

Discussion on the Application Demonstration Course Construction Project of Chifeng College

Taking the course of hydraulic and pneumatic technology as an example

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Abstract. This article takes the mechanical design, manufacturing, and automation of Chifeng University as an example to explore the construction plan of a demonstration course for the application of hydraulic and pneumatic technology. Propose three construction plans to strengthen the integration of ideological and political education into courses, "project driven, competition education integration", and virtual simulation technology application. The construction significance is in line with the current ideas of Chifeng University construction, and the construction plan provides practical guidance for the development of similar professional disciplines

1 Introduction

Chifeng College began recruiting the first mechanical engineering students in the autumn of 2008. As a core professional course, hydraulic and pneumatic technology has been taught for 13 rounds from 2009 to 2021. The main teaching content of this course is to enable students to master the basic composition and application development of hydraulic and pneumatic transmission technology; Master the characteristics and technology of transmission media; Master basic knowledge of static fluid mechanics and flowing fluid mechanics; Master the structural characteristics, analysis and calculation of hydraulic pumps and motors; Master the classification of hydraulic valves, working principles, structural characteristics, and applications of hydraulic valves; Master the working principle, structural characteristics, and analysis and calculation of typical hydraulic circuits; Master the basic knowledge of pneumatic transmission, principles and characteristics of pneumatic components; Understand the basic circuit of pneumatic transmission; Have certain experimental and hands-on skills, and can continue to combine research and development capabilities with practical work applications^[1-3].

2 Existing teaching system

2.1 Basic system

After 13 years of curriculum construction and reform, this course has developed relatively mature teaching ideas, methods, and means. This course is a highly theoretical and practical course, emphasizing not only the

comprehensiveness and practicality of knowledge, but also the ability to innovate, comprehensively analyze, and solve practical production problems. Therefore, the teaching philosophy of this course is to strengthen the foundation, connect with reality, and pursue innovation^[4-6].

Aiming at the current situation of this course with few class hours and many contents, the teaching methods adopted mainly focus on key points, difficulties, ideas, and methods, highlighting the main line of hydraulic component principles, strengthening the integration of theory with practice, paying attention to strict logical reasoning, and conducting infiltration, induction, and discussion teaching to cultivate students' innovative spirit and autonomous learning ability.

2.2 Existing problems

The traditional teaching method of this course has become very mature, but in the context of the national promotion of new engineering courses, in accordance with the requirements of the "Fourteenth Five Year Development Plan and the Outline of the 2035 Vision and Objectives of Chifeng University" and the "Action Plan for High Quality Development of Chifeng University (2021-2023)", the hydraulic and pneumatic technology course pre improves the content construction of the course and comprehensively improves the teaching quality, Key issues that need to be addressed include continuing to strengthen the integration of ideological and political education into the hydraulic and pneumatic technology curriculum and the "project driven, competition teaching integration" research of the hydraulic and pneumatic technology curriculum^[7-10].

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3 Integration of Ideological and Political Courses

The course of Hydraulic and Pneumatic Technology mainly cultivates the basic skills of students from various majors in the installation, commissioning, maintenance, and testing of electrical equipment; This course cultivates students' innovative and comprehensive abilities, enabling them to understand the application of advanced hydraulic and pneumatic technology achievements at home and abroad in automation equipment. Integrating curriculum reform into the teaching of hydraulic and pneumatic technology is conducive to establishing students' correct professional qualities and ethics, better practicing socialist core values, and possessing a deep sense of patriotism and national pride. Integrating ideological and political elements into the curriculum objectives, teaching design, curriculum content, performance assessment, and curriculum evaluation of the hydraulic and pneumatic technology course enables students to conduct ideological and political education while learning science and technology^[11-13].

