Exploration of the Curriculum Reform of "Automobile Parts Recognition Drawing" Based on Solidwork

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Abstract: Based on the characteristics of vocational students, this thesis reconstructs the course content of "Automobile Parts Recognition Drawing". With the help of 3D drawing software Solidwork, it focuses on training students' mechanical drawing ability, engineering awareness and innovation ability. Through the study of the course, students will master the ability to draw and read typical parts and assembly drawings of mechanical products. At the same time, they will have the ability to independently analyze and solve problems with rigorous and standardized work methods and good professional habits. Teachers should take into account the cultivation of students' ability to collaborate, adopt optimize methods, and use technical data correctly.

Keywords: Automobile Parts Drawing; Curriculum Reform; Solidwork

1. Introduction

"Automobile Parts Recognition Drawing" is an important technical basic course for automotive students. It mainly studies how to use the basic principles of orthographic projection to draw and read mechanical drawings, and train students to draw, read, and configuration design. The ability to innovate is very important. However, this course has higher requirements for students' spatial imagination and spatial logical thinking ability. According to the traditional teaching model, from basic knowledge and skills of drawing, national standards of mechanical drawing, descriptive geometry, point, line, and surface projection, to the comprehensive expression of basic body, combination body, shape, drawing of parts drawing, assembly drawing and reading, most students will be afraid of the difficulties and bored of mechanical drawing courses. The lack of interest in learning results in less effective teaching. With the extensive application of 3D CAD software, the course can fully rely on CAD technology to increase students' interest in the course, which cultivates students' innovative thinking and stimulates students' innovative ability.

2. Disadvantages of the Traditional "Mechanical Drawing" Course

"Mechanical drawing" is a basic course that must be mastered in many engineering colleges. This course is mainly for students to fully understand the basic theory of the orthographic projection method and the relevant regulations of national drawing standards. In addition, in the teaching process, students must continue to exercise their thinking, so that students can fully master the drawing and reading methods, and these abilities are also the professional abilities that every engineering and technology practitioner should have. However, this course is usually opened in the first grade when students have no practical experience and the content of the course is relatively abstract, so many students cannot grasp the main points of knowledge correctly. In traditional teaching, teachers will use some models or floor plans during class, so that students have a more comprehensive understanding of graphics. These models are relatively bulky,

which will bring teachers a lot of works and large inconvenience. The models are also not very complete that can not be changed and processed according to the actual needs of the course. These models have a high degree of complexity, so they also require a lot of capital investment when they are produced. The use of 3D modeling technology can make up for the deficiencies in these areas.

3. Analysis of the Demand of Higher Vocational Students for the course "Mechanical Drawing"

Over the years, the focus of the teaching of mechanical drawing is to teach students to draw and read pictures. The traditional method is to learn descriptive geometry first, clarify the relationship between points, lines, and surfaces in each projection surface, and then learn how to draw parts, and then the assembly drawings. Most students are struggling to learn the mechanical drawing class, especially the students in higher vocational schools. Most of them feel the course is difficult, the expression is boring, and they lack the interest in learning. The teaching effect is not very good. With the technical development of 3D CAD software, the teaching of mechanical drawing courses can be established with the help of the development of CAD technology, which not only reduces the cost, but also effectively builds the model step by step. Students will find fun and inspiration in learning, which in turn cultivate their innovative thinking, and inspire their innovative vitality to adapt to the main ideas of the country to encourage young people to innovate.

4. Refurbishment of the Course Content of "Auto Parts Recognition Map"

In the course design, we insist on use projects as the center, ability as the basis, and students as the main body, with sufficient, applicable and practical theories as the basis to highlight the principles of practice. The knowledge and skills of reading and drawing of mechanical drawings are recombined to form the teaching content of this course. During the teaching process, the original knowledge system is broken up and teaching is carried out according to the process of project development.

