

Exploration and Practice of Ideological and Political Teaching of Fluid Transmission and Distribution Pipe Network

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Abstract

In the new era of socialism with Chinese characteristics, professional courses and ideological and political courses should develop in the same direction and synergy. How to effectively integrate ideological and political elements into professional courses and build a large pattern of all-round education is a new topic for professional teachers to cultivate people by virtue. In teaching design of "fluid transmission and distribution network" course, based on the Guiding Outline of Ideological and Political Construction of Higher Education Courses issued by the Ministry of Education, the curriculum teaching content was redesigned, which is around the "engineering fluid distribution network, fluid distribution network function and composition, fluid distribution network of hydraulic calculation and case analysis, fluid transmission and distribution network operation and adjust" four modules of professional knowledge and curriculum ideological content fusion design. Put the "salt" of ideological and political education into the teaching process of professional courses, and realize the unity of knowledge teaching, ability training and value guidance, and truly achieve the goal of curriculum education.

Keywords

Fluid Transmission and Distribution Pipe Network; Ideological and Political Courses; Mixed Teaching; Teaching Practice.

1. Foreword

In September 2020, the Chinese government proposed the "carbon peak and carbon neutrality target" (double carbon target) at the 75th Session of the United Nations General Assembly [1]. According to the China Building Energy Consumption Research Report (2021), in 2019, the whole process energy consumption in China reached 46% of the national total, the carbon emission reached 50% of the national total, and the carbon emission in the building operation stage reached 2.13 billion tons CO₂, accounting for 21.6% of the national carbon emissions. The construction industry has become one of the main battlefields to achieve the dual-carbon target [2]. "Double-carbon target" puts forward new requirements for the training of building energy related talents. To achieve the dual-carbon goal, a large number of building energy professionals with strategic vision, solid professional knowledge and information technology, innovative spirit and innovative ability are urgently needed.

"Fluid Transmission and Distribution Pipe Network" is very important in a professional platform course. The course is the "Air Regulation", "Ventilation Engineering", "Gas Distribution", "Heating Engineering", "The Ventilation Engineering", "The Construction of Water Supply and Drainage", "Boiler and Boiler Room Equipment", "Building Fire Engineering" and other courses of network system principle, after refining integration, enrich and into a course. Most of the graduates of built environment will be engaged in the energy application industry. The teaching of this course is of great significance to students' career enlightenment. Whether they are engaged in design and construction or operation management, we must help students set up correct views of values, morality, learning and happiness. The professional

construction in the future should not only cultivate skilled "specialists" for enterprises, but also help future engineers to establish correct life values and dignity, and gradually set up the trinity teaching goal of "value building, ability cultivation and knowledge transmission".

2. Ideological and Political Teaching Design of "Fluid Transmission and Distribution Pipe Network"

It is based on and followed by the Guiding Outline for Ideological and Political Construction of Higher Education Courses, The Guide for Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era into Curriculum and Teaching materials, and the Spiritual Department of Chinese Communists[3]-[6]. Based on the basic principle of student-centered, we scientifically set teaching objectives, optimize the supply of ideological and political content in the curriculum, and innovate the teaching methods of ideological and political education in the curriculum[7]-[10].

2.1. Course Objectives

In the context of COVID-19, schools have actively implemented the working policy of "postponing the opening of school without suspension", and the traditional teacher-centered teaching model has been challenged in the online teaching process. Many teachers are slightly deficient in ideological cognition, teaching resource reserve, teaching methods and methods[5]. Some students do not have the environment and conditions for online learning. In the traditional teaching mode, teachers usually play the leading role, which is easy to ignore the subjectivity of students, so the overall teaching quality is not good[6].

2.2. Curriculum Design

2.2.1. Educational Concept: Design of "Four Views" for Engineers

Centering on the implementation of the teaching concept of "curriculum ideological and political, common growth, reasonable burden increase, mixed classroom" and the learning concept of "hard work, happy experience, active understanding, self-growth", the four views of "values, morality, learning and happiness" are formed.

2.2.2. Teaching Module Design: The Design of the Four Major Modules

The teaching content was divided into four modules, as shown in Figure 1.

