https://doi.org/10.37420/j.cer.2025.082

Exploration on Ideological and Political Teaching Reform and Practice of Mechanical Design Course

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Abstract:
Under the background of implementing the fundamental task of "establishing morality and cultivating people" in higher education, mechanical design, as the core basic course of mechanical specialty, urgently needs to integrate ideological and political elements into the whole teaching process. Based on the characteristics of Mechanical Design course and the requirements of ideological and political education, this paper explores the reform path of ideological and political education from four dimensions: reconstruction of teaching objectives, optimization of teaching contents, innovation of teaching methods and perfection of evaluation system. By excavating the ideological and political elements such as family feelings, craftsman spirit, scientific thinking and social responsibility in the field of mechanical design, the trinity teaching mode of "knowledge teaching + ability cultivation + value guidance" is constructed, aiming at improving students 'professional accomplishment and ideological and political quality, and providing practical reference for cultivating high-quality mechanical engineering talents with both ability and political integrity.

Key words:
Mechanical design; curriculum ideology; teaching reform; trinity; personnel training

1.Introduction

Mechanical Design is the core technical basic course of mechanical engineering, mechanical design and manufacturing and automation in colleges and universities. It mainly teaches the design principles, methods and specifications of mechanical parts. It is the key link between basic courses and professional courses and plays an important role in cultivating students 'mechanical design ability and engineering practice ability[1]. With the deepening of higher education reform in the new era,"curriculum ideological and political education" has become an important measure for colleges and universities to implement the fundamental task of "establishing morality and cultivating people", requiring all courses to assume the responsibility of ideological and political education and realize the organic integration of ideological and political education and professional education. However, in the traditional teaching of Mechanical Design, there is a problem of "emphasizing knowledge transmission and neglecting value guidance": on the one hand, teachers focus on the

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structure, strength calculation, type selection and other professional knowledge of mechanical parts, ignoring the cultivation of students 'ideological concepts, professional qualities and social responsibility; On the other hand, students often only pay attention to formula derivation and problem-solving skills in the process of learning, lack of cognition of cultural connotation and spiritual value behind mechanical design field, and it is difficult to form correct engineering ethics and family feelings. Therefore, to carry out the ideological and political teaching reform of Mechanical Design course and deeply integrate ideological and political elements with professional knowledge is not only to respond to the requirements of national higher education reform, but also to improve the teaching quality of Mechanical Design course and cultivate high-quality mechanical talents.

2. Reconstruction of Ideological and Political Teaching Objectives of Mechanical Design Course

Based on the trinity teaching concept of "knowledge imparting, ability training and value leading", this paper reconstructs the teaching objectives of the course and clarifies the integration direction of ideological and political education by combining the knowledge system of the course "mechanical design" with the training objectives of mechanical talents.

2.1. Combination of Knowledge Goal and Ideological and Political Element

On the basis of mastering the design principles, methods and standard specifications of mechanical parts (such as gears, shafts, bearings, couplings, etc.), ideological and political elements such as "national standard consciousness" and "engineering specification spirit" are integrated[2]. For example, when explaining gear design, introduce the development process of China's gear industry standards, compare international advanced standards, guide students to realize the importance of standard formulation to the development of the industry, and establish the engineering consciousness of "respecting standards and practicing standards"; When explaining the material selection in mechanical design, introduce the research and development achievements of high-performance engineering materials in China (such as steel for high-speed rail bearings and turbine blade materials for aero-engines), so that students can understand the breakthroughs in the field of materials in China and enhance national pride.

2.2. Combination of ability goal and ideological and political elements

In the process of cultivating students 'abilities such as mechanical system scheme design, component structure design, strength check and engineering drawing, ideological and political elements such as "innovative thinking","craftsman spirit" and "team cooperation" are integrated. For example, through the "mechanical innovation design" project (such as small intelligent handling robot, green energy-saving reducer, etc.), guide students to break through traditional design ideas, cultivate the innovative spirit of "dare to be the first, dare to explore"; in the course design link, students are required to design strictly according to engineering specifications, repeatedly check data, optimize structural details, and cultivate the craftsman spirit of "excellence, rigor and meticulous"; Complete the design task of complex mechanical system through group cooperation, let students realize the importance of teamwork, and cultivate the team consciousness of "division of labor,

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cooperation and mutual benefit".

