Study on the teaching method of mechanical drawing

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Abstract. This article has conducted the research to the traditional teaching mode of mechanical drawing course and the course of modern mechanical drawing teaching mode, respectively expounds the teaching method includes two modes, and summarized the existing mode of traditional teaching in mechanical drawing problems. With the CAD 2D and 3D software and other computer aided design method to focus on the methods of modern teaching of mechanical drawing, it can combine the traditional teaching and the combination of information technology, without the limitation of time and space, can be multi-purpose Omni-directional virtual real scene, provide interactive space for teaching. Through the teaching case analysis to solve the difficulties in teaching the course of mechanical drawing part drawings and assembly drawings, effectively solve the difficult problems of drawing process, improve the students' learning interest in mechanical drawing course and improve the teaching quality.

Keywords: CAD drawing; Mechanical drawing; Teaching mode.

1. Introduction

《Mechanical drawing》 course as compulsory course of mechanical engineering, is to use projection drawing mechanical pattern, the spatial geometry theory and method of a course [1]. The main content is to introduce basic principle of mapping and the national standard, study methods of plotting and reading mechanical engineering drawings, drawing skills and techniques, etc. Closely linked with the engineering practice, this course is a practical specialized fundamental course, it is to cultivate students to master scientific thinking methods, strengthening engineering and innovation ability is particularly important, the learning effects will directly influence the follow-up professional course study and master professional skills.

The content of《mechanical drawing》has formed a complete set of system theory, on the teaching and formed a set of traditional teaching methods [2]. But with the rapid development of computer technology, the traditional mechanical drawing course teaching content and teaching methods increasingly disconnected with the engineering practice, the students practice ability, space imagination ability is insufficient, which affects the quality of the graphics and effects.

The traditional teaching mode combined with modern technology, formed the concept of drawing teaching methods at the present stage, this method can adopt multimedia graphics teaching courseware, make full use of sound, images, animation, enrich teaching materials, and use CAD drawing software in the teaching auxiliary students to strengthen the cultivation of spatial ability. Based on this, this paper, the traditional mechanical drawing teaching method and modern teaching methods were compared, points out that the outstanding problems of the traditional teaching method, through the typical case illustrates the advantages of modern teaching mode.

2. The traditional teaching model of mechanical drawing

The teaching method. The traditional teaching mode, it is a kind of centered on teachers and teaching materials, students passively accept the way of teaching. The traditional mechanical drawing "figure-body- figure " teaching mode, namely, from the perspective of the 2D graphics, imagine the three-dimensional shape; From the stereo form again, to draw 2Dgraphics[3]. Teaching process starts from the content of the descriptive geometry to the basic knowledge of projection, after to the

knowledge of mechanical drawing. Traditional mechanical drawing teaching mode mainly adopts the direct-viewing teaching method, the line surface analysis, inspired discussion-based teaching method, etc.

Intuitive teaching method

Intuitive teaching method can increase the students' perceptual knowledge, deepen the understanding of things, link theory knowledge and practical observation object, and help students to construct the observation object graph. For example, explaining the formation of the three view drawing, explained the concept of projection first, and then explain the projection system, and why do you want to set up three side's projection system. When teaching on single projection, projection and three sides projection relation and characteristics of the two sides. Teaching process, for example, can be used in on three view drawing projection when, for example, two adjacent walls and direct reference to the classroom as a plane on the ground, use local materials, easy to understand. This kind of method is more suitable for application in cartography teaching in the primary stage, the effect is good, can make the student to obtain the profound basic concept of the abstract.

Line and plane analysis method

Line and plane analysis method including wire frame model and a wireframe model method, respectively from the stereo to space transformation and conversion from planar to three-dimensional. In the process of teaching, emphasizing the demand the students master the basic geometric shapes of three view drawing, do understand quickly with three view drawing three-dimensional model, students are required to have a strong sense of figure. This method is mainly training spatial thinking ability of students and improve students' ability of thinking in images. This section is a emphasis and difficulty of drawing teaching. In the teaching process, it takes a lot of time in class and auxiliary teaching means to complete, in order to help students to gradually cultivate the graphics thinking, improve the ability of graphics.

Inspired by the discussion-based teaching

Inspired by the discussion-based teaching is a process of interaction between teachers and students. Teachers play a leading role in the process, and guide students to active learning, so students are required to have a positive initiative. Teachers in the teaching process of specific course content and the teaching goal, scientific design problem, purposefully organize various forms of discussion, continue to guide the students in the study found that the problem, the teacher through various means and methods to inspire the student to obtain the way to solve the problem. The basis of the teaching method suitable for the teaching of mechanical drawing part.

In the traditional teaching method in question. Traditional mechanical drawing teaching model is given priority to with teachers' teaching, through the blackboard writing, drawings, the actual model, projectors and other static teaching means instilling knowledge to students, students passively accept, lack of interactive teaching process, students in the learning process feel boring, to produce the boredom; With the sample area, single way of learning also increases the students understand the difficulty of the problem, over time, also produced school-weary psychology. Figure 1 is a known parts of the second view, for example, the third view, to complete this problem is to have the very strong spatial ability, it is difficult for beginners. To solve these problems, we must to the mechanical drawing teaching method reform, curriculum system and teaching idea.

