge, and is more popular and easier to accept by students. A variety of teaching apps and online courses emerge one after another, which has also become an important means to assist students to learn and teachers to teach, providing more possibilities for teachers to explore new teaching methods and reform of teaching models, providing more choices for students, and more possibilities for students' active learning^[3]. Its main purpose is to be employment-oriented, enhance students' practical ability, strengthen the integration of knowledge and action, and cultivate advanced application-oriented talents.

In view of the shortcomings of the current traditional classroom, in order to improve the teaching effect and improve the quality of teaching, we should first change the current "teaching-learning" relationship and change the situation of passive learning of students. In the information age, the role of teachers is changed from a single "knowledge transmitter" to a leader of students' knowledge learning, and the harmonious teacher-student relationship of "teacher-led, student-oriented" is more conducive to the improvement of students' enthusiasm for learning, and teachers exchange ideas and explore knowledge with students in a more equal capacity, and achieve the perfection of students and their own development through open interaction with students. Students improve their drawing efficiency through pre-class preview, classroom learning, and after-class review, and also adopt the "student-centered, teacher-led" teaching mode in the classroom, and students actively explore the skills of efficient drawing through group peer evaluation^[4].

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Fig. 1. Group Evaluation Inquiry Learning

Affected by the epidemic, online teaching is carried out in the teaching process, in order to fully mobilize students' enthusiasm for class and avoid some students from thinking due to online classes, so the teaching is consciously student-centered, this course adopts the form of flipped classroom in the teaching process, allowing students to be the master of the classroom. Flipped classroom refers to a teaching mode that readjusts the time inside and outside the classroom and transfers the right to learn from teachers to students, relying on the flipped classroom teaching concept, which can not only stimulate students' enthusiasm for learning, improve students' learning efficiency, repeat students' personality and specialties, promote students' personalized learning, but also cultivate students' independence of thinking and learning autonomy, and improve students' digital learning ability.

The online flipped classroom teaching mode allows students to change from passive learning in traditional teaching to important participants in the teaching process, and the use of seminar teaching method in classroom teaching not only mobilizes students' enthusiasm for learning, but also promotes students' deeper understanding of what they have learned and better grasps it. Through the early teaching practice, this new teaching mode has a great response among students, is deeply liked by everyone, improves the relationship between teachers and students, shortens the distance between teachers and students, creates a good learning atmosphere, and also achieves better learning results, and significantly improves students' professional comprehensive literacy and self-learning ability.

3 Combining the professional equipment of this major to reform the content of classroom teaching

"Computer-aided Design" is a professional and technical course used to cultivate students' ability to use computer-aided drawing, with its own system and strong practicality. In the teaching process of the course, most schools are based on the basic course "Drawing Geometry and Engineering Drawing" course to explain the course, and its course content mainly relies on the mechanical basic content of non-mechanical majors for teaching throughout, but in the process of learning, students may lack the imagination of entities because they have never touched actual equipment, thereby limiting the absorption of the knowledge learned in this course. Therefore, this course is based on the reform of

classroom teaching content on the basis of the major of built environment and energy application engineering, as a traditional and new major under the new engineering discipline, related to the comfort of people's life and the good national environment, is an important focus of modern vocational education, is the vanguard of modern applied undergraduate education reform, so the curriculum reform of "computer-aided design" is of great significance to cultivate new engineering application talents^[5]. The previous course of "Computer Aided Design" of this major is "Drawing Geometry and Engineering Drawing", which is extended and practiced on the basis of the previous course, so it is necessary to pay attention to its organic connection in the teaching process, implement the national drawing norms, and flexibly use various expression methods to make the design language - drawings readable, not only accurate, standardized, complete and concise, but also pay attention to its previous courses "Drawing Geometry and Engineering Drawing", "Production Practice" and later courses "Air Conditioning Engineering" and "Graduation Project". The previous course of "Computer Aided Design" of this major is "Drawing Geometry and Engineering Drawing", which is extended and practiced on the basis of the previous course, so it is necessary to pay attention to its organic connection in the teaching process, implement the national drawing norms, and flexibly use various expression methods to make the design language - drawings readable, not only accurate, standardized, complete and concise, but also pay attention to its previous courses "Drawing Geometry and Engineering Drawing", "Production Practice" and later courses "Air Conditioning Engineering" and "Graduation Project" Computer-aided design is just an application-oriented toolbox, relying on AutoCAD software to bring the designer's ideas to paper, must overcome the strange circle of drawing for the sake of drawing, must think about why the design is so, and cultivate the ability to read pictures^[6].

