Construction of Curriculum Ideological and Political Model Curriculum based on the Background of Engineering Education Certification

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Abstract. The professional certification of engineering education is an important educational quality assurance system recognized internationally in the field of engineering education at present. The ideological and political construction of curriculum can cultivate students' craftsman spirit of great country for excellence. Engineering materials and machinery manufacturing is based on the process equipment and control engineering, mechanical engineering, an important professional course, in this paper, combining with the characteristics of curriculum and syllabus, fully excavate ideological elements of curriculum knowledge and build "people-oriented" of "s ix integration" ideological system, implements the concept of engineering education accreditation with course education accurately. This course can stimulate students' patriotism enthusiasm, cultivate students' practical ability and grasp the law of development of things.

Keywords: Course Education; Engineering Education Certification; Engineering Materials; Six of One; Patriotism.

1. Introduction

General Secretary Xi Jinping pointed out: "To make good use of classroom teaching as the main channel, ideological and political theory courses must be strengthened through improvement, enhance the affinity and pertinence of ideological and political education, and meet the needs and expectations of students' growth and development. A good channel, a good field of responsibility, so that various courses and ideological and political theory courses go in the same direction, forming a synergistic effect [1] ". The "Guidelines for the Ideological and Political Construction of College Curriculum" issued by the Ministry of Education in 2020 pointed out: "The ideological and political construction of the curriculum should be comprehensively promoted in all colleges and universities and all disciplines, focusing on the core point of comprehensively improving the ability to cultivate talents, around political identity, family National feelings, cultural literacy, awareness of the constitution and the rule of law, moral cultivation, etc. to optimize the supply of ideological and political content of the course, improve teachers' awareness and ability to carry out ideological and political construction of the course, systematically carry out education on socialism with Chinese characteristics and the Chinese dream, education on socialist core values, Rule of law education, labor education, mental health education, and excellent traditional Chinese culture education strengthen students' ideals and beliefs, and effectively improve the effectiveness of morality and people. Engineering professional courses should focus on strengthening students' engineering ethics education, and cultivate students' spirit of craftsmanship in a big country that strives for excellence. Inspire students' family and country feelings and mission to serve the country with science and technology [2] .

2. Engineering Education Professional Certification and Curriculum Ideology and Politics

Engineering education professional accreditation is an important education quality assurance system recognized internationally in the current engineering education field. It aims to propose a professional qualification evaluation certification for the higher education level of engineering majors,

and is also an important guarantee for the quality of engineering education. System [3] . Currently, the internationally recognized mutual recognition agreement for undergraduate engineering education degrees is the "Washington Agreement". In 2006, China launched the relevant pilot work with the equivalent effect of international engineering education professional certification. In 2013, it joined the "Washington Agreement" as a probationary member, and in 2016 it became a full member [4] . Carrying out relevant engineering education professional certification work can effectively support China's " Made in China 2025 " national strategy, the " Belt and Road " initiative, and the construction of new engineering majors to provide China with a large number of internationally recognized engineering talents [5] .

Under the background of professional certification of engineering education, how to better complete the professional course construction of engineering materials and mechanical manufacturing basic course ideological and political demonstration course construction has become a topic of great significance. Engineering Materials and Basics of Mechanical Manufacturing is a comprehensive technical basic course about the manufacturing methods and materials of mechanical parts. It is a compulsory course for students majoring in mechanical engineering in colleges and universities. The pre-requisite courses of this course are mechanical drawing, engineering mechanics, metalworking practice, etc., which are indispensable pre-requisite courses for subsequent courses such as mechanical design, interchangeability and technical measurement, and mechanical manufacturing technology. On the basis of metalworking practice, through the study of this course, students can acquire the knowledge of commonly used engineering materials and parts processing technology, cultivate the preliminary ability of process analysis, and lay the necessary foundation for studying other related courses and engaging in mechanical design and processing and manufacturing in the future. It can also provide a practical education foundation for the professional certification of engineering education [6] .

According to the goal of professional training, graduates should " possess the basic professional qualities and sense of social responsibility of engineers " , which is consistent with the ideological and political goals of the course, and also with the " OBE " concept advocated by engineering education certification - the educational concept based on results consistent with [7] . Therefore, ideological and political elements must be integrated into the formulation of curriculum teaching objectives, teaching method design and other links, so that the teaching of curriculum knowledge, moral cultivation, and value guidance complement each other and promote each other [8] .