2.3. Clarity of value objectives

Through the ideological and political teaching of the curriculum, help students establish correct world outlook, outlook on life and values: first, cultivate the feelings of home and country, let students realize that the machinery industry is the foundation of the national industrial system, and the development process of China's machinery industry from "following" to "running together" and then to "leading" inspires students to devote themselves to the machinery industry and contribute to the construction of a powerful national manufacturing country. Second, establish engineering ethics, guide students to consider safety, environmental protection, sustainable development and other factors in the design process, for example, when explaining the reliability of mechanical design, combine the case of "safe production", let students understand that "design is no trivial matter, responsibility is more important than mountain", and cultivate the engineering ethics consciousness of "people-oriented, safety first"; Third, inherit the spirit of scientists, guide students to learn their lofty spirit of "caring for the motherland and serving the people" by introducing the contributions of scientists such as Qian Xuesen, Qian Sanqiang and Huang Xuhua in the field of mechanical engineering, as well as the scientific research achievements of experts in the field of contemporary machinery (such as Wang Shuguo and Tan Jianrong), and establish the academic pursuit of "pursuing truth and climbing the peak bravely".

3. Optimization of Ideological and Political Teaching Content of Mechanical Design Course

According to the knowledge module of Mechanical Design course, systematically excavate the ideological and political elements contained in each chapter, construct the teaching content system of "professional knowledge + ideological and political elements", realize the organic integration of ideological and political elements and professional contents, and avoid the phenomenon of "two skins".

3.1. Introduction Chapter: Integrating Family Feelings and Industry Mission

As the beginning of the curriculum, introduction is an important starting point for ideological and political education. In introducing the development course of mechanical design, from the ancient waterwheel, compass car and other mechanical inventions, to the backwardness and humiliation of modern China's machinery industry, and then to the rapid development of China's machinery industry after the founding of new China, especially since the reform and opening up (such as high-speed rail, large aircraft, CNC machine tools, industrial robots and other achievements), so that students clearly understand the development of China's machinery industry, stimulate the sense of mission of "revitalizing China's machinery industry"[3]; When introducing the status and function of the course, combined with the strategic goal of "Made in China 2025," it explains the core role of mechanical design in realizing the intelligentization and high-end of manufacturing industry, so that students can understand the importance of learning Mechanical Design to personal career development and national strategy, and establish the goal of "learning for the construction of a powerful manufacturing country."

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3.2. Chapter on Basic Theory of Mechanical Design: Integrating Scientific Thinking and Rigorous Spirit

When explaining the basic principles of mechanical design (such as strength theory, stiffness theory, vibration theory, etc.), incorporate the ideological and political elements of "scientific thinking" and "rigorous scholarship". For example, when introducing the development process of intensity theory, explain the process of scientists through a large number of experiments, repeated verification and continuous revision of theories, and guide students to realize that "scientific research needs a realistic and rigorous attitude"; When explaining the formula derivation and calculation in mechanical design, the accuracy of data and the preciseness of calculation are emphasized. Combined with the case of "engineering accident caused by design calculation error"(such as the fracture caused by the strength check error of a certain mechanical equipment, resulting in economic loss), students can deeply understand the truth of "the slightest difference is a thousand miles" and cultivate a rigorous academic attitude[4].

3.3. Part Design Chapter: Integrating Craftsman Spirit and Innovation Consciousness

Parts design is the core content of Mechanical Design course, and the design of each part contains rich ideological and political elements. Take "shaft design" as an example, when explaining the structural design of the shaft, compare the advantages and disadvantages of different structural designs, and guide the students to establish the craftsman spirit of "optimizing design and pursuing excellence"; when explaining the strength check of the shaft, introduce the concept of "lightweight design", combined with the design case of the transmission system of new energy vehicles, so that the students realize the importance of innovative design for energy saving and emission reduction and promoting the development of the industry[5].

