Research and Practice of Project Teaching Method in CAD/CAM Course Teaching

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Abstract. Taking the design of two-stage reducer in mechanical CAD/CAM course as an example, this paper analyzes the research and practice of applying the project teaching method in the actual classroom teaching. Combining the current situation of CAD/CAM teaching and the characteristics of students' learning, the final assembly plan was completed, the process of project teaching was summarized, and good results were achieved, which instructed the application of other projects in teaching.

Keywords: CAD/CAM teaching · Project teaching method
Guiding significance

1 Introduction

Project teaching method Germination in Europe, the idea of labor education, the earliest by the American educator Dr. Katz and Canadian Chad jointly introduced to introduce the practice of teaching, is a typical teaching method of student-centered activities [1]. The project pedagogy is also widely respected by institutions of higher learning. Its main teaching goal is to enable students to systematically understand the characteristics of CAD/CAM software: grasp the drawing method of engineering drawing, learn to use CAD/CAM related software to complete the relevant professional requirements of a complete graphic analysis, drawing, editing and mapping work, training students have basic pictorial ability, pictorial ability, spatial imagination and thinking ability as well as drawing skills. Due to the specialty of CAD/CAM, the project teaching method is utilized in the CAD/CAM professional course teaching, the project teaching method and professional teaching are integrated, and the key teaching is targeted and the ideal teaching effect can be achieved [2].

2 CAD/CAM Teaching Status

The teaching model of "full house" and "spoon-feeding" is ubiquitous in classroom teaching. Most of the students tend to feel boring and lack of passion in learning CAD/CAM, which can not arouse students' enthusiasm for learning [3]. With the

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characteristics of learning students of mechanical and electrical specialty, after observation, the teacher did not show interest and curiosity when explaining. Students just grasp the textbook knowledge, can no longer meet the needs of society.

Students learn at school, working only a little bit to use, the reason for this phenomenon is to learn too limited to the textbook knowledge, there is no research and innovation [4].

Classroom teaching methods and means too simple, teaching can no longer meet the needs of teaching, need to find a new teaching method to make CAD/CAM curriculum system knowledge system.

Considering the status quo of CAD/CAM teaching, in order to developing students' long-term, students pay more attention to the cultivation of their overall quality and ability. Therefore, a new teaching method—project teaching is introduced in the process of CAD/CAM teaching [5]. "Project teaching" is a kind of design-based teaching activity that aims at specific projects. Students are required to gradually achieve the set goals and develop their research-based learning ability through practical application based on the comprehensive application of the knowledge and skills of each subject research. The project pedagogy advocates the student as the main body and allows the student to play the role of researcher. Under the stimulation of the situation and under the guidance of the teacher, the project pedagogy proactively conducts exploratory activities and masters knowledge and learns analytical and problem-solving methods in the course of inquiry, So as to achieve the purpose of improving the ability to analyze and solve problems. Here, teachers have retreated behind the scenes, only planning and guiding role.

Therefore, we should attach great importance to cultivating students' ability of discovering problems, analyzing problems and solving problems instead of learning from their predecessors. Project teaching method, the course is divided into several sub-projects, sub-projects can also be divided into a number of sub-projects, and the development of sub-projects and sub-project goals. Through the teaching of each sub-project and sub-project, on the basis of realizing the teaching objectives of each sub-project and sub-project, the curriculum objectives should be realized step by step from shallow to deep. Learning any knowledge, only through continuous practice can be used properly.

3 Project Teaching is Applied in the Characteristics of CAD/CAM Course

3.1 Optimize Teaching Content

We focus on CAD/CAM teaching instead of "reasoning" and can read medium-complexity parts drawings [7]. Cartographic drawing is the purpose of cartographic teaching. To rationalize the teaching content, we use the principle of "enough" and necessary" as the principle, take the basic theory as the clue, and then attach various parts drawings and design features to strengthen the explanation. This avoids some difficult, difficult to learn the part, try to make the learning knowledge is simple and effective to improve teaching effectiveness. The assembly drawing should be used as the key content of CAD/CAM course to explain repeatedly and use a lot of time training so that our students finally form a space imagination ability and improve the ability of drawing.