3. Problems in the Teaching of Basic Courses of Engineering Materials and Mechanical Manufacturing

In recent years, with the continuous deepening of the construction of mechanical majors, many domestic colleges and universities have made preliminary preparations for the teaching content, teaching methods and teaching practice of "Engineering Materials and Mechanical Manufacturing Basics" around the talent training programs and target requirements of this major. However, it is still based on the teacher's classroom lectures. This teaching and learning method has been followed for decades and has certain characteristics and advantages. During the learning process of previous students, they feel that knowledge is not difficult to learn. But it is very difficult to really grasp the understanding, and the exam is also relatively difficult. The reasons for the existing problems are as follows:

First of all, the teaching content (textbook) is not logical. With the development of materials and machinery manufacturing technology, new technologies and new materials are constantly emerging, which have caused major changes in the scope and function of materials. However, the content of the teaching materials for this course has been too jumpy so far. For example, the first chapter of many textbooks talks about the properties of metal materials, and the second chapter skips to the study of the crystal structure of materials. However, the basis of crystal structure is atoms and their

arrangement. It is difficult to understand the microscopic crystal structure of materials, and students' learning efficiency is low.

Secondly, the teaching method is relatively simple. At present, many colleges and universities mainly focus on traditional narration. However, this course is more practical. It is not an abstract concept, but our common steel materials, non-ferrous metals, copper, aluminum and other materials. Students have seen it with naked eyes. But for microstructure or metallography, most students only learn through pictures or videos. So how to present the content in front of students more clearly, or let students understand the microstructure of metal materials more clearly, this requires teachers to adopt certain teaching methods in the teaching process to help students understand, which requires each teacher to seriously think about their own Teaching methods and technical means.

Therefore, the construction of the ideological and political demonstration course based on the background of engineering education certification - "Engineering Materials and Mechanical Manufacturing Foundation" is very meaningful. Combining knowledge imparting with value guidance, effectively integrating ideological and political elements into the course, so that Lide Shuren education can be moist and silent, and will guide students majoring in mechanical engineering to establish a correct outlook on life and values, and strengthen students' understanding of majors. Cognition and professional identity, cultivate engineers of the new era with a sense of professional honor, social responsibility, and a sense of mission to strengthen the country.

4. Construction of the Ideological and Political System of the Basic Course of Engineering Materials and Mechanical Manufacturing

Fig 1. Ideological and political system of basic course of engineering materials and machinery manufacturing

Requirements in the teaching syllabus: Students master the basic theory, basic knowledge and experimental skills of engineering materials through classroom teaching and experimental teaching, and have the ability to reasonably select materials for structural parts and arrange parts processing routes according to the use conditions and performance requirements of mechanical parts. Preliminary ability; acquire the knowledge of commonly used engineering materials and blank production technology, cultivate the preliminary ability of casting, forging, and welding process analysis; and lay the necessary foundation for studying other related courses and engaging in mechanical design and processing and manufacturing in the future. In order to achieve the teaching objectives of the course, combined with the goal orientation of Zaozhuang University to build a first-class application-

oriented university in China, and incorporating ideological and political elements such as materialist dialectics, professionalism, and craftsman spirit, the "six-in-one" course thinking of "people-oriented" was constructed. political system, as shown in Figure 1,

The above curriculum ideological and political system can build the coincidence, similarity and compatibility of curriculum ideological and political education and engineering education professional certification, integrate curriculum ideological and political and professional certification, and realize the simultaneous improvement of majors and courses; The basic courses of engineering materials and mechanical manufacturing of political significance are presented in the classroom in keeping with the times, so that the innovation of ideological and political education concepts and the concept of engineering education certification can go forward together; the combination of engineering education professional certification and course ideological and political The concept runs through all aspects of student training, continuous improvement, and the improvement of our school's professional construction and talent training level. To achieve the guidance of ideological value on the basis of knowledge imparting and ability training, the main objectives of the curriculum are as follows: first, to achieve the educational goals of cultivating morality and cultivating people; second, to integrate materialist dialectics and grasp the The main contradiction and the secondary contradiction, recognize the relationship between the whole and the part, build a full-staff, whole-process, and full-course education pattern, and cultivate students' awareness of the overall situation; third, cultivate students' professionalism, so that students have a craftsman spirit; fourth , The connection between the development history of learning materials and the development of human society, and the cultivation of patriotism among students.