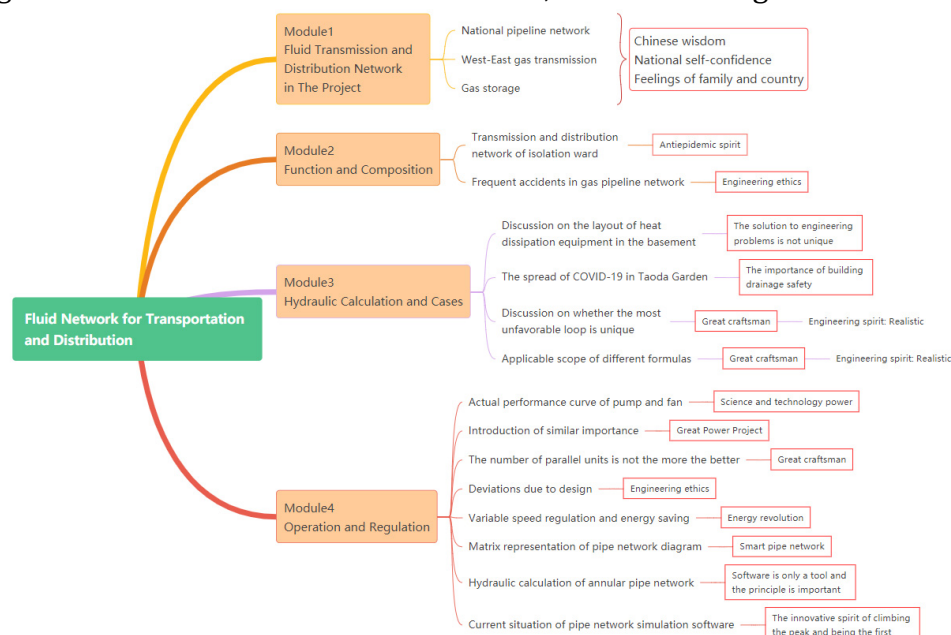


Figure 1. The ideological and political content of each teaching module

Module 1: the fluid transmission and distribution pipe network in the project

[Teaching content]: It mainly includes the west-east gas transmission project, south-to-north water diversion project, gas transmission and distribution pipe network, water supply and drainage pipe network, and air regulation pipe network.

[Teaching method]: It taught by case teaching method, mixed type, and discussion type.

[The ideological and political content]: Combined with the case teaching of practical projects such as national pipe network, west-east gas transmission, gas storage, south-to-north water diversion project, ideological and political elements such as appreciating Chinese wisdom and national feelings are integrated into the teaching of fluid transmission and distribution pipe network, so as to enhance national confidence and establish correct values.

Module 2: the function and composition of the fluid transmission and distribution pipe network

[Teaching content]: It mainly includes function and composition of gas transmission and distribution network, function and composition of liquid transmission and distribution network, and function and composition of multi-phase flow transmission and distribution network.

[Teaching methods]: It taught by case teaching method, mixed type, and discussion type.

[The ideological and political content]: It will integrate practical engineering cases into morality, and permeate the sincere heart of scientific research from the change of pipeline steel grade.

Module 3: hydraulic calculation and case of fluid transmission and distribution pipe network

[Teaching content]: It mainly includes hydraulic calculation method of fluid transmission and distribution pipe network, hydraulic calculation case of air transmission and distribution pipe network, hydraulic calculation case of gas transmission and distribution pipe network, hydraulic calculation case of water supply pipe network, hydraulic calculation case of drainage pipe network, etc.

[Teaching methods]: It taught by case teaching method, mixed type, and discussion type.

[The ideological and political content]: It will discuss design comprehensive cases, which is around scientific research spirit, craftsman spirit and engineering ethics. For example, designers should have the spirit of excellence and the spirit of scientific research, and establish the sense of rule of law and correct engineering ethics and morality in engineering design.

Module 4: the operation and regulation of the fluid transmission and distribution pipe network

[Teaching content]: It mainly includes the joint operation of equipment and pipe network, working condition point, analysis method of hydraulic working condition of branch pipe network, hydraulic working condition debugging and hydraulic stability of pipe network system, and dynamic adjustment of branch pipe network.

[Teaching method]: It taught by case teaching method, mixed type, and discussion type.

