Teaching Design of Mechanical Drawing Course Based on Group Competition Teaching Mode

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Abstract. Aiming at the problems existing in the teaching of the mechanical drawing course of the mechanical manufacturing process specialty in vocational education, using the group competition teaching mode, the course teaching design is carried out from the three aspects of teaching content, teaching strategy and assessment and evaluation, so as to achieve the purpose of improving the quality of course teaching.

Keywords: Group competition teaching mode; Mechanical drawing course; Teaching design

1 Introduction

The Vocational Education Mechanical Manufacturing Technology Program is mainly responsible for the training of fabrication technicians, whose main functions are the processing and fabrication of mechanical parts and the maintenance and protection of electromechanical equipment. Mechanical drawing course is a professional introductory course of the mechanical manufacturing process professional tenure foundation module, is the students learn to draw and read mechanical drawings, competent preparation technician jobs, become the basis of high-quality technical skills. Compared with other basic courses, mechanical drawing courses are more specialized and applied, and require students to have certain spatial configuration and graphic expression skills[1,8]. In the previous mechanical drawing course teaching, there are mainly problems such as insufficient teaching relevance, low student participation and lack of process evaluation, which affect the quality of course teaching[2-4].

Group competition teaching mode is a new type of curriculum teaching mode formed according to the learning characteristics and learning needs of vocational education students, to stimulate students' learning motivation and potential as the goal, through the group cooperation, inter-group competition teaching form, to achieve the purpose of comprehensively improving the quality of students' abilities, is one of the teaching modes that are more widely used in the vocational education curriculum teaching at present[5]. Therefore, this paper utilizes the group competition teaching mode to design the teaching of mechanical drawing course from the three aspects of teaching content,

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teaching strategy, and assessment and evaluation, in order to achieve the purpose of continuously improving the teaching quality of the course.

2 Teaching Content Design

In order to enhance the relevance of mechanical drawing course teaching, in the construction of teaching content, close to the mechanical manufacturing process of professional skills learning and job requirements, highlighting the cultivation of students' ability to draw and read mechanical drawings, in accordance with the principle of "necessary, sufficient" optimization and adjustment, focusing on the application of knowledge. That is, to maintain the traditional and mechanical drawing and note method related to the main body of the national standard of drafting teaching content unchanged, delete the method of surface change and unfolding of the relevant content, new computer two-dimensional drawing and three-dimensional modeling content, weakening the theoretical teaching of the design process, and to strengthen the sketching and mapping of the practice of teaching.

In the arrangement of teaching content, change the traditional chapter-type content organization, according to the "modular, task-based" design ideas, the course teaching content is divided into basic knowledge of drawing, basic theory of drawing, parts drawing, assembly drawing, parts mapping five modules, each module contains a number of drawing and reading tasks, as shown in Fig. 1.

3 Instructional Strategy Design

3.1 Teaching Philosophy

The teaching concept of "student-oriented, ability-oriented and nurturing" is implemented. It highlights the main position of students, focuses on the cultivation of students' ability to draw and read mechanical drawings, emphasizes the proficiency of the process and the standardization of the results, and integrates the ideological education into the whole process of teaching, so as to realize the unity of educating people and educating talents.

3.2 Teaching Mode

Change the traditional form of indoctrination and didactic classroom teaching, the use of group competition teaching mode to create a "compare, learn, catch up, help, super" learning atmosphere, to stimulate students to learn knowledge, improve their ability to increase the quality of learning motivation. Learning groups as a unit, to take intra-group cooperation, inter-group competition in the form of teaching to enrich the classroom student-student interaction and teacher-student interaction links, to improve the degree of participation of students in classroom teaching.

