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Application of Network Technology in Basic Teaching of Chemical Equipment and Machinery

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ABSTRACT. *In the teaching process of chemical machinery foundation, a bridge between teachers and students can be built through the network platform to help students learn and master the key and difficult points of the course, cultivate students' practical ability and improve self-study efficiency. It can be said that the network course has become a useful supplement to classroom teaching. While stimulating students' learning enthusiasm, it greatly improves the foundation of chemical machinery.*

KEYWORDS: *Chemical machinery foundation; Network classroom; Interactive teaching; Teaching effect*

0. Introduction

Although Chinese chemical professionals mainly carry out process design and research, they often encounter design problems of machinery and equipment closely related to process design. Faced with the social development in the 21st century, various professional fields are constantly broadening and interdisciplinary infiltration requires students majoring in chemical technology and engineering not only to be proficient in process and process design, but also to have basic knowledge of chemical mechanical drawing, engineering mechanics and chemical equipment design, in order to meet the needs of society for advanced chemical professionals[1].

As a compulsory course for undergraduates majoring in chemical engineering, the foundation of chemical machinery mainly includes four parts: engineering mechanics, engineering materials, container design and mechanical transmission.

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Among them, engineering mechanics introduces the calculation of strength and stiffness of straight bars under tension, compression, bending, shear and torsion loads, so that students have basic engineering mechanics knowledge; engineering materials mainly introduce basic knowledge of carbon steel, cast iron, alloy steel, non-ferrous metals and common non-metallic materials, so that students can understand the selection of chemical equipment; container design includes internal pressure vessel design, external pressure vessel design. Design, accessories design, tower equipment strength check and other knowledge, so that students learn preliminary chemical containers, chemical equipment design and verification methods. Mechanical transmission introduces various common transmission modes, so that students can have a better understanding of mechanical design and selection[2].

Because the course is rich in content, involving mechanics, material science, machinery and other disciplines, and has a high requirement on the basis of mathematics, students generally feel that it is difficult to achieve the desired teaching effect in the learning process. How to mobilize the enthusiasm and initiative of students, use limited hours to learn and master the basic theory of chemical equipment engineering design is a practical problem facing the basic teaching of chemical machinery. With the rapid development of computer and network technology, it is possible to construct a network virtual classroom with both sound and appearance. Students can make good use of the abundant teaching resources on the Internet to do pre-class preparation, after-class review and self-study. This paper will focus on how to use the network platform to improve the teaching effect of chemical machinery foundation, so that students can achieve twice the result with half the effort in learning this course.

1. Discussing Garden-Interactive Guidance Teaching

Modern teaching theory holds that teaching is a process of bilateral interaction. The teaching method should change from one-way "perfusion" to two-way "guidance". Teachers should change from "lecturer" to "guide". They should create conditions for students to actively participate in teaching so as to give full play to students'main role and mobilize their enthusiasm and creativity in learning. In classroom teaching, heuristic and questioning interactive teaching methods are

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adopted, such as students'questions and teachers' answers, teachers'questions and students' answers, and students'questions and common thinking. These methods are effective in understanding students'understanding of the knowledge points taught at any time, prompting students to think and understand problems, and mobilizing students' initiative and participation. However, due to the large amount of information and tense hours, there is no time to interact with students in class. At this time, we can refer to the form of Internet communities and forums to establish discussion sites. Teachers and students can register user names, manage personal user information, initiate discussion topics or participate in discussions after login, and solve the problems left behind in class in time. For common problems, teachers can explain them to students in class. It can be said that the discussion garden extends interactive teaching and teacher-student communication from class to after class, saves teachers and students a lot of time and makes some introverted personality. Students who are not good at speaking can also actively participate and speak freely, which greatly stimulates students'interest and initiative in learning. In the actual teaching process, this method has achieved good teaching results[3].