[The ideological and political content]: It will help students pay attention to the optimization of the operation scheme of fluid transmission and distribution pipe network, penetrate the concept of active learning, expand the energy saving method when the joint operation of fluid transmission and distribution pipe network and equipment, expand the relevant knowledge of energy revolution, and enrich students' view of learning and happiness.

COVID-19 (COVID-19 refers to pneumonia caused by novel coronavirus 2019.)

3. Specific Measures for the Ideological and Political Development of the Course

3.1. Combine the Course with Engineering Cases

The course is arranged in the sophomore year. At this stage, students are familiar with the learning methods of basic courses, but they are not deep in the concept of engineering, and there is a problem of thinking transformation in learning professional basic courses. Teaching should start from the engineering examples, introduce the problem solving methods, and explain the abstract process and practical application of relevant theories. The basic principle of case explanation is that the case should be typical, representative, explained thoroughly, and at the same time. We should guide students to analyze the differences and connections between different types of pipe networks, so that students can gradually form the analysis ability of "understanding by analogy". The construction of ideological and political resources of the fluid transmission and distribution network requires the organic combination of ideological and political elements such as national feelings, craftsman spirit, professional ethics with the course content, so that students can set up correct values, morality, learning and happiness while learning knowledge.

3.2. Task-based Teaching

Part of the course of fluid transmission and distribution pipe network, such as the hydraulic calculation of indoor gas pipeline, is complete and not difficult. Students can learn by themselves on the basis of being familiar with the branch pipe network and the assumed flow rate method. This content is suitable for task-based teaching, where students complete the hydraulic calculation process independently. Teachers are mainly responsible for the arrangement and summary of tasks, and the whole process is student-led. Task-based teaching can improve students' participation in learning, and students will gain a strong sense of satisfaction after completing their tasks. The teacher summarizes the difficult points and easy to error points in the hydraulic calculation process after the students complete the task, which is conducive to the students to deepen the impression and consolidate the knowledge points. In the course of fluid transmission and distribution pipe network, there are many contents suitable for task and project teaching. Completing the learning of corresponding content in the way of task or project is conducive to students to form the learning concept of "hard study, happy experience, active experience, self-growth".

3.3. Deepen the Mixed Teaching

Since the outbreak of COVID-19 at the end of 2020, adopting online and offline mixed teaching has been the norm in all schools, and students have been accustomed to switching from offline teaching to online teaching at any time. The hybrid teaching method is quite different from before. Online teaching requires high autonomy for students' learning, and the attention duration of students' online learning is shorter than that of classroom learning. Online teaching, special attention should be paid to the determination of teaching content and teaching methods and the grasp of teaching rhythm. The mixed teaching of fluid transmission and distribution network should adhere to the teacher as the leading and students as the main body, establish an equal, harmonious and democratic teacher-student relationship in the classroom ideological and political teaching, create a harmonious teaching environment, and create a two-way interactive teaching scene, so as to improve students' learning initiative and enthusiasm.

3.4. Improve the Evaluation System of Ideological and Political Education

The assessment content and methods of the course of fluid transmission and distribution pipeline network are enriched and improved, and the ideological and political elements of the course are integrated into the knowledge, ability and quality covered by the process assessment

and the final assessment, so as to guide students to pay attention to the learning of the ideological and political content of the course and improve the ideological and political teaching effect of the course. Combined with the course content, students are required to write ideological and political special reports of the course as a part of the usual results, so that the ideological and political teaching and assessment of the course form a benign interaction.

4. Conclusion

"Double-carbon" is an important goal of the green transformation and upgrading of China's energy industry in the future. The ideological and political education of Building Environment and Energy Application Engineering is not only a necessary measure for the major to cultivate compound talents, but also to facilitate the optimization of the talent structure of Building Environment and Energy Application Engineering to make the industrial development more consistent with the goal of "double carbon". In the construction of teaching education, each teaching link to natural into ideological and political education. By adopting diversified teaching methods, in the form of "silent" infiltration of socialist core values, making the fluid distribution network course bear educational function. Put ideological and political education in professional courses, realize the goal of ideological and political education in the course of fluid transmission and distribution pipe network, and contribute to the realization of the "double carbon" goal.

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