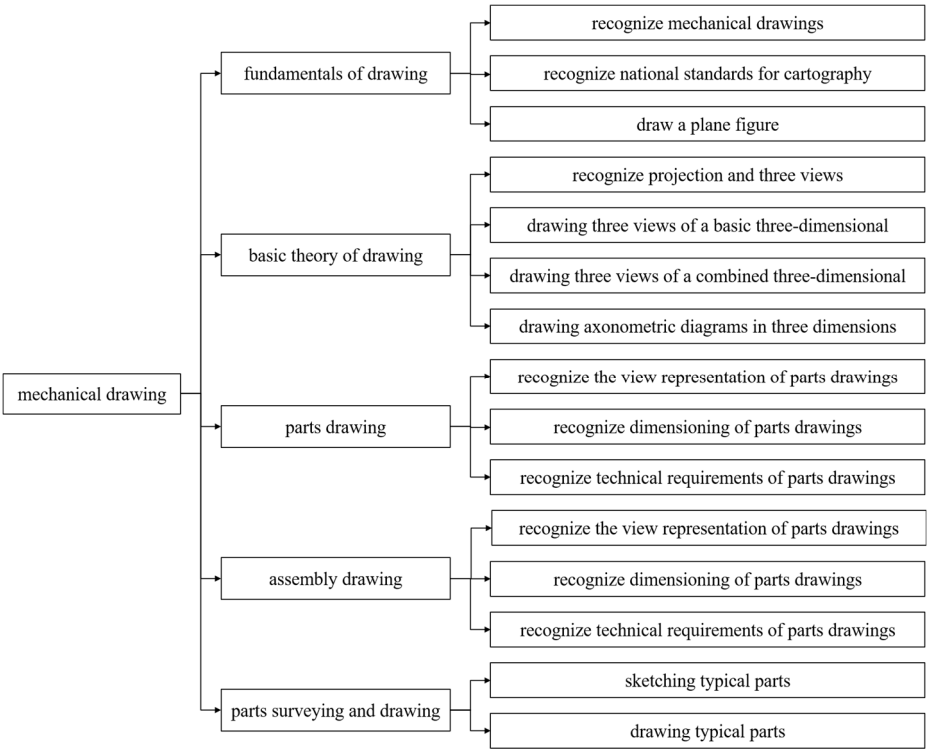

Fig. 1. Teaching Content.

3.3 Teaching Methods

The course is taught flexibly using teaching methods such as task-driven, inspirational guidance, discussion and analysis, and visual demonstration. Focusing on the combination of preparation technician job work situation, the introduction of drawing or reading tasks, according to the task introduction, task analysis, task implementation, task summary, task expansion of the five links in the organization of teaching. Focus on the key links to set up inspiring questions to guide the learning group to explore independently, optimize the process of knowledge construction, and enhance the ability to analyze and solve problems. Emphasis is placed on combining multimedia presentations and instructor model drawings to promote rapid improvement in students' drawing skills.

3.4 Teaching Tools

Course teaching makes full use of objects, animation, models and other teaching resources to achieve the abstract theory of visualization, visualization, dynamic display. Help students develop spatial concepts in teaching projection theory. Assisting students in visualizing the shape and structure of parts in the teaching of parts drawings. Aid

students' understanding of the structure and principles of assemblies in the teaching of assembly drawings. Reduce the difficulty of students' spatial imagination and spatial thinking. At the same time, with the help of all-in-one machines, high-fidelity cameras, high-definition cameras and other teaching equipment to achieve the whole interactive, synchronized, visualized teaching, enhance the sense of student experience.

4 Assessment and Evaluation Design

In order to reverse the tendency of traditional teaching to emphasize only on the evaluation of results, the assessment and evaluation of mechanical drawing course includes two parts: process evaluation and summative evaluation, as shown in Fig. 2.

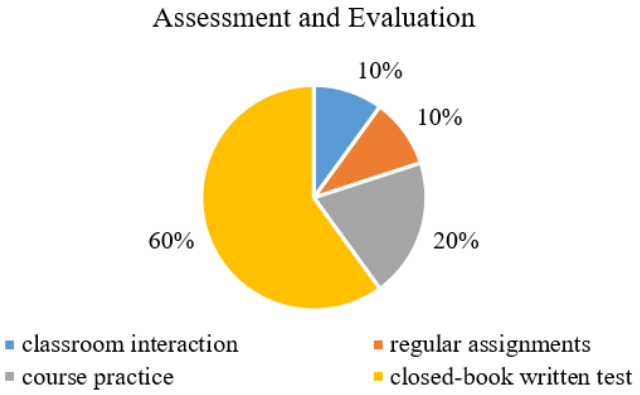

Fig. 2. Assessment and Evaluation.