4.1 Curriculum System Construction Implementation Plan and Method

The construction of the curriculum system is mainly divided into three stages. In the first stage, the syllabus is revised to implement the Outcome-Oriented (OBE) concept of engineering education certification. Using the case investigation method and literature data method to investigate and search for the syllabus of the "Engineering Materials and Machinery Manufacturing Foundation" course in domestic general undergraduate colleges, to compare and modify the syllabus, formulate the ideological and political goals of the course; revise the engineering materials and machinery manufacturing foundation course syllabus; develop a blended teaching curriculum construction plan. In the second stage, a course teaching team was formed to excavate the ideological and political elements of the course in the teaching materials and integrate them accurately. Use comparative research method and experience summarization method for research and communication, and accurately excavate. Form a teaching team with both ability and political integrity, which integrates majors and courses, and conducts regular course teaching exchanges. In the third stage, ideological and political elements are effectively integrated to achieve the organic integration of curriculum ideological and political and engineering education certification. Using Marxist theory, socialist core values and the theory of socialism with Chinese characteristics in the new era to accurately analyze the ideological and political aspects of the course to achieve the purpose of engineering education certification. Based on specific knowledge points, use Marxist theory to explain, based on the development of Chinese materials, stimulate students' patriotism and national pride, and based on the scientific stories behind the knowledge points, introduce socialist core values and the theory of socialism with Chinese characteristics in the new era.

4.2 Ideological and Political Elements in the Curriculum

The course takes the structure and performance of metal materials and the two knowledge modules of material processing technology as the core, and takes the development of students as the foundation. The development and innovation process of students, cultivate students' patriotic spirit, strengthen students' ideals and beliefs, focus on loving the party, patriotism, socialism, people, and the collective as the main line, and focus on political identity, family and country feelings, cultural literacy, awareness of the constitution and the rule of law, It aims to cultivate students' spirit of teamwork,

hard work, and overcoming difficulties, as well as the ability to find and solve problems in practice. According to the content of the course, ideological and political elements are excavated. In the process of explaining the classification and performance of engineering materials, students can strengthen their sense of democratic pride by understanding the development history of Chinese materials, inspire patriotism, and feel the growing strength of the motherland. Through the cooperation with world materials Develop an understanding of the gaps that exist in our country, and stimulate students' will to work hard. Show students the videos "Great Weapons of a Great Country" and "Awesome, My Country", explain while playing, and let students answer their impressions of watching. Strengthen cultural self-confidence and stimulate interest in learning. Take socialism with Chinese characteristics and Chinese dream education in the ideological and political curriculum as the integration point. First of all, the development history of materials is the history of human civilization. Our ancient bronzes have developed the same composition and application materials as the modern phase diagram, and the material forming technology contained in them is far superior to that of Western countries in the same period. We are ancient Chinese bronzes. Proud of brilliant scientific and technological achievements, my country's modern steel material output has ranked first in the world, and some key materials for 919 large aircraft and high-speed rail have been localized. Fundamentals of metallurgy chapters include the following points: crystal structure of metals, crystallization of pure metals, structure of alloys, phase diagrams of alloys. Build a full-staff, full-course, and full-course education pattern to train students to establish a sense of the overall situation. Through class discussions, students can establish the philosophical thought of quantitative change to qualitative change. The crystallization process of metals is a process of nucleation and nucleation growth, and needs to meet certain conditions of supercooling, energy fluctuations, and structural fluctuations; based on this knowledge point, the law of materialist dialectics of "mass mutual transformation" is introduced. In the mechanical properties of metals, there is a general rule of "the better the strength and hardness, the worse the plasticity and toughness". However, refining the grain can not only improve the strength of the metal, but also the better the plasticity and toughness; The law of materialist dialectics of "universality and particularity" and "unity of opposites". The chapter on iron-carbon alloys includes the following points: basic knowledge and application of phase diagram. By cultivating students' professionalism, students have the spirit of craftsmanship, and adopt a problem-based teaching method to guide students to understand. Strengthen cultural self-confidence and stimulate interest in learning. Introducing ideological and political elements - the process of forging and making swords in Chinese classical culture, leading to the importance of the iron-carbon alloy phase diagram. Chapter on heat treatment of steel: includes two main points of general heat treatment and surface heat treatment. Through the construction of a full-staff, whole-process, and full-course education structure, students are trained to establish a sense of the overall situation, establish a philosophical thought that sees the essence of the book through the phenomenon, and sees the essence through the phenomenon. Taking the most common kitchen knife in daily life and the blacksmith I saw in the village as an example, the essence of heat treatment, that is, the essence that affects the properties of materials, is drawn out. Commonly used engineering materials chapter: mainly includes three key points: the learning and application of industrial steel, cast iron, and other engineering materials. Let students feel the important role of the performance of materials in the national economy, cultivate students to have solid scientific knowledge, rigorous scientific style and strong family and country feelings, build a full-staff, full-course, and full-course education pattern, and train students to establish an overall situation consciousness. Using a problem-based teaching method to guide students to understand. Establish the philosophical thought of "interrelated constraints between things". Several elements of materials are interrelated and restricted. Engineering materials are classified based on different components in materials. Different components will lead to changes in the macroscopic properties of materials. Casting Chapter: It mainly includes four main points of casting theory, casting method casting, process design casting, and structural manufacturability. By cultivating students' socialist core values and national culture's self-confidence, sense of identity and sense of belonging, a full-staff, full-course, and full-course education pattern

