

The Realization Path of Exploring Ideological and Political Resources in Mechanical Engineering Materials under the New Era's "Great Ideological and Political" Framework

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Abstract: This article explores the realization path of ideological and political resource excavation in the curriculum under the "Great Ideological and Political" framework of the new era. It analyzes the current problems in curriculum ideological and political education, and proposes a realization path for excavating ideological and political resources in the curriculum from three main aspects: curriculum teacher team construction, curriculum ideological and political education design, and multimedia-assisted teaching. Various measures are taken to stimulate students' learning enthusiasm and participation, enhance students' sense of achievement in classroom learning, and ultimately achieve the goal of nurturing students.

The "Record of Rites" states: "The way of great learning lies in manifesting one's bright virtue, loving the people, and stopping at the highest good." This passage points out the purpose of higher education is to promote virtues, encourage innovation, and lead individuals to achieve the highest level of excellence [1]. Modern higher education is a place for fostering talents and instilling moral values, and it serves as an important indicator of a country's level of development and potential. In recent years, the state has placed a strong emphasis on the development of ideological and political work in higher education.

On December 7, 2016, the National Conference on Ideological and Political Work in Higher Education emphasized the central role of moral education in higher education and the integration of ideological and political work throughout the entire process of education and teaching. It also called for all courses to uphold their respective responsibilities, aligning various courses with ideological and political theory courses to create a synergistic effect [2]. This statement indicates that ideological and political education in universities is not solely the responsibility of ideological and political theory courses; various professional courses also play a role in ideological and political education. It signifies that the construction of "curriculum ideological and political education" in universities has entered a new stage.

The quality improvement project for ideological and political work in higher education states: "Review the ideological and political education elements contained in various professional courses and the ideological and political education functions they carry, integrate them into all aspects of

classroom teaching, and achieve organic integration of ideological and political education with knowledge-based education." This interpretation further deepens the concept of "curriculum ideological and political education." [3]

Talent cultivation systems encompass academic disciplines, teaching systems, teaching materials, management systems, etc. Ideological and political work runs through these systems. Universities, as the forefront of talent cultivation, must prioritize moral education. Embracing internal development is an essential path for the development of China's higher education [4].

"We must adhere to the unity of explicit and implicit education, tap into the ideological and political education resources contained in other courses and teaching methods, and achieve comprehensive, full-process, and all-round education for all." "We must improve the curriculum system and address the coordination between various courses and ideological and political theory courses" [5].

The Guidance Outline for Curriculum Ideological and Political Construction in Higher Education Institutions states: "Promote curriculum ideological and political construction in various disciplines according to their characteristics. Professional courses are the basic carriers of curriculum ideological and political construction. We must thoroughly review the teaching content of professional courses, integrate ideological and political education elements, and organically incorporate them into curriculum teaching to achieve the subtle and silent effects of nurturing students." "For engineering courses, we should focus on strengthening students' engineering ethics education, cultivating students' spirit of pursuing excellence, and inspiring students' sense of duty and mission to serve the country with science and technology" [6].

It is evident that the construction of curriculum ideological and political education in higher education is of great significance for talent cultivation. It also places higher requirements on the reform and innovation of various professional foundational courses and specialized courses. How to achieve efficient integration of specialized courses with ideological and political education, and how to fully unleash the educational functions of professional foundational courses and specialized courses are pressing issues that "curriculum ideological and political" construction urgently needs to address. How to design curriculum ideological and political education effectively is the primary link in implementing "curriculum ideological and political" in higher education institutions under the new era's "Great Ideological and Political" framework. It is also the key to ensuring the effective implementation of "curriculum ideological and political." In this context, this article actively explores the realization path of excavating ideological and political elements in the curriculum in the mechanical engineering materials course, which is based on the actual cultivation of high-quality applied talents in our university. [7]

1. Introduction to the Course "Mechanical Engineering Materials"

"Mechanical Engineering Materials" is a compulsory foundational course for mechanical engineering majors. The course is offered in the fourth semester and serves as a bridge between general education courses and specialized courses. Prerequisite general foundational courses include "Mechanical Drawing," "University Physics," "Engineering Mechanics," among others, while subsequent courses include "Mechanical Design," "Mechanical Manufacturing Technology," "Mechanical Equipment Design," and more. The course has a total of 40 class hours, with 34 hours dedicated to theory and 6 hours to practical experiments.

