

Design and Implementation of Ideological and Political Education Based on the Course of Mechanical Manufacturing Technology

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Abstract: The implementation of curriculum ideological and political education in vocational education is an important component of achieving the goal of "all-round education". This article takes the course of "Mechanical Manufacturing Technology" as an example to deeply analyze the characteristics of the course and the problems that exist in teaching. With "one center, three perspectives, and four civilizations" as the main line, it explores the path and teaching methods of implementing ideological and political education in the course, in order to strengthen students' ideological and moral cultivation and cultivate their craftsmanship spirit.

Keywords: Vocational Education; Mechanical Manufacturing Technology; Course Ideological and Political Education.

1. Introduction

In 2022, the 13th National People's Congress revised the Law of the People's Republic of China on Vocational Education for the first time. Article 4 of the Law once again emphasizes that the implementation of vocational education must adhere to the leadership of the CPC, adhere to the socialist direction of running schools, implement the national education policy, take moral cultivation as the foundation, carry out ideological and political education and professional ethics education for the educated, impart professional knowledge, cultivate professional skills, provide vocational guidance, and comprehensively improve the quality of the educated.

At present, vocational college students mainly integrate ideological and political education courses into the field of public basic learning, introducing the development forms of Chinese politics, culture, economy, and diplomacy, and enhancing students' confidence and sense of social responsibility.

The course of Mechanical Manufacturing Technology is a core professional course in higher vocational engineering colleges. It has strong practicality and cultivates students to establish correct worldviews, outlooks on life, and values in course teaching. It is necessary to integrate ideological and political education into the imparting of professional knowledge through course teaching as the main channel, and achieve collaborative education of ideological and political construction in courses.

On the basis of analyzing the characteristics of mechanical manufacturing technology courses and the problems existing in teaching, this article explores the integration of ideological and political education in mechanical manufacturing technology courses, and explores how to integrate ideological and political education into the imparting of professional knowledge by using course teaching as the main channel, and achieve collaborative education in curriculum ideological and political construction.

2. Characteristics of Mechanical Manufacturing Technology Course and Problems in Teaching

The mechanical manufacturing technology course, as a core course in the field of mechanical engineering, is characterized by its wide and deep content, as well as the close integration of theory and practice. This course not only requires students to have a solid theoretical foundation, but also to possess excellent practical skills and problem-solving abilities.

However, in actual teaching, we face many challenges: firstly, the teaching content is diverse, including knowledge of metal cutting principles, machine tools and fixtures, mechanical processing methods and processes, etc. The course information is large and the knowledge points are numerous, making it difficult for students to achieve a balance between depth and breadth within the limited class hours. And the practicality of the course is too strong, making it difficult for students to transform abstract theories into intuitive understanding, resulting in a disconnect between theory and practice. Secondly, there is a lack of ideological and political education in curriculum teaching. Traditional teaching often focuses on theoretical lectures and skill training, lacking guidance for students to think about deep-seated issues such as technical ethics and professional ethics. This teaching method of 'discussing technology based on technology' is difficult to stimulate students' moral consciousness and humanistic care. In addition, the course content focuses too much on technical details and process flow, and students are surrounded by a large amount of professional knowledge, often neglecting the social significance and ethical considerations behind technology.

3. The Path of Implementing Ideological and Political Education in the Course of Mechanical Manufacturing Technology

(1) Constructing the "One Three Four" Education Model

The mechanical manufacturing technology course has strong practicality and applicability, combined with enterprise process production. The course content is broken down into six modules: metal cutting basics, metal cutting methods and equipment, mechanical processing process specification design, mechanical processing quality and control, mechanical assembly process, and machine tool fixture design. Based on the course content, a thorough analysis of the knowledge foundation related to ideological and political education in the curriculum is conducted, with a focus on cultivating students' moral character. Starting from the perspectives of quality, knowledge, and ability, the ideological and political elements of the curriculum are deeply explored from four aspects: political civilization, spiritual civilization, social civilization, and ecological civilization. A "one three four" ideological and political education model is formed, as shown in Figure 1, to achieve the integration of the "salt" of ideological and political education into the "water" of professional courses, making it taste and leave no trace when immersed in the water.