Taking "bearing design" as an example, when introducing the classification, characteristics and selection of rolling bearings and sliding bearings, the development status of China's bearing industry is introduced: on the one hand, China is a big bearing production country, but high-end bearings (such as high-speed bearings, aeroengine bearings) have long relied on imports; on the other hand, in recent years, China's enterprises have increased R & D investment and made breakthroughs in the field of high-end bearings (such as Luoyang LYC bearings developed high-speed bearings have been localized). Through case analysis, students can not only recognize the challenges faced by China's machinery industry, but also see the hope of development, and stimulate students 'sense of responsibility of "overcoming difficulties and independent innovation".

3.4. Curriculum Design: Integrating Engineering Ethics and Teamwork

Curriculum design is the practical teaching link of Mechanical Design course, and it is an important carrier to test students 'professional ability and ideological and political accomplishment. In the course design task book, it is clearly integrated into the ideological and political requirements[6]: firstly, students are required to consider environmental protection, energy saving, safety and other factors in the design scheme, such as adopting green materials, optimizing transmission structure to reduce energy consumption, setting safety protection devices to ensure the safety of operators and cultivating students 'engineering ethics consciousness when designing reducers; The second is to complete the curriculum design in a group cooperation way, with 4-5 people in each group and clear division of labor.(such as scheme design, structure calculation, drawing

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and report writing), the group is required to hold regular discussions to jointly solve the problems encountered in the design process and cultivate the students 'team cooperation ability; thirdly, the part of "ideological and political reflection" is added to the curriculum design report, requiring students to summarize their understanding of craftsman spirit, innovation consciousness and social responsibility in the design process, so as to realize the deep integration of ideological and political education and professional practice.

4. Innovation of Ideological and Political Teaching Method in Mechanical Design Course

In order to avoid the "rigid implantation" of ideological and political education, combining with the characteristics of the course of "Mechanical Design," innovative teaching methods are adopted, such as "case teaching method,""project-driven method" and "situational teaching method", so as to realize the "subtle" integration of ideological and political elements.

4.1. Case teaching method: transmitting ideological and political value with typical cases

Select typical cases in the field of mechanical design, combine professional knowledge with ideological and political elements, and let students understand the ideological and political connotation in case analysis[7]. For example, when explaining the innovative design of mechanical system, take "China high-speed rail" as an example: on the one hand, analyze the design principle of core components such as high-speed rail transmission system and bogie, and explain the mechanical design knowledge therein (such as optimization of gear transmission, stiffness design of shafting, etc.); on the other hand, it introduces the development process of China high-speed railway from introduction, digestion and absorption to independent innovation, tells the story of scientific researchers overcoming technical blockade and conquering core technology, so that students can experience the spirit of "independent innovation and climbing the peak bravely" while learning professional knowledge, and enhance national pride. For another example, when explaining the reliability of mechanical design, take "manned spaceflight engineering" as an example: introduce the design requirements of spacecraft mechanical components (such as rocket engine turbine pump, space station robot arm), emphasize the design standard of "zero defect", and guide students to establish the engineering consciousness of "rigorous and meticulous, responsibility first" in combination with the working attitude of "excellence and foolproof" of aerospace researchers.

4.2. Project-driven method: cultivating ideological and political literacy through practical projects

Using "projects" as a carrier, students can not only improve their professional abilities, but also cultivate their ideological and political literacy in the process of completing the project. For example, to carry out the "green energy-saving reducer design" project: students are required to "reduce energy consumption, reduce pollution" as the goal, complete the reducer design, structure design, strength verification and model production. In the process of project implementation, teachers guide students to think about "how to embody environmental protection concept in design" and "how to improve energy utilization rate through innovative design", so as to cultivate students 'innovation consciousness and social responsibility; in the project defense link, students are required not only to report design scheme and achievements, but also to share team coop-

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eration experience, difficulties encountered and solutions in the process of project implementation, so as to cultivate students' teamwork ability and anti-pressure ability.

4.3. Situational Teaching Method: Stimulating Emotional Resonance with Real Situations

By creating real engineering situations, students can experience the value and significance of mechanical design personally and stimulate emotional resonance. For example, when explaining the application of mechanical design in intelligent manufacturing, organize students to watch videos of "smart factories"(such as automatic production scenes of automobile production lines and machining workshops), so that students can intuitively understand the importance of mechanical design to realize intelligent manufacturing; invite enterprise engineers into the classroom and share practical cases in the process of mechanical design.(such as how to solve technical problems in product design, how to deal with changes in market demand), so that students understand the status quo and professional requirements of the industry, establish the concept of "theory linked to practice, service industry development"; organize students to visit the machinery manufacturing enterprise practice, let students personally experience the production process of mechanical products, understand the working status of front-line workers, experience the connotation of "craftsman spirit", and stimulate students 'love for the machinery industry.