The primary focus of the course is to introduce fundamental theoretical knowledge and practical applications of materials in mechanical engineering. The course predominantly covers ferrous materials and elaborates on the relationship between material composition, processing, structure, and properties. It also succinctly introduces the applications of non-ferrous metals and their alloys,

polymer materials, ceramics, composite materials, and more in mechanical engineering. Through this course, students acquire a solid foundation in the theoretical knowledge of mechanical engineering materials, develop the engineering competence to select and apply materials appropriately, and gain analytical skills and research capabilities for material-related issues. The course lays the theoretical groundwork for subsequent specialized courses related to component materials selection, heat treatment process planning, and more.[8]

While delivering professional knowledge, the course aligns with ideological and political education, aiming to achieve collaborative educational goals. The course emphasizes the cultivation of students' professional ethics, engineering ethics, the spirit of pursuing excellence, a sense of duty and mission to serve the country with science and technology, and patriotism.

2. Challenges in Ideological and Political Education within the Course "Mechanical Engineering Materials"

The teaching content of the "Mechanical Engineering Materials" course includes numerous material names and concepts. It is highly theoretical and lacks visual appeal, often lacking logical deduction. Students tend to find the classroom teaching dry and tedious. In the initial stages of implementing ideological and political education within the course, due to insufficient depth in teacher learning and misconceptions in understanding, the ideological and political resources are somewhat superficial, and the teaching design is suboptimal. As a result, there are several issues in the ideological and political education aspect of the course: it is overly evident, feeling forced; it includes fabricated content, overstating small elements; inappropriate ideological and political elements may harm the knowledge structure of the professional course, disrupt its logical flow, and blur the course's focus; superficial integration without substantial connections results in a situation where professional knowledge dissemination and ideological and political education lack substantive integration, appearing merely superficial. The key to addressing these issues lies in how teachers can unearth the ideological and political resources within the course and maximize their value in nurturing students.[9]

3. Path to Unearthing Ideological and Political Education Resources in the "Mechanical Engineering Materials" Course

3.1. Building the Course Teaching Team

In his famous work "Fa Yan," Yang Xiong of the Western Han Dynasty stated, "A teacher is the role model for others." The "Record of Rites" emphasizes the importance of skilled teaching, saying, "A good teacher helps others pursue their aspirations." During the Tang Dynasty, Han Yu expressed, "A teacher is the one who imparts knowledge, solves doubts, and guides the way." The "Book of Changes" states, "A noble person advances in virtue and cultivates skills." As role models for students, teachers should possess ideals, morality, knowledge, and compassion.

Renowned educator Tao Xingzhi once said, "Teachers are responsible for teaching people to seek the truth," while students are responsible for learning how to become genuine individuals. Deng Xiaoping also pointed out that the key to whether a school can cultivate qualified talents for socialist construction, individuals with all-around development in morals, intellect, physique, and a sense of socialist consciousness, lies with the teachers. To be a good teacher means having strong ideals and beliefs, moral integrity, solid knowledge, and a compassionate heart. Effective implementation of ideological and political education within the curriculum heavily relies on the leadership role of teachers. Teachers must demonstrate outstanding political qualities, superb professional abilities, and high-level student mentoring skills to bring "Course Ideology and Politics" to life in the classroom.[10]

As university educators, teachers bear the sacred responsibility of nurturing the next generation. They should not only be well-versed in their respective fields but also possess a basic understanding of knowledge beyond their specialties. They must strive to be experts within their domains and knowledgeable about subjects beyond their own. Teachers' words and actions have a profound impact on students and serve as strong examples. Therefore, university educators must continually educate themselves. While imparting specialized knowledge, they should strive to become disseminators of ideology and culture, mentors for students' healthy growth, and guides in their journey of personal development.[11]

