Study on the Teaching of Mechanical Drawing and Parts Mapping under the Guidance of the World Mechanical CAD Design Competition

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Abstract: The mechanical drawing course is an important technical basic course, which plays an important role in cultivating students' design ability, engineering practice ability and innovation ability. This course has the characteristics of close integration of theory and practice. Therefore, the practical teaching link plays an important role in the teaching process. It requires the training of practical teaching to make students understand engineering and design, learn to do it, and lay the foundation for cultivating innovative ability and practical ability. basis. This paper expounds the construction of the experimental system of mechanical drawing courses in Southwest Jiaotong University and its role in teaching. At the same time, it also gives some views on some problems existing in the process of practical teaching.

1. Introduction

The World Skills Competition is organized by the World Skills Organization and is held every two years. It is known as the “Skills Olympics” and is an important platform for members of the World Skills Organization to display and exchange professional skills. The World Skills Competition is divided into six major categories: CAD Mechanical Design, Creative Arts and Fashion, Information and Communication Technology, Manufacturing and Engineering Technology, Social and Personal Services, Transportation and Logistics, for a total of 46 competitions. Most of the competitions are limited to 22 years old for the contestants, and the manufacturing team challenge, mechatronics, information network cabling and aircraft maintenance are four comprehensive projects with work experience requirements. The age limit of the players is 25 years old. World Skills Competition The CAD Mechanical Design Project is a skill competition project that uses computer-aided design software to perform part/product digital modeling, drawing generation, solution design, and 3D printing. The project is mainly a competition design for the complete modeling of mechanical products. The age limit means that the event will have a unique age advantage in promoting the participation of high-level mechanical students in the competition. Together with the systematic knowledge training, it will greatly promote China's talents in the CAD mechanical design industry. Cultivation. In addition, with the implementation of the national skills competition results, it is imperative to introduce the outstanding achievements of the competition into the teaching reform of mechanical drawing and CAD courses. Through the promotion of the World Skills Competition, in order to promote the actual connection between teaching and enterprises, improve the quality of mechanical drawing and CAD courses in the student audience, carry out a series of reforms on mechanical drawing and CAD courses, and abandon the traditional two-dimensional mechanical pattern teaching mode. Advocate the process from three-dimensional to two-dimensional drawings to enhance students' basic understanding of mapping and drawing.

2. The practical basis and curriculum design of curriculum practice teaching innovation

Implement project-based teaching in teaching. Project-oriented teaching is one of the more mature teaching concepts and methods in vocational education. Work-oriented project-oriented teaching is not only thorough in academic research, but also widely used in practice. Therefore, this course has been working-oriented project-oriented teaching reform since 2010 and has achieved good teaching results. Integrate the curriculum according to needs. During the research process of

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professional talent development plan formulation, the teaching team found that several courses such as “Mechanical Drawing”, “Parts Mapping”, “Cartography Software”, etc., are interrelated and conflicting in content. Different teachers have different opinions when scheduling classes. At the same time, the content of these courses tends to be consistent in the needs of social talents. For these reasons, these courses are guided by the work process, and the projects in different courses are integrated into 12 projects according to the work requirements. These 12 work projects are arranged in the same course, namely “Mechanical Drawing Parts Mapping”. The production and application of micro-courses. In the practice teaching process, after some teachers demonstrate, the students may not be able to remember the operation essentials. In order to facilitate the students to repeatedly view the teacher's presentation operations, the teaching team tries to make the operation process into teaching videos in different ways. Share videos with students in different ways. The practice began in the fall of 2010 and is also catering to the popularity of “micro-courses”. The choice of difficult and difficult teaching activities. After the integration of this course, there are many contents. After the practice, the general principles of teaching activities are as follows: the cultivation of manual drawing operation skills as the focus, the auxiliary design software application as the auxiliary, and the comprehensive vocational ability training as the core. Course content design. The course is aimed at cultivating the professional core competence of engineering and technical workers. The overall design of the course is based on the talent training program. After the teaching objectives and main teaching contents of the course are determined, 12 common applications in the field are simulated into actual work scenarios and identified as 12 work tasks. In each work task, the work scene, task objectives, work task specification process, task acceptance and other elements are clarified, which constitutes the unit teaching design in the course design.

3. Discussion on the advantages and disadvantages of the reform of mechanical drawing and parts mapping course

In the practical teaching, the engineering sketch training is intensified, the physical concept design is infiltrated, and the students' graphic design, structural expression and preliminary auxiliary design ability are comprehensively cultivated through comprehensive exercises, machine parts mapping and computer drawing on the machine. Designing expression exercises based on function-based parts structure promotes divergent thinking and leads to creative ideas. Students fully appreciate the great fun of design and creation to achieve better teaching results. Computer design and drawing, CAD and CAD three-dimensional modeling training are practical activities that students are interested in. They connect students' interests and learning through links such as computer graphics and online learning and inquiry. The surveying and mapping course is an effective way to cultivate students' hands-on ability. Students can understand the relationship between structure and function. They can grasp the essence of two-dimensional three-dimensional transformation, and can cultivate the comprehensive ability of manual sketching, instrument drawing and computer drawing, and introduce measurement technology and mechanical design. The combination of content, demonstration experiments and teaching can also greatly stimulate students' interest in learning.