will be constructed, and students will eventually be trained to establish a sense of the overall situation. Using a problem-based teaching method to guide students to understand the case teaching method. Teachers take the craftsman spirit as the main line, introduce the real stories of outstanding front-line workers, analyze the craftsman spirit of outstanding workers, and guide students to learn from outstanding workers. Promote social responsibility and professional interest. Casting is one of the most common and widely used processing techniques in metal material processing. The story of academician Shi Changxu, the father of Chinese material science in China, is introduced to reflect the importance of casting. Plastic Forming and Welding Chapter: Mainly includes three main points: the basics, methods and techniques of plastic forming and welding. Cultivate students' socialist core values; cultivate students' sense of self-confidence, identity and belonging to national culture, build a full-staff, whole-process, and full-course education pattern, and cultivate students' awareness of the overall situation. Using a problem-based teaching method to guide students to understand the case teaching method. Promote social responsibility and professional interest. By narrating academician, He Jilin's research, he created tantalum and niobium metal smelting, processing technology, technology and methods with independent intellectual property rights and realized engineering applications. Presided over and directed a number of new material technology research such as titanium alloy processing. Cutting machining chapter: mainly includes four points: basic knowledge of cutting machining, conventional machining methods of typical surfaces, basic machining technology, and manufacturability of parts structure. Cultivate students' socialist core values; cultivate students' sense of self-confidence, identity and belonging to national culture, build a full-staff, whole-process, and full-course education pattern, and cultivate students' awareness of the overall situation. Using a problem-based teaching method to guide students to understand the case teaching method. Teachers take the craftsman spirit as the main line, introduce the real stories of outstanding front-line workers, analyze the craftsman spirit of outstanding workers, and guide students to learn from outstanding workers. Strengthen cultural self-confidence and stimulate interest in learning. Mechanical processing accounts for a relatively large proportion of my country's GDP, and the values of the three cutting elements and the tool angle directly reflect the spirit of excellence in work.

5. Innovation Points and Promotion Value

This topic is based on the construction of curriculum ideological and political demonstration courses under the background of engineering education certification, and accurately combines the OBE concept of engineering education certification with curriculum ideological and political, which is more in line with the connotation of new engineering construction. The innovation points of the project are as follows: First, build the coincidence, similarity and compatibility of curriculum ideological and political education and engineering education professional certification, and integrate curriculum ideological and political education with professional certification. Second, the innovation of curriculum ideological and political education concept and the concept of engineering education certification move forward together. Third, the OBE concept of engineering education professional certification runs through all aspects of student training and curriculum ideology and continuous improvement. After the research is successful, it can be promoted in the engineering education certification major of Zaozhuang University. After the internal promotion is successful, it can be promoted in domestic ordinary colleges and universities, which has extensive and practical promotion value.

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