2. Difficult Explanation-Deep and Simple Teaching

Reasonable and reliable design of chemical equipment requires students to have a solid mechanical and mathematical foundation, and to be able to analyze and solve problems using the ideas of Engineering mechanics. For most students majoring in chemical engineering and technology, because many chapters of engineering mechanics are ABSTRACT in concept and have many formulas, it is not easy to digest and absorb these knowledge in limited classroom time. Taking the analysis of combined deformation stress as an example, many concepts such as unit, principal stress, principal plane, maximum shear stress, stress circle, strength theory and equivalent stress are unfamiliar to students. While accepting these new concepts, a large number of calculation formulas need to be deduced and memorized. Students generally reflect the unsatisfactory mastery of this part of the content. At this time, the ABSTRACT concepts can be vividly displayed by the animation software Flash. For example, the bar under tension and torsion load can be cut by two or two parallel six planes. Using the three-dimensional animation effect, the selection process and orientation of the unit can be clearly seen. Combining the stress

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distribution characteristics of the tension and torsion bar, it is easy for students to understand the positive response. The direction of force and shear stress and the relationship between element stress and bar stress. Through the rotation and switching of views, students can see how to simplify the three-dimensional complex stress problem to the two-dimensional plane stress problem, and have a deep understanding of the method to construct the unit and solve the stress state at a point. In the process of animation demonstration, the best teaching effect can be achieved by synchronously inputting teachers'explanations and cooperating with text explanations. Because Flash animation can easily achieve the effects of cutting, superposition and rotation, it is very suitable for the application in the key and difficult chapters of engineering mechanics such as section method, superposition method and complex stress analysis. At present, corresponding to the difficult content of each chapter, we have produced 17 difficult explanation animation courseware and uploaded it to the network course platform. Practice shows that difficult explanation has received in-depth and vivid teaching effect, which helps students to deepen understanding and improve learning efficiency[4].

4. Establishing Model Base and Cultivating Practical Ability

Through classroom teaching, students can grasp the basic theory initially. In order to enable students to use their knowledge comprehensively to solve practical engineering problems and cultivate practical ability, some colleges and universities have added curriculum design of chemical machinery foundation. But for most colleges and universities, because of the large number of chemical undergraduates and less hours, they generally do not have the ability to set up curriculum design. At this time, we can consider establishing an open model library of chemical equipment on the network, including the models of tower equipment, pressure vessel, heat exchanger and stirring kettle, and assembling and decomposing typical equipment with assembly drawings, assembly drawings and parts drawings, so as to strengthen students'ability to assemble and decompose important tower internals (such as distributors, redistributors, collectors, support grids, etc.) of chemical equipment. Feeling impression and design capability of grating and accessories (head, bearing, flange, etc.). Model base can effectively make up for the deficiencies of classroom teaching in practice, stimulate students'interest in learning, and guide students to

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integrate theory with practice[5].

5. Streaming Media Classroom, Assisting Students to Learn by themselves

In fact, the four parts of chemical machinery foundation are equivalent to four main compulsory courses for students majoring in process equipment and control engineering: material mechanics, engineering materials, chemical equipment design and mechanical principles. The course content is informative, and can only highlight the key and difficult points in the limited class hours. Some contents require students to study by themselves after class. For example, the introduction of chemical equipment materials in this chapter can only focus on carbon steel, alloy steel and anti-corrosion. There is little time to introduce non-ferrous and non-metallic materials. After self-study, students generally reflect that the content is messy, unable to sort out the clue, and the effect of self-study is not good. At this time, with the help of streaming media technology of the Internet, teaching videos about non-ferrous and non-metallic materials can be uploaded to the Internet to construct a virtual streaming media classroom in the air to help students understand and learn. Streaming media technology is a widely used Internet segmented transmission technology, which enables students to watch online without downloading teaching videos, and to repeat the parts they do not understand, so as to deepen their understanding. It can be said that the streaming media classroom reappears the real classroom teaching environment, so that students can choose and broadcast the relevant chapters according to their own learning situation and progress, and truly teach according to their aptitude, so as to improve the teaching effect and learning efficiency. At the same time, streaming media classroom can help to supplement the contents that classroom teaching can not cover, assist students to study independently, and effectively mobilize their subjective initiative and learning enthusiasm[6-8].

In a word, through the vivid and vivid network platform, it can effectively complement and improve the teaching methods and means of chemical machinery foundation, create a teaching environment conducive to the cultivation of students'comprehensive application ability, and greatly stimulate students' interest in learning. Practice shows that the discussion garden, difficult explanation, model base and streaming media classroom based on the network platform have become a useful

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supplement to classroom teaching, and can effectively improve the teaching effect of chemical machinery foundation.

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