According to the survey, 54.84% of the teachers believe that the integration of 3D software and mechanical drawing can get rid of the current teaching dilemma, and enumerate the advantages of combining 3D software and mechanical drawing. The main advantages are intuitive, efficient, easy to understand and three-dimensional. Strong, easy to generate drawings, easy to correct drawings, easy to understand and convey the information of subsequent processing, easy to understand the assembly process, easy to understand the manufacturing process. This curriculum reform has established the expression of mechanical products for the purpose of mapping and drawing, focusing on the realization of the performance of mechanical products and reflecting the characteristics of design. Using Autodesk Inventor as the main carrier, the first two-dimensional drawing after two-dimensional drawing is expressed, and then the two-dimensional pattern is expressed to the three-dimensional expression. The mechanical two-dimensional pattern reading and the three-dimensional drawing engineering expression are effectively trained to completely

solve the problem of reading and drawing, and solve the assembly understanding problem through the explosion animation and the motion simulation animation. This course reform relies on the CAD mechanical design competition of the World Skills Competition. It uses the relevant test questions and the mechanical drawing course to closely combine the traditional 3D software as the auxiliary teaching mode, and transforms the auxiliary teaching software into the main skill tool to integrate the knowledge. Skills. Through investigation, it is found that some unfavorable aspects of the reform of combining 3D software and mechanical drawing mainly include: the basic knowledge of drawing will be neglected, the ability of students to draw by hand will be reduced; too much knowledge will be learned, which will cause difficulties for students to learn; weaken students The ability of three-dimensional thinking is not conducive to the cultivation of students' imagination and thinking ability;

4. Views on the practical teaching of mechanical drawing courses

At present, most of the teaching modes of mechanical drawing courses are based on multimedia teaching, and most of them are large class teaching. Most of the teaching content is based on graphics, and the amount of information in the course is large. This may cause some students to be indigestible and absorbed in the classroom, feel that the content of the pattern is Abstract, the space cannot be imagined, or it takes time to do homework, especially involving reading pictures. Therefore, the teaching model should be an essential teaching aid in the teaching process. At the same time, it is necessary to open the mechanical drawing model room and display the corresponding type models, such as the cut-off body, the intersecting body, the combined body, the cut-away solid, etc., so that the students can visually observe the physical model and cultivate the space imagination ability and the accumulated object. Representation, increase the ability to read pictures. This is especially important for non-mechanical students who do not have the knowledge of computer 3D modeling, and the 1st grade fashion cannot be observed on the machine modeling entity.

Students should study the parts and assembly drawings and strengthen the teaching practice. Students can go to the factory to visit the internship, observe the actual parts processing process, and clarify the processing methods and processing order of typical parts, so as to have a clearer understanding of the view selection, dimensioning and technical requirements in the parts drawing, avoiding the students' feelings. Learning the cumbersome complexity and Abstraction of part drawings also avoids the disconnect between teaching and reality.

In the practice of mechanical drawing courses, several experiments were completed by the machine, the results were intuitive and save time, which also caused some students to rely too much on the drawing software, the difficulty of reading, the unreasonable view expression and mapping Non-standard issues. Students should strengthen the “three-dimensional - two-dimensional - three-dimensional” conversion process training of objects, cultivate the brain's image thinking ability and logical thinking ability, and improve the corresponding drawing and reading ability, instead of using CAD modeling directly Projection, not to analyze why. Therefore, in the 1st grade drawing teaching, the relationship between the 3D drawing software and the traditional drawing content should be handled. In addition to requiring students to master the basic knowledge and skills of the necessary 3D solid modeling, students should master the necessary basic content such as drawing specifications. Master the various drawing methods of the machine parts, master the drawing method of the standard parts, etc. At the same time, in the drawing skill training, we should pay full attention to and strengthen the standard 2D engineering drawing expression, including the hand drawing.

For the different majors and non-mechanical professions, it is obviously unreasonable to cultivate the same syllabus. Therefore, in the teaching process, it is necessary to combine the professional characteristics and make appropriate adjustments to the teaching content. Relevant professional characteristics, so that students can clearly define the relationship between this course and their own profession, and increase their enthusiasm for learning. At present, this aspect is still under discussion.

5. Conclusion

It has been proved by practice that refining the regular teaching content with reference to the competition content and professional qualification standards shortens the students' cognition and skill proficiency process, improves the professional scientific research and practical skills of teachers, and improves the overall skill level of the contestants. This summer, the mold class students participated in the “2012 Guangdong CAD Graphics Skills and Innovation Competition Machinery Competition”, and competed with the undergraduate key college students, and finally achieved excellent results. And in the other professional courses in this semester, the performance is also very good, reflecting the great progress. To this end, I hope that I can use the role of the “sports competition” to improve teaching, improve teaching quality in an all-round way, and cultivate more outstanding high-skilled talents that enterprises really need, and realize the history of “Made in China” and “Created in China”. Sexual transformation contributes strength.

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