This course is a highly practical course. All theoretical knowledge must be understood and mastered in the process of skill training. Based on the nature of the curriculum and the original intention of preparing for professional courses, the final design is 6 project modules. The main purpose of project 1 is to cultivate strong spatial imagination of students through the conversion between 2D and 3D with the help of 3D drawing software, which can lay the foundation for the study of professional courses and future career development. 2 to 4 are the reading and drawing of parts drawings of different mechanical products whose main role is to master the labeling specifications of typical parts drawings, the expression method and reading of the matching relationship between parts, and understand the structural characteristics and operating principles of typical parts in the enterprise.

The course has been restructured and is divided into the following four items. The teaching objectives are analyzed from three aspects: knowledge, skills and qualities:

Project 1: Cognition of the model. Learning goals: 1. Familiar with Solidwork drawing software; 2. Master the drawing principle of three views of basic body and combined body; 3. Understand the projection rule and nature of points, lines and planes. Capability goals: 1. Use SolidWork to create a simple model stereogram; 2. Draw its three views according to the model. Quality objectives: 1. Cultivate students working ability and unity assistance ability; 2. Cultivate students' good psychological quality and professional moral quality.

Project 2: Recognition and drawing of slewing parts. Knowledge goals: 1. Understand the shape characteristics of slewing parts; 2. Master the modeling method of slewing parts; 3. Familiar with the view representation of slewing parts. Competency goals: 1. Ability to draw a three-dimensional model based on the slewing parts; 2. Ability to manually draw and annotate the parts drawing according to the three-dimensional model; Quality goals: 1. Cultivate students' working ability and unity assistance ability; 2. Cultivate students to be good psychological and professional ethics.

Project 3: Reading and drawing of the plane parts diagram. Knowledge goal: 1. Understand the characteristics of plane parts; 2. Master the modeling method of plane parts; 3. Familiar with the view representation of plane parts. Capability goals: 1. Ability to draw a three-dimensional model based on a planar part drawing; 2. Ability to manually draw and annotate a part drawing based on a three-dimensional model of a part; Quality goals: 1. Cultivate students' job ca-

pabilities and unity assistance capabilities; 2. Cultivate good psychological and professional ethics for students.

Item 4: Reading and drawing assembly drawings. Knowledge objectives: 1. Understand the composition and unique expression method of assembly drawings; 2. Master the methods of Solidwork assembly parts; 3. Master the reading methods of assembly drawings. Ability objectives: 1. Use Solidwork to assemble parts according to the assembly schematic diagram; 2. Use Solidwork to draw the component assembly; 3. Draw the assembly schematic diagram and parts disassemble drawing according to the assembly drawing manually. Quality objectives: 1. Cultivate students working ability and unity assistance ability; 2. Cultivate good psychological quality and professional moral quality for students.

5. The Application of Solidwork Technology in the Curriculum

At present, there are many commonly used mechanical 3D software such as UG, PROE, SOLIDWORK, etc. They have their own unique advantages in the mechanical 3D drawing. Solidwork was born in 1995 and consists of multiple modules. The functions of each module are relatively independent. The operator can apply them according to actual needs. The specific operations of Solidwork include sketch creation, part creation, assembly, simulation, and engineering drawing creation. Simple, it is easier for students to get started.

We use Solidwork software to build a library of course models: cutting bodies, intersecting bodies, complex parts, assemblies, etc. For the cutting body part, students will have a deeper understanding of how the model evolved from the basic body during the process of constructing the model, and improve their logical thinking ability. The assembly part is to give students a part drawing and allow students to assemble by themselves, so as to deeply understand the connection relationship between the parts in the assembly drawing.

6. Conclusion

The purpose of "Automobile Parts Recognition Drawing" is mainly to enable students to master the ability to read pictures, cultivate students' spatial imagination ability and innovation ability, and lay the foundation for subsequent courses. The use of 3D software in teaching can reduce the cost of teaching. It is an easy and fun teaching activity, which makes students full of fun in learning, and give them a sense of accomplishment at the end of learning. In the modeling process, it also promotes students' further understanding of teaching. In short, the effective use of Solidwork software in the course of "Automobile Parts Recognition Drawing" has greatly improved the quality of teaching.

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