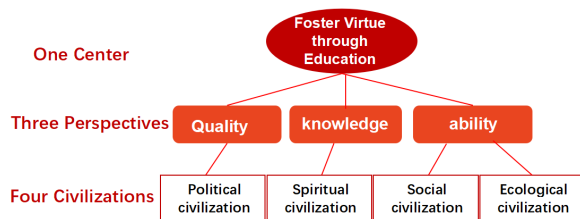


Figure 1. "One Three Four" Education Model

(2) Integrating ideological and political elements of the "Four Civilizations"

Mechanical manufacturing technology is a course that combines practicality and skills, with a focus on vocational job demands and student employment prospects when teaching course content. Thoroughly analyze the ideological and political education elements contained in political, spiritual, social, and ecological civilization, such as patriotism, national confidence, cultural confidence, professional ethics, etc., and construct the "four civilizations" system of ideological and political education, as shown in Figure 2. The course content focuses on students' characteristics and growth: the design of ideological and political content in the course should fully consider students' subjective initiative, and the educational goals should adapt to students' growth and development, making ideological and political education highly, deeply, and approachable. In project-based teaching, actively integrate the spirit of craftsmanship, patriotism, green manufacturing, etc., focus on shaping students' own values and cultivating their ideals and beliefs, and guide students to integrate knowledge and skills with the four civilizations in their future work positions.

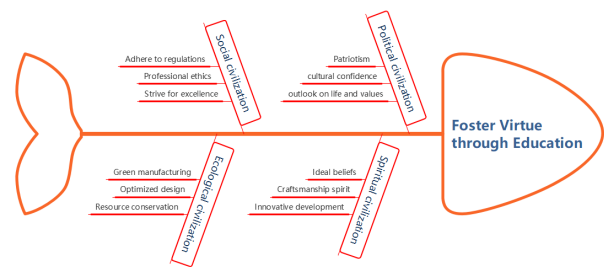


Figure 2. Elements of Ideological and Political Education in the Four Civilizations

(3) Constructing a Curriculum Ideological and Political Matrix Diagram

Carefully analyze the key knowledge points of each project in the mechanical manufacturing technology course, and based on in-depth study of the ideological and political concepts of the course, organically integrate the ideological and political elements of the "Four Civilizations" into the course content to form the course ideological and political map, as shown in Figure 3.