3.1 Integrating ideological and political objectives into curriculum objectives

Add ideological and political objectives to the course objectives. After completing the course, students should not only have the ability to draw and design hydraulic system diagrams, hydraulic system faults, and maintenance, but also have the spirit of loving the motherland, loving their jobs, and being brave to take responsibility

3.2 Integrating Ideological and Political Genes into Teaching Design and Course Content

Identification and selection of hydraulic components, identification of hydraulic system schematic diagrams, and hydraulic system design. There are more than 70 knowledge points in the course. It is necessary to select appropriate knowledge points to integrate ideological and political genes into them, combine the knowledge content of the course itself with the ideological and political education materials contained therein, and describe the ability to integrate ideological and political education content with professional knowledge and skills education content in the course teaching^[14-15].

The field of organic integration; Describe the specific results corresponding to the educational goals of the course, which can be observed, evaluated, and made available to students as much as possible. Through watching documentaries such as "The Craftsman of a Big Country", students are inspired to have the courage to innovate and overcome difficulties. In combination with the current "Made in China 2025", students will be presented with the latest technologies from well-known domestic construction machinery manufacturers, Chinese super engineering, etc., to enable them to understand the latest technologies and enhance cultural confidence.

3.3 Integrating Ideological and Political Genes into Performance Assessment and Course Evaluation

The course assessment is divided into process assessment, experimental assessment, and routine homework assessment. Integrating ideological and political genes into curriculum evaluation is to increase ideological and political assessment, which does not directly raise ideological and political issues, but integrates ideological and political genes into professional curriculum issues,

Students receive ideological and political education in the assessment. Integrating ideological and political genes into the process assessment, proposing professional questions that incorporate ideological and political genes in the classroom, and giving bonus points to students who respond well. This allows students to actively understand ideological and political content. Compared to passive indoctrination, this approach allows students to increase memory and understanding, and is easier to stimulate their patriotic enthusiasm. In addition, integrating ideological and political genes into the three procedural examination papers can make some professional issues have ideological and political education effects. Students can actively contact and understand China's great achievements, which can increase their enthusiasm for building their motherland.

4 Project driven cultivation

In the course evaluation, it is necessary to comprehensively investigate the learning situation of students during the teaching process, whether they inspire learning interest, whether they stimulate learning enthusiasm, and whether they promote sustainable development of students. In the evaluation of ideological and political integration into teaching, process evaluation and result evaluation should be adopted; Combining qualitative and quantitative methods to improve their practical application abilities, all teachers in the research group should timely adjust and improve the teaching process based on the large amount of information obtained from the course evaluation.

Gradually carry out the construction and reform of hydraulic and pneumatic technology courses, adopt teacher theory teaching and practical tutors to guide skill competition project training, and students actively participate in the teaching mode of their professional projects. According to the progress of the project, constantly adjust and optimize the teaching content, strengthen practical teaching, combine with reality, optimize the teaching team, and continuously improve students' innovation ability and level.

Innovate the teaching methods of hydraulic and pneumatic technology to stimulate students' active thinking. Using teacher theory teaching and practical tutors to guide skill competition project training, students actively participate in the teaching mode of the project, allowing tutors outside the school to personally explain, visit the hydraulic and pneumatic technology practice base outside the school, guide students to play their initiative in

innovation, constantly expand teaching content, change the status of teachers and students, constantly guide students, and implement the main role of students in learning.

Strengthen the practical teaching of hydraulic and pneumatic technology, and form a dynamic assessment and evaluation system. Firstly, deepen the practical teaching content of the course of hydraulic and pneumatic technology, carry out teaching around innovative projects, constantly adapt and create, and accept the test in practice; Secondly, increase the proportion of practical teaching, and strive to establish a perfect practical teaching system, such as the "Internet plus" contest, big challenge, small challenge, innovative training projects and other practical skills training and comprehensive application ability are organically combined, and included in the credits of this course as a form of course assessment; Thirdly, change the assessment method. In terms of curriculum assessment, highlight the cultivation of innovation awareness and practical ability assessment, establish a dynamic assessment and evaluation system, consider factors such as students' enthusiasm to participate in the practical project process, and whether there are project results. Explore the establishment of standardized assessment indicators, and set corresponding scores to focus on testing students' ability to use knowledge to solve problems. The results obtained in the competition will be added as regular scores.