3.2 Improve Teaching Methods

To make students more clearly and intuitively understand the entire assembly process. CAD/CAM courses have their own characteristics—practical and intuitive, we consider the teaching methods from the characteristics of the curriculum, according to the different stages of teaching content, using different teaching methods and means [8]. First of all, in the early stages of CAD/CAM course, students are required to understand the nature and importance of the course with the project. We bring students to the factory or workshop to observe the production process of the work piece, take the students to the exhibition hall to visit or take some factories Drawings, so that students understand some of the actual production of knowledge. Second, in the shaft parts drawing phase, we combine the main training. By the teachers to clarify the basic concepts and basic theory, and then arrange the students to practice training, students in training, teachers do next guidance, students do not grasp the concentration of counseling at all times, so the classroom atmosphere is active, clear purpose, high motivation for learning. This stage lectures mainly use multimedia courseware, 3D animation and other auxiliary teaching. The traditional teaching and dynamic courseware teaching together, the boring, difficult to understand the projection with a colorful three-dimensional dynamic model demonstration to make up for the traditional teaching methods in the sense of intuitive, three-dimensional sense of the deficiencies. Make the teaching process vivid and intuitive, cultivate the students' space imagination. Lastly, during the part drawing and assembly drawing phases, we collect some typical zeroes, components or commonly used mechanical equipment used in life so that students can study the working principle, the folding process, the assembly relationship and the expression method in groups and then group these Principle applied to the assembly diagram. Improve students' reading ability.

3.3 Test Evaluation Method

Measuring the performance of students is good or bad, can not be based on an examination of the results as a basis for assessment. Therefore, in this course learning process, we combine the actual situation of students to establish a reasonable student performance evaluation system, focusing on process evaluation. The CAD/CAM instruction uses a flexible and diverse form of exams that are tested in stages by completing the project. This is to check the mastery of student knowledge, but also targeted counseling. This emphasis on the evaluation of the learning process, not only to consolidate our knowledge of students, but also exercise the learning ability of students is the enthusiasm of students has been greatly improved.

4 Application of Project Teaching Method in CAD/CAM Teaching

Project teaching method fully embodies the teacher as a guide, runs through the "problem-oriented", can stimulate students' interest in learning, change passive learning to take the initiative to participate in, improve students' ability to analyze and

solve problems [9]. The project teaching method applied to CAD/CAM teaching, we should first establish teaching programs and goals, and then by the teachers to guide students to develop their own programs to implement the program, and finally by the students and teachers jointly examine the results of assessment [10].

4.1 Teaching Preparation

Site and equipment: computer graphics software installation, related applications and hardware room

Teaching materials: multimedia courseware and so on
Teacher conditions: teachers to students grouping, assigning tasks to guide students to complete the design tasks to correct the students incorrect programs to complete the comprehensive evaluation of students.

4.2 CAD/CAM Curriculum Features and Analysis of Students' Academic Situation

4.2.1 CAD/CAM Course Features

CAD/CAM is a specialized course in mechanical and electrical engineering. This course is a follow-up mechanical course in the mechanical course. It provides the spatial logical thinking and image-based thinking for the mechanism movement analysis, dynamic analysis and common basic mechanism design in the basis of mechanical theory and mechanical design.

4.2.2 Academic Analysis

Mechanical and electronic classes for the four-year general education, high overall quality of students, learning ability is also strong, better self-learning ability and learning foundation, but most students lack the systematic theory of learning methods.

4.3 Teaching Process

4.3.1 Student Group

In order to improve students' ability of group collaboration, the students are divided into 5 groups, a total of 7 groups

4.3.2 Ask a Question

"Problem-oriented" By continuously raising questions and researching questions, the goal of curriculum teaching is established so that students can grasp the ability of computer drawing based on the knowledge of the diagram. Due to different professions, the content of the drawing should also be different. According to the professional characteristics, the appropriate drawing content should be chosen as the training goal of the course.

4.3.3 Teaching Objectives

The CAD/CAM course is divided into two sub-projects. As a basic entry, it requires students to complete some of mechanical engineering parts drawings, such as shaft parts,

the learning drawing parts as the first teaching goal. Based on the mastering of CAD/CAM basic skills, students can use the acquired knowledge flexibly to complete the established assembly drawings, such as retarder assembly drawings, and finish the assembly drawing as the second teaching goal. Through the realization of two sub-project teaching objectives, and ultimately achieve the purpose of teaching objectives.

4.3.4 The Establishment of Sub-projects and Teaching Objectives

Sub-project

According to the content of the course, the different, specific and independent blocks of knowledge divided by the teacher after comprehensive analysis, and each sub-project has its own teaching objectives to be achieved. It is to achieve sub-project teaching objectives, so as to achieve the goal of teaching the overall ladder. In the formulation of sub-projects need special attention is consistent with the level of knowledge of students, with maneuverability. Students under the guidance of teachers and students to help each other in the process of mutual learning sub-project content.