This course reform enriches the teaching content, extends and practices on the basis of the course "Drawing Geometry and Engineering Drawing", combines the professional equipment of the major - fan coils, air-cooled wall-mounted air conditioners and other professional equipment to explain, and moves the professional equipment visited and learned by students in the production practice and other energetic courses into the classroom, part of which improves students' interest in learning in class, on the other hand, strengthens students' understanding of the professional equipment of

the major, understands its internal structure, and clears its working principle. As shown in Figure 2, the air duct connection of the ceiling air conditioning unit replaces the traditional drawing of bearings and other structures

after learning the basic commands to strengthen students' understanding of the professional equipment of this major.

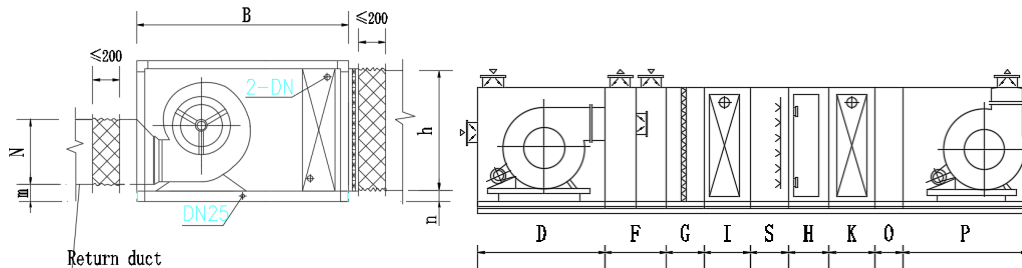


Fig. 2. The improvement of teaching content after the reform

4 Innovation of Teaching Mode Combining Industry, Education and Research

At present, most engineering drawing teaching is based on mechanical parts such as bearing drawings and other examples to explain parts drawings or assembly drawings, although related to engineering, but because the teaching object is facing the built environment and energy application engineering students, students in the lack of relevant professional foundation and professional background for this part of the content lack of interest, reading and drawing these parts drawings is more difficult, and will directly affect students' learning effect and confidence. Therefore, in this course, combined with the equipment seen by students in practical training projects such as internship courses, factory field visits, and student metalworking internships, students can understand the drawing methods of equipment, so the teaching content of drawing courses is biased towards the components that students of this major understand, and the use of computer CAD drawing helps students understand drawing-related knowledge while enhancing students' interest and ability. While improving students' drawing efficiency, it enhances students' rigorous work attitude, thereby improving students' hands-on drawing ability and further enhancing students' imagination^[7].

The combination of production, education and research is a teaching mode based on the school-enterprise cooperation model, "production" is production practice, "learning" is learning and teaching, and "research" is technology development and promotion, education law and teaching method research. With the development of market economy, the cultivation of application-oriented talents oriented to serve the needs of local economic development has become the general trend of the transformation of colleges and universities, and school-enterprise cooperation is the only way to cultivate application-oriented talents, an important carrier for deepening industry-university-research cooperative education, and an important way for schools to solve students' internships and employment. School-enterprise cooperation talent training can strengthen the pertinence

and practicality of teaching, realize the diversification of talent training, and also promote enterprises to absorb outstanding talents one step ahead, which is a win-win cooperation for enterprises and universities. The combination of production, education and research is also an important measure to promote the innovation and development of enterprises. Combine the content of this course with the Central Air Conditioning Industry College of the university, through the actual visit to learn the layout of the Central Air Conditioning Industry College, the actual drawing cases for course explanation, the direction and layout of a series of equipment such as air ducts, students will be more clear and clear about the employment direction of the major, and lay a solid foundation for students' employment^[8].