The construction of "Course Ideology and Politics" requires teachers to prioritize ideological awareness, harness their enthusiasm and initiative, and build a course teaching team that collaboratively designs the curriculum. Through top-level design, unified thinking, collective brainstorming, complementary strengths, and the exploration of natural points of convergence between ideological and political education resources and professional knowledge, the teaching team aims to develop a teaching system that seamlessly integrates knowledge transmission and value guidance, thereby maximizing the educational potential of ideological and political education resources.

The mechanical engineering course team, guided by the principles of nurturing students' character and spirit, has collectively studied important discourse and documents related to course ideology and politics and familiarized themselves with our university's course ideology and politics development plan. Specifically, they have studied the important discourse on ideological and political education in higher education in the new era, deeply implemented important discourse on education, and integrated ideological and political education throughout the talent development system. They have emphasized the role of the "Mechanical Engineering Materials" course in nurturing students within mechanical engineering disciplines and enhancing the quality of talent development at our college.

The course team actively participates in special training and academic exchange activities related to course ideology and politics. They engage in campus-based training for course ideology and politics, establishing a firm understanding of course ideology and politics concepts, enhancing their political and theoretical literacy, and consolidating a shared understanding of student development. During their spare time, the course team engages in discussions and exchanges to explore how to seamlessly integrate ideological and political elements into the curriculum without causing disruptions, all while continuously developing methods to assess the achievement of course ideology and politics objectives.

3.2. Ideological and Political Education Design in the "Mechanical Engineering Materials" Course

The course team first takes a systematic approach to overall planning and deployment, providing essential guidance for teachers to unearth ideological and political education resources. "Mechanical Engineering Materials" is a fundamental course in mechanical engineering closely related to practical production. It requires abstract and logical thinking skills. Through this course, students acquire knowledge of common engineering materials, comprehend the intrinsic relationships and physical essence of material composition, structure, heat treatment processes, and properties in various mechanical engineering applications. They learn to make informed material selections and develop appropriate processing routes for mechanical engineering designs. This course also emphasizes engineering ethics, the spirit of pursuing excellence, and a sense of duty and mission to serve the country with science and technology.

The course team first enhances teaching design, summarizing existing case studies and ideological and political elements within the curriculum. They proceed to identify more accessible and

implementable ideological and political elements, aiming to seamlessly integrate them with the teaching content.

The course team selects curriculum knowledge points for unearthing ideological and political education resources, including topics such as the mechanical properties of metallic materials (hardness), the crystallization process of metals, concepts of iron-carbon alloys, basic structures of iron-carbon alloys, the influence of carbon content on iron-carbon alloy properties, an overview of heat treatment, comparisons between pearlite, sorbite, and martensite, the purpose of full annealing, the application of spheroidizing annealing, concepts of quenching, quenching cooling media, induction hardening of steel surfaces, flame hardening of steel surfaces, surface carburization, Q345 steel, Q460 steel, bearing steel, ferritic stainless steel, austenitic stainless steel, industrial aluminum, and engineering plastics (such as polyether ether ketone).

The ideological and political education objectives for the course focus on nurturing students' engineering ethics, engineering consciousness, teamwork spirit, the spirit of pursuing excellence, and a sense of duty and mission to serve the country with science and technology.

Resource material selection involves the full utilization of visual and textual aids, current events, and abundant online resources, including production site videos and documentaries such as "Super Engineering," "Great Nation's Arsenal," "Great Nation's Craftsmen," "Hong Kong-Zhuhai-Macao Bridge," and "Wonderful China." These resources showcase China's remarkable engineering and scientific achievements in recent years. During lesson preparation, teachers select segments related to the study of engineering materials, providing students with an enlightening journey through engineering achievements and scientific spirit.