4.3.5 Proposed Design

4.3.5.1 Program Design Ideas

First: to combine the characteristics of each group of students, students should give full play to the subject position in teaching practice. Because the project pedagogy is a typical student-centered teaching method, students can only take advantage of the project pedagogy only by adopting an active attitude towards learning and treating themselves as teaching subjects. As the subject of a subject research, it should run through the discipline from beginning to end, because it is the concentration and generalization of the relevant content of the discipline. From the perspective of content, it is manifested in that after continuous investigation and consideration, there is a plan and plan to implement Program, final assessment and evaluation. ① students should conscientiously do a good job preparatory work. Each project has a certain degree of difficulty, both the application of old knowledge, but also the exploration of new knowledge, read the relevant textbooks in advance, prepare the relevant knowledge, access to relevant information, and even drilled ahead of schedule, do a good job preparatory work. ② play team spirit, and actively participate in the project practice. CAD/CAM course project teaching commonly used model group teaching, generally each group of 2 to 3 people, the machine operation, to complete the project goal. Put forward their own solutions to consider, the final optimization, to the best solution ideas, the completion of the project. ③ carefully write analysis report. According to the characteristics and requirements of CAD/CAM, the training report is usually completed on the computer. By compiling the analysis report, students can not only analyze, summarize, summarize, summarize and write the technical documents, but also improve students' computer application ability.

Second: pay attention to the teacher's guidance, guidance and supervision status. As the guide, mentor and supervisor of the project teaching process, teachers should do a good job guiding the development of the entire CAD/CAM course project, which is also the key factor for the project teaching to be successfully implemented. First,

teachers should help students identify suitable group development projects based on their own characteristics. Then, in the concrete implementation process, each person collects the information needed for the job. Regular meeting of the project leader, real-time understanding of the development process of each project team, in time to find problems, Q & A, to help students solve the technical problems encountered, appropriate to remind them the next step in the operation, timely development of all stages work summary.

4.3.5.2 Methods and Steps

According to this design content, each group gives program design ideas, in accordance with the parameters and known conditions, put forward specific implementation steps shown in Fig. 1.