Allocate professional teachers. In talent cultivation, curriculum is the core, teachers are the key, and hardware is the support. Under the mode of "project driven, competition teaching integration", a specialized teaching team is configured, selected from among teaching personnel who have served as innovative practical courses for a long time, and systematic training is conducted to gradually form specialized innovative practical teachers. On the one hand, innovative practical teachers undertake the course teaching tasks, refine innovative projects in teaching, and integrate competition teaching with competitions; On the other hand, it is dedicated to guiding high-level competitions, which are recommended by the school level and jointly guided by the school level to provide path and technical support for students' innovation and entrepreneurship.

5 Virtual simulation technology has been widely used in university teaching.

Through computers and virtual software, abstract and boring teaching can be made rich and colorful, and the teaching process becomes more intuitive and vivid, effectively stimulating students' learning interest and improving teaching effectiveness. The integration of virtual simulation technology into hydraulic and pneumatic technology courses mainly focuses on two aspects: the structural assembly of hydraulic components and the working principle of hydraulic oil circuits.

5.1 Structural assembly of hydraulic components

Virtual disassembly and assembly experiment of hydraulic component structure: Hydraulic pumps and control valves are important components of hydraulic systems. Through disassembly and assembly experiments, students can understand the structural composition and working principles of various hydraulic pumps and control valves, and master the analysis of common faults and troubleshooting methods of hydraulic pumps and control valves. Traditional disassembly and assembly experiments use physical objects, with a long experimental process and high equipment loss. Some parts of the equipment are lost after disassembly and cannot be assembled. The laboratory developed a virtual disassembly and assembly system for hydraulic pumps and control valves using UG software as a platform, using UG modeling modules and UG assembly modules. Firstly, the UG modeling module is used to establish the physical modeling of the hydraulic pump and control valve, and then the UG assembly module performs virtual disassembly and assembly of each component. Students log in to the system and click on the components that need to be disassembled according to the experimental progress to understand the composition of each component and understand its components. They can also rotate and zoom to observe the structural composition of the components from different angles.

5.2 Working principle of hydraulic oil circuit

The principle of hydraulic components demonstrates how hydraulic pumps output pressure oil, and how hydraulic control valves control the flow direction, pressure, and flow of hydraulic oil. In traditional teaching processes, these problems can only rely on teachers' gestures and written descriptions, but students find it difficult to understand their abstract working process. At the same time, the functional testing of traditional hydraulic basic circuits mainly relies on various instruments and sensors, which is cumbersome and not conducive to students' experiments and operations, and affects the effectiveness of the experiment. Therefore, Flash software is used to simulate the working process of hydraulic pumps and hydraulic control valves through animation. By clicking on the animation, students can clearly see the working process of the hydraulic pump, the movement of the valve core in the hydraulic control valve, and the opening and closing of the oil circuit. They can also visually see the flow and pressure curves of the control component, as well as the speed curve of the execution component.

6 Conclusion

The construction of applied demonstration courses for hydraulic and pneumatic technology courses mainly focuses on strengthening the integration of ideological and political education into courses, "project driven, competition education integration", and the application of virtual simulation technology. Its construction

significance is in line with the current ideas of Chifeng University construction, and its construction plan provides practical guidance for the development of similar professional disciplines.

Acknowledgements

This work was financially supported by the 2022 Chifeng University Applied Demonstration Course Construction Project (Grant No. SFK20210801), the Natural Science Foundation of Inner Mongolia Autonomous Region (Grant No. 2021MS05001), the Program for Young Talents of Science and Technology in Universities of Inner Mongolia Autonomous Region (Grant No. NJYT22117).

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