5 Negate the results of one volume and strengthen the usual performance assessment

It is the most direct and effective way to deny the fixed grades of one volume and increase the proportion of learning process assessment in course assessment. The final score of the ordinary grade and the final examination score shall be calculated according to the proportion of 50% each. In the usual grades, the prep test, class discussion performance, homework and other aspects will be comprehensively evaluated. This is to increase students' participation in learning, so that everyone has to participate, everyone must participate. Only when the process assessment is effectively controlled and supervised can the predetermined learning objectives be successfully achieved^[9]. This course uses MOOC format to record the knowledge points involved in each lesson into a video and upload it to the learning platform, and students can use mobile phones or computers to watch it at any time for preview or review. In the video, the basic theories such as the definition and usage of each tool are explained, and then the operation methods are demonstrated by examples and screen recording, so that students can see the step-by-step operation steps more clearly. The video has a variety of functions such as pause and playback, which can be

self-controlled, which is conducive to students' independent learning.

Before class, let students prepare for the course through learning resources, understand the specific content of the lesson in advance, and make sure that they have a clear idea of the lesson; In the classroom, let students summarize the main content of this lesson, through pre-class preview to achieve a clear understanding of the content of this lesson, and come to class with questions, teachers strengthen the interaction between teachers and students during the teaching process, improve students' interest in learning, and advocate a student-centered teaching model; After class, review the content of this lesson by doing homework, check the learning situation and learning effect after class, and fill in the gaps through the process of doing homework, so as to improve the knowledge points that you have not fully mastered in the classroom^[10].

6 The teaching effect has begun to show results

The assessment results have improved significantly. After two semesters of online and offline teaching reform practice, certain results have been achieved in the teaching of computer-aided design courses. Based on the output-oriented policy, this course adopts a computer-based examination, drawing a multi-question graphic within a specified time, including: layer setting, text style setting, part drawing, isometric drawing, professional equipment drawing, from drawing recognition to drawing to examining the application of software in the environmental construction major, the test questions cover all the main knowledge points and skill points such as drawing commands, editing and modifying commands, annotation commands, layer settings, drawing layout, etc. According to the analysis of the results before and after the reform, the excellent rate has increased significantly, indicating that students' mastery and application ability of tools and cartography-related knowledge in computer software have been improved, and the teaching effect has been significantly improved^[11].

Students' attitude towards learning is beginning to bear fruit. Before the reform of the teaching model, students listened passively in the classroom and had low participation in the classroom. After the reform, students have a preliminary understanding and understanding of the content of each class through pre-class preview, and through the flipping of the class, the classroom has become a place to solve problems. Whether it is a preview test or a difficult breakthrough in the classroom, whether it is a unit test or a class summary, students become the protagonists of the class, through questions, discussions so that everyone can participate in the classroom, but also let students have something to say, students from passive acceptance of knowledge slowly to active to seek answers to questions, from individual individual learning to everyone to help complete the discussion topic, mutual help within the group, fierce competition between groups, jointly create a positive

learning atmosphere, students get happiness from learning, Get promoted, gain a sense of accomplishment, satisfaction, and actively participate in classroom teaching^[12].

In the integration of courses, the "metalworking practice" course and the "production practice" teaching are integrated; Integrate the "Building Environmental Control Systems" course with the "Computer Aided Design" course to improve students' learning effect. According to the requirements of the post-graduation work, strengthen the learning of the professional equipment understanding content of the specialty, the training goal has an accurate career positioning, can actively serve the needs of talents for the development of the industry, and incorporate the vocational qualification certificate assessment into the teaching plan. According to the course of the class, students independently participated in the HVAC CAD design engineering is the job skills examination, the pass rate is as high as 93%, the examination of this certificate also for students to master the basic knowledge of heating, ventilation and air conditioning, proficient in using AutoCAD software for drawing, familiar with the relevant workflow, with relevant post practical skills and working ability, can be competent positions for HVAC CAD design engineers, draftsmen, for the graduation work to lay a solid foundation^[13].

7 Conclusion

In short, through the teaching reform of CAD courses, the courses are optimized from the teaching content, teaching methods and teaching evaluation, and the practicality of the courses runs through the entire teaching process, fully emphasizing the practicality and professionalism of the courses. The course relies on the project and emphasizes the student-oriented teaching method in the form of group or individual cooperation, breaking the traditional teaching mode based on teachers' "teaching" and fully mobilizing students' enthusiasm for learning.

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