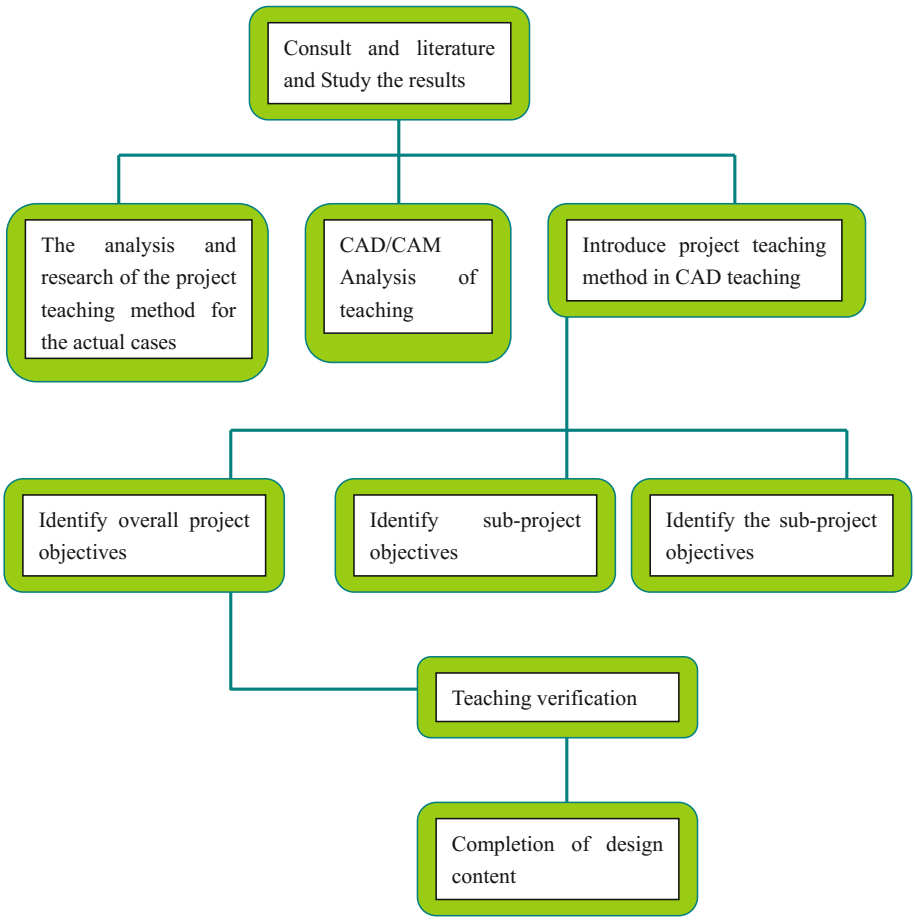

Fig. 1. Implementation steps

4.3.6 Results Show

According to the design plan, students design two-stage reducer three-dimensional map shown in Fig. 2.

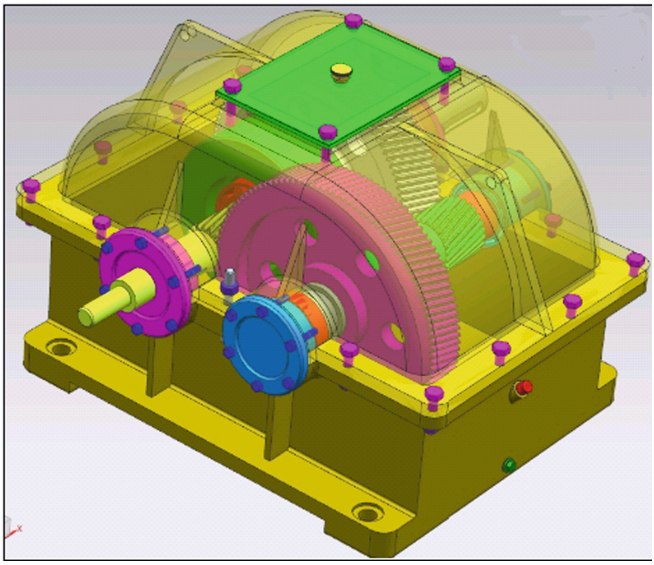

Fig. 2. Two-stage reducer three-dimensional map

4.4 Discussion

Through the analysis of the results, this time according to the project teaching method to complete the teaching design, to achieve the teaching purpose, and achieved good teaching results, all students enhanced teamwork ability, but the follow-up project teaching method should also be used in CAD/CAM teaching should consider a few points:

4.4.1 In CAD/CAM Teaching, the Project Plan Should be Determined According to the Professional Field of Students

In the selection of projects, professional requirements should be selected for the corresponding professional knowledge and teaching projects. Outstanding professional features closely linked to teaching syllabus and teaching objectives, the classroom teaching project design. As for the two reducers, CAD/CAM courses can be designed according to the shaft parts drawings, assembly drawings and other projects.

4.4.2 Choose the Project Should Choose the Items the Teacher Can Control

According to the teacher's own understanding of the project's environmental background, the familiarity of the project involved, and the analysis, judgment and response

experience of the project involved issues. Choose a project that the teacher can control. Students according to their strengths division of labor, do not know how to discuss with each other and research, so as to find a solution to the problem.

4.4.3 Select the Project from Easy to Difficult, Step by Step

To combine the actual knowledge of students, we should pay attention to the arrangement of the contents of the project from easy to difficult, step by step, so that students can always continue to accumulate knowledge in a relaxed and pleasant learning atmosphere. For example, in the parts modeling project, the first line, then the surface, then the entity, from easy to difficult, then students are very easy to accept.

4.4.4 Should Pay Attention to the Right Medicine, Stratification

Teachers should be based on different teaching objects and professional requirements to select and design different projects. The difficulty of the project should also be based on different students based on CAD/CAM mastery, cognitive characteristics and acceptability of individual differences, different levels of students were designed for different projects of different gradient.

4.4.5 The Choice of the Project

The choice of the project to leave more space to play a good project with more space to play will certainly lead students to think more about the problem and provide more ways to solve the problem. Not only able to stimulate the student's desire for knowledge, but also conducive to the cultivation of students' innovative ability.

5 Conclusion

The use of project teaching, to better stimulate the creative potential of students to develop creative thinking and innovative ability in CAD/CAM teaching, teaching and practice using a combination of project teaching methods to enable students to learn CAD/CAM courses Easier, the teacher's curriculum advances more smoothly, then stimulate students interest in learning, improve the overall ability and professionalism of students.

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