Entry name	Content of courses	Mapping and integration points of ideological and political education	Goals of educating people
Principles of Metal Cutting and Cutting Tools	The current situation and opportunities of the manufacturing industry; Tool structure angle and material; Tool wear and tool life; Cutting force; Reasonably choose cutting conditions	The connection between the epidemic and the manufacturing industry. Made in China 2025. The mutual constraint relationship between tool angle selection, the introduction of dialectical materialism, and the primary and secondary contradictions. Tanyuan Iron and Steel's "Pen Tip Steel". Li Feng, a master craftsman from a major country, specializes in handcrafted precision grinding tools. CNC cutting tool active tool spectrum - Zou Feng. Great country craftsman - using hard alloy to achieve 0.12mm micro hole wire drawing die. The advantages and disadvantages of tool material performance should not be generalized.	Love the motherland; Cultural confidence; Ideal aspirations; Professional ethics; Craftsmanship spirit; Outlook on life and values.
Metal cutting machine tool	Equipment classification, composition, and processing scope; Selection of machining parameters for machine tools; Turning and milling tools; Milling and milling cutters	US sanctions Huawei, highlighting the importance of processing equipment. Great country craftsman - Wang Yang, participated in the production of key components for the Shenzhou spacecraft. National technical expert - Long Xiaoping, CAP1400 nuclear power rotor precision machining. Great country craftsman - Wang Shuan, researching and developing high-end equipment. The concept of remanufacturing for railway construction heavy industry enterprises.	Love the motherland; Cultural confidence; Professional dedication; Professional ethics; Craftsmanship spirit.
process planning	Process specification design; Process documents and process preparation; Process size, Process dimension chart.	Legal programs highlight the importance of rules and regulations. When selecting the process specification scheme, the accuracy of the processing method should be gradually improved without skipping levels. The philosophical idea of quantity change causing quality change should be introduced, emphasizing that everything should be done step by step and down-to-earth. Analyze the applicable scenarios and their respective advantages and disadvantages of the machining process plan for parts, and introduce a philosophical idea of comprehensively understanding and analyzing problems from multiple perspectives. Analyze the relationship between parts and machine equipment, introduce the relationship between the whole and the individual, the relationship between the country and the individual, and integrate patriotic consciousness.	Comply with regulations; Cultural confidence; Outlook on life and values; Optimize design. Save resources, refine on.
machining accuracy	The concept of machining accuracy and the factors that affect machining accuracy; Ways to improve and ensure accuracy	Great Nation Craftsman - Xia Li "Improving 'Chinese Precision' to the slightest extent. Recommend watching 'Great Nation Craftsman' to explain the technical requirements of parts, introduce the impact of part size accuracy on production costs and product quality, and cultivate cost and quality awareness. Condense the spirit of great country craftsmen in mechanical processing technology. Analyze the vibration during mechanical processing and pay attention to its impact on health and the environment.	Love the motherland; Professional ethics; Green manufacturing; Craftsmanship spirit; Save resources, refine on.
Machine Tool Fixture Design	Positioning components; Analysis of positioning errors; Clamping of workpieces in fixtures; Fixture composition and typical fixtures	Reasonable fixtures improve work efficiency. Emphasize the selection of standard components, highlight the importance of complying with industry standards, and teach that the drawing of fixture diagrams reflects the rigorous spirit of great country craftsmen. When explaining positioning errors, fully demonstrate the scientific and important nature of engineering calculations. Diamond shaped pins and other positioning components reflect the wisdom of engineering and technical personnel.	refine on, Comply with regulations; Craftsmanship spirit; refine on, Cultural confidence.
Design of Mechanical Assembly Process Regulations	Assembly foundation, assembly dimension chain	Assembly standards and law-abiding citizens; Assembly, low-carbon, environmentally friendly, and green development.	Green manufacturing; Comply with regulations

Figure 3. Course Ideological and Political Map

Integrating ideological and political elements into content knowledge points, such as in the introduction of the course on mechanical manufacturing technology, discussing the development and importance of mechanical manufacturing technology, and cultivating students' awareness of serving society. China's self-reliance has transformed from poverty to a manufacturing powerhouse, and is moving towards becoming a manufacturing powerhouse; The design and manufacturing of major national weapons such as high-speed trains, space shuttles, and submarines cannot be separated from the spirit of dedication, craftsmanship, and innovative manufacturing. Inspire students' patriotism with the dedication of the older generation of scientists and the craftsmanship spirit of ordinary positions, and guide them to establish their ideal aspirations of contributing their own strength to the great development of the country.

(4) Forming the "Five Rings" and educating students throughout the process

Following the "one three four" education model, the content of professional courses incorporates ideological and political education elements in the form of preview, introduction, content, interaction, and assessment, as shown in Figure 4. The construction of ideological and political education in the curriculum implements the concept of "whole process education", follows the implementation

process of curriculum project teaching, follows the laws of education and student growth, and has different focuses at different stages. With a three-dimensional approach of quality, skills, and knowledge, the "Four Civilizations" ideological and political education is integrated throughout the entire process of "pre class, during class, and after class" in classroom teaching.