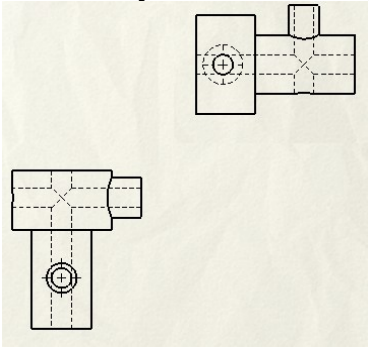

Fig.1 Two views of rotors

3. The study of the mechanical drawing teaching methods at the present stage

Independent type teaching method. Descriptive geometry and mechanical drawing and CAD 2D drawing and 3D CAD modeling design be in harmony are an organic whole, the traditional teaching and modern teaching content are independent of each other. Teaching basic arranged in order, basic knowledge, the projection mapping projection theory, point, line, surface, the relative position between geometric elements, projection transformation, curve surface of projection, three-dimensional projection and intersection, combination and axonometric drawing, parts of commonly used expression method, standard parts and common parts, detail drawing and assembly drawing, computer CAD 2D drawings and 3D entity model. This mode, both fused the 2 d drawing in the combination of teaching, teaching and have to be alone.

Integrated teaching methods. This method is principle and method of 3D modeling and skills into the mechanical drawing course, form a new teaching system and teaching content. Integrated teaching mode with CAD 3D design, the teaching idea of focusing on the 2D projection drawing. Main teaching contents include composition of geometry analysis, parts of configuration analysis, create assembly, drawing the basic knowledge, two-dimensional representation methods of industrial products, standard parts and common parts of the said method, the expression of detail drawing and assembly drawing method, create the basic knowledge of CAD three-dimensional entity model, CAD 3D design process, CAD 3D entity design.

Sectional teaching method. Sectional teaching mode is the descriptive geometry and mechanical drawing, 2Ddrawing and 3D modeling design teaching segments, the main contents are as follows:

The first stage focuses on the projection rule, projection of point, line, face and form;

The second phase focused on the national standard, and combination form the common form of expression;

The third phase focused on detail drawing and assembly drawing;

In fourth stage covers computer drawing, including the two-dimensional drawing ability, 3D CAD modeling method.

The above each are not identical to the requirement of teachers' teaching methods. Independent type, sectional teaching content relatively independent, the teacher can explain separately. Fusion higher requirements for teachers teaching methods, teachers must have a high level of the three dimensional theory and practice ability, shown in figure 1 difficult questions in a traditional way is very big, if converts teaching mode "3D-2D-3D", namely the introduction to start learning 3D modeling, and then by converting a three-dimensional planar view, go back to the three-dimensional model, as shown in figure 2, figure 3, so this problem is solved, will help students grasp and understanding of the problem and improve the teaching quality and teaching effect.

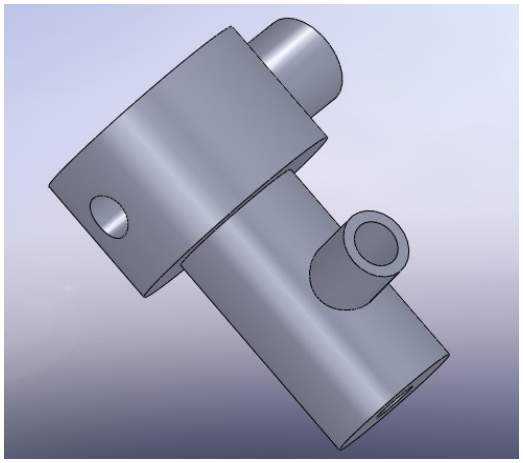

Fig.2 3D modeling entity graph

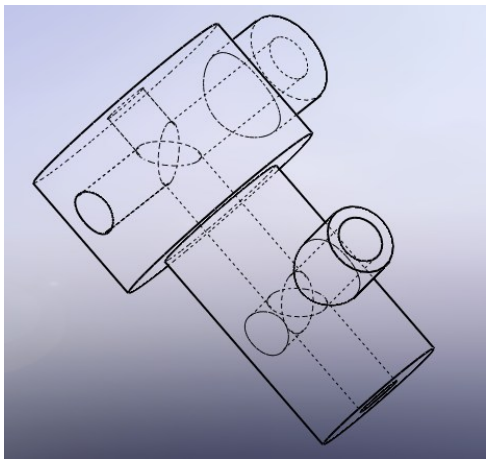

Fig.3 3D modeling perspective

4. Conclusion

Traditional single teaching mode and teaching content of mechanical drawing, design, creative content, less conducive to mobilize the enthusiasm and initiative of student learning, hindered the advance of the cartography curriculum teaching and development. Modern teaching methods combined with computer aided design and manufacturing technology, not only enriches the teaching contents, improve the students' interest in learning cartography curriculum, develop students ability to learn, but also provides a more accurate and more rapid analysis solves the question ability, for the new product, new process design provides a strong support.

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