Strengthening Engineering Ethics Education: In the section discussing the heat treatment of steel in the "Mechanical Engineering Materials" course, short videos are used to narrate the remarkable history of China's Baolian Steel, ancient quenching methods for knives and swords (covering methods like applying mud or horse urine), and modern surface hardening technology for camshafts. These examples inspire students to adopt a proactive life outlook and learning attitude, fostering unwavering ideals and beliefs, national pride, and cultivating a rigorous and truth-seeking scientific and humanistic spirit.

Promoting Engineering Ethics: In the "Mechanical Engineering Materials" course, the focus is on training students to assess parts' working conditions and failure modes, determining performance indicators for parts' resistance to failure, selecting materials rationally, and devising suitable cold and hot processing routes for components. Given the urgent need for sustainable development, low-carbon environmental protection, and cutting-edge national defense technology, students are guided to consider issues such as cost and environmental protection when selecting materials for mechanical design.

Instilling a Sense of Duty to Serve the Country with Science and Technology: Through video presentations of the online hardness testing system for automotive brake drums, students are introduced to the most advanced hardness testing methods in China. This cultivates students' engineering consciousness and innovative spirit. Videos showcasing the past and present of the Nanjing Yangtze River Bridge, which was constructed in 1960 and initially aided by the Soviet Union, provide an example of how, despite the Sino-Soviet split in 1960, China independently produced bridge steel. By emphasizing this aspect, students are made aware of China's indomitable spirit of self-reliance and its ability to overcome adversity, thus nurturing their patriotism.

The Spirit of Pursuing Excellence as Great National Craftsmen: Within low-alloy high-strength steel, there are some steels with significantly higher strength than Q345, and they are increasingly used in modern applications. For instance, Q460 is widely used in large or heavily loaded structures. One of the most iconic applications in China is the National Stadium, known as the "Bird's Nest." The stadium's external structure is primarily composed of portal frames, with 24 nodes supporting

the enormous roof structure. This case demonstrates the importance of Q460 steel, which is used in critical areas of thin steel plates, and highlights the significance of this steel in making the Bird's Nest a reality. While the quantity of Q460 steel used may be less than that of Q345, it plays a vital role in crucial components like composite steel column nodes, underlining its importance. Through such case explanations, students come to appreciate China's research prowess in alloy steels, instilling national pride and patriotism. It also nurtures students' engineering awareness and sense of responsibility.

Fostering Teamwork: Students use optical microscopes to observe the equilibrium phase diagram of iron-carbon alloys. This exercise nurtures their ability to review the past and gain new insights, fostering a rigorous and truth-seeking scientific and humanistic spirit, an ability to conduct in-depth research, and a fearless attitude toward challenges. It also encourages a sense of teamwork.

3.3. Achieving Educational Goals through Multimedia-Assisted Teaching

Ideological and political education within the curriculum should be effectively conducted through classroom teaching, actively promoted within the context of a smart teaching environment, and enhanced through the application of modern information technology. Innovative teaching methods and optimized strategies for embedding ideological and political education resources are essential. These measures aim to fully engage students' enthusiasm and initiative, stimulate their interest in learning, encourage deep thinking, improve teaching quality, and achieve the goals of ideological enlightenment and value guidance.

By creating interactive multimedia courseware, teachers can incorporate text, images, animations, videos, and various teaching methods such as heuristic, question-based, and case-based approaches to pique students' interest. Psychological studies show that once interest is triggered, students naturally become more focused on solving problems, dedicating more energy to exploring the issues at hand.

4. Conclusion

Higher education has always adhered to the central focus of fostering virtue and nurturing talent. It integrates ideological and political education throughout the entire process of teaching and learning, achieving comprehensive student development. This article has discussed how to enhance teachers' ideological and political awareness, improve their ability to unearth ideological and political education resources, create interactive multimedia courseware, and build colorful course ideology and politics classrooms. Through various measures, it aims to stimulate students' enthusiasm and participation, enhance their sense of achievement in classroom learning, and ultimately achieve the goal of nurturing well-rounded individuals.

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