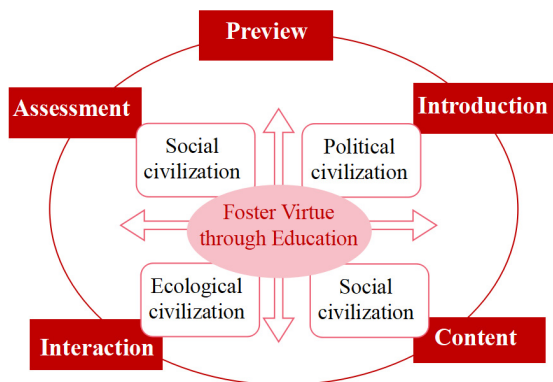


Figure 4. The Whole Process of Ideological and Political Education at the Five Rings Festival

Taking the course content of "Performance of Cutting Tool Materials" as an example, a self-learning video of cutting tool materials and a discussion on what materials are commonly used for fruit knives will be released before class. Students will preview the knowledge points of cutting tool material performance in advance to cultivate their self-learning ability; In class, the case of Taiyuan Iron and Steel's "Pen Tip Steel" was introduced to explain the history of innovative development of mechanical manufacturing materials in China, enhancing students' patriotism and innovative manufacturing. In teaching the content of hard alloy cutting tool materials, Zhang Jianming, a master craftsman from a major country, independently developed the "High precision Ultra fine Hard Alloy Micro hole Drawing Die Core". The quality meets the requirements of Q/OHNG 013-2013 standard, and the main performance indicators are comparable to the international advanced level, with significant economic and social benefits. Inspire students' strong patriotism, national confidence, and craftsmanship spirit of innovative development; Course assessment includes skills and daily grades, based on students' horizontal evaluation and vertical value-added evaluation, comprehensively assessing students' grades.

4. Research on the Teaching Method of Ideological and Political Education in the Implementation Course of Mechanical Manufacturing Technology

(1) Ideological and political education runs through the entire process of the curriculum

The construction of ideological and political education in the curriculum implements the concept of "whole process education", follows the implementation process of curriculum project teaching, follows the laws of education and student growth, and has different focuses at different stages. With a three-dimensional approach of quality, skills, and knowledge, the "Four Civilizations" ideological and political education is integrated throughout the entire process of "pre class, during class, and after class" in classroom teaching.

(2) Integrating ideological and political elements into

various forms of content

When sorting out the knowledge points of mechanical product quality, taking the case of Japan's "never loose" nut as an example, comparing the differences in mechanical product quality between China and foreign countries, analyzing the rigor of mechanical manufacturing, and promoting the spirit of craftsmanship. Incorporating Chinese mechanical manufacturing achievements into case teaching to inspire students' patriotism. Introduce personalized evaluation in assessment and evaluation to encourage students of different levels to continue improving their knowledge and skills.

(3) Integrating ideological and political education into online and offline teaching

To enhance teaching effectiveness, combining resources such as images, animations, videos, etc. with online platforms, fully utilizing the novel, fast, and diverse characteristics of online resources, and conducting ideological and political education through blended online and offline teaching can not only improve teaching effectiveness, but also enable students to make full use of their spare time to improve learning efficiency. Through the discussion forum of the Chaoxing Machinery Manufacturing Technology Network Platform, content such as the history of Chinese manufacturing, the latest achievements of Chinese manufacturing, and the gap between Chinese and foreign manufacturing will be released. Based on the platform, discussions will be held with students to address the problems that students face in a concentrated manner through offline classroom interaction. It is also possible to publish course ideological and political materials on the Chaoxing platform before class, using questions as a guide to assign self-study content. In addition, through this platform, teachers can pre add ideological and political exercises, in class exercises in offline classrooms, and explain the problems that arise during the exercises for students to quickly understand. In order to fully utilize online information and strengthen timely interaction between teachers and students, QQ groups and WeChat groups are established on a class by class basis to publish course ideological and political content in real time. Students can express their learning insights, questions, and opinions at any time in the group. Helps to strengthen students' learning initiative and stimulate their patriotic enthusiasm.

5. Conclusion

The ideological and political education of the curriculum should start from the daily teaching of the curriculum, in order to strengthen the ideological and political construction of the mechanical manufacturing technology curriculum and cultivate mechanical manufacturing technology talents with patriotism and both moral integrity and talent. This article analyzes the exploration and integration of ideological and political points in the course of mechanical manufacturing technology, which can help students understand the background and application fields of professional course knowledge, improve teaching quality, and promote the achievement of the goal of cultivating high-quality skilled talents.

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