Process evaluation accounts for 40% of the total grade weighting, including three forms of classroom interaction (10%), regular assignments (10%), and course practice (20%). Among other things, classroom interactions were graded based on the quality of student responses to questions and discussion presentations. Regular assignments are graded based on the quality of the theoretical answers. Course practice is graded on the basis of the quality of completion of drawing and reading tasks. Summative assessment accounts for 60% of the total grade, mainly in the form of a closed-book written test, highlighting the drawing and map-reading ability assessment, based on the correctness, completeness and standardization of the answer scoring.

5 Classroom Teaching Implementation

According to the teaching design of the course based on the group competition teaching mode, take the task of "sketching pin parts" in the module of parts mapping as an example to illustrate the implementation process of classroom teaching. The pin 3D model is shown in Fig. 3.

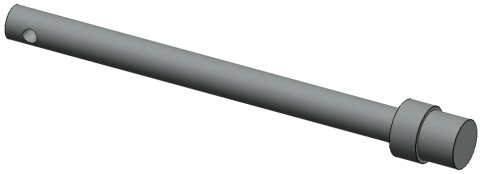

Fig. 3. Pin Models.

Classroom instruction follows the five components of a task-driven pedagogy, as shown in Fig. 4.

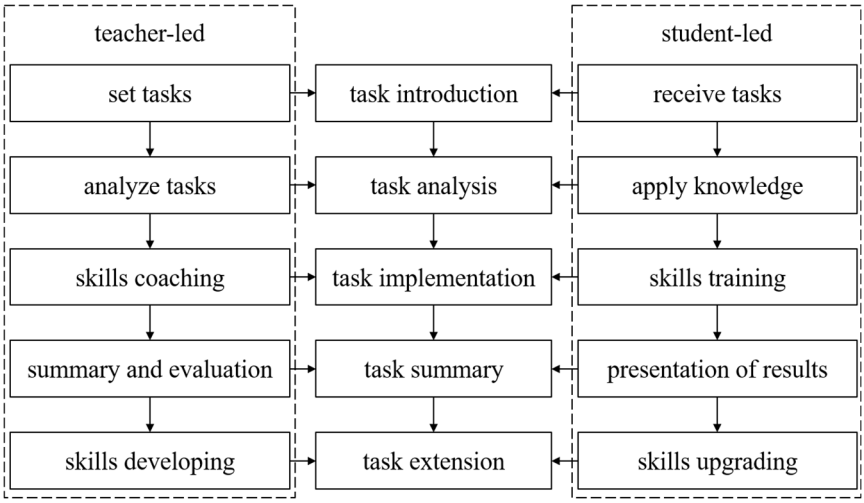

Fig. 4. Teaching Process

In the task introduction link, create a mating processing situation, introduce the sketching task of mapping pin parts to stimulate students' learning interest. In the task analysis session, the learning group as a unit, under the inspiration and guidance of the teacher, the use of manually controllable three-dimensional model of the pin function and structure analysis, with the help of the annotation function of the all-in-one machine to determine the pin view expression and dimensioning scheme, and the formulation of technical requirements. In the task implementation link, the teacher guides the students to independently follow the sequence of drawing view, measuring size, marking technical requirements, fill in the title bar to complete the sketching of the pin parts, the process with the help of the high-fidelity camera and all-in-one real-time screen casting, focusing on explaining the common and typical problems. In the task summary session, the key points and skills of sketch mapping are emphasized, and students' participation in classroom interactions and mapping are evaluated, while self-assessment, mutual assessment and teacher assessment are conducted against the marking criteria. In the task

extension session, learning groups were used to complete a 3D model of the pins to build a physical model using 3D printing technology at the end of the lesson.

6 Conclusions

As a student-centered interactive teaching mode, the group competition teaching mode mainly stimulates students' learning motivation and potential through the teaching form of group competition and contest[6,7]. Students are able to build knowledge, proficiency, and quality in group learning and practice. The course teaching design according to the group competition teaching mode helps to solve the problems of insufficient relevance of mechanical drawing course teaching, low student participation and lack of process evaluation. The teaching quality of the Mechanical Drawing course has been effectively improved, as shown by the overall assessment results of the students' course assessment and the awards won in the second classroom, as well as the feedback from the teachers of the subsequent specialized courses.

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