4.4. Online and offline integration teaching: expanding ideological and political education channels

Use online teaching platforms (such as Superstar Learning, Rain Classroom, MOOC) to expand the teaching channels of curriculum thinking. Upload rich ideological and political resources on the online platform: First,"Mechanical Hall of Fame", introducing the deeds of scientists and engineers in the field of machinery at home and abroad (such as Qian Xuesen, Xu Shunshou, Toyota Kiichiro, etc.), so that students can learn their spirit anytime and anywhere; second,"industry dynamics", timely update the latest development achievements of the machinery industry (For example, China's breakthrough in the field of high-end equipment manufacturing and the development trend of international mechanical technology), so that students can understand the forefront of the industry and enhance their learning motivation; Third, the "ideological and political case library", sorting out ideological and political cases in the field of mechanical design (such as engineering ethics cases, innovative design cases, team cooperation cases), for students to study and discuss independently.

In offline teaching, interactive teaching is carried out in combination with online resources: for example, students are organized to discuss and share their own opinions around the "ideological and political cases" of online platforms in class; and "ideological and political knowledge Q & A" is carried out in rain class (such as "What achievements have been made in the first five-year plan of China's machinery industry?" Do you know any scientists who have made outstanding contributions to our mechanical industry? Improve students 'participation; arrange online homework after class, ask students to watch the video of "Mechanical Hall of Fame" and write their experiences to deepen their understanding of ideological and political elements.

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5. Perfecting the Evaluation System of Ideological and Political Teaching of Mechanical Design Course

Establishing scientific and reasonable teaching evaluation system is an important means to ensure the effect of ideological and political teaching. The traditional teaching evaluation of Mechanical Design is mainly based on the final examination results, which is difficult to comprehensively evaluate students 'ideological and political literacy. Therefore, it is necessary to construct a diversified evaluation system of "knowledge + ability + thinking", and bring ideological and political literacy into the evaluation scope.

5.1. Diversity of evaluation content

The evaluation contents include three aspects[8]: one is professional knowledge evaluation, mainly through final examination, classroom test, homework and other ways to evaluate students 'mastery of mechanical design principles, methods and norms; the other is professional ability evaluation, through curriculum design, project report, practical operation and other ways to evaluate students' design ability, innovation ability and team cooperation ability; Third, the evaluation of ideological and political accomplishment, through classroom performance, case analysis report, project reflection, experience and other ways, to evaluate students 'ideological and political accomplishment such as family feelings, craftsman spirit, engineering ethics consciousness, innovation consciousness, etc.

For example, in the evaluation of ideological and political literacy, specific evaluation indicators are formulated: "family feelings" mainly evaluate whether students understand the development process and achievements of China's machinery industry and whether they have a sense of responsibility to contribute to the development of national manufacturing industry;"craftsman spirit" mainly evaluates whether students are rigorous and meticulous in the design process, keep improving and pay attention to design quality;"Engineering ethics consciousness" mainly evaluates whether students consider safety, environmental protection, sustainable development and other factors in design;"innovation consciousness" mainly evaluates whether students have the ability to break through traditional thinking and put forward innovative design schemes.

5.2. Plurality of evaluation subject

Change the former "teacher single evaluation" mode, introduce students 'self-evaluation, students' mutual evaluation, enterprise evaluation and other diversified evaluation subjects to ensure the objectivity and comprehensiveness of evaluation. One is self-evaluation of students, which allows students to self-evaluate their professional knowledge, professional ability and ideological and political accomplishment against evaluation indicators, and summarize their strengths and weaknesses; the other is mutual evaluation of students, and cooperation projects in groups (For example, course design and practice projects), members of the group evaluate each other, mainly evaluating each other's team cooperation ability, work attitude and ideological and political accomplishment performance; thirdly, enterprise evaluation. For projects participating in enterprise internship or cooperation with enterprises, enterprise engineers are invited to evaluate students 'practical ability and professional accomplishment (such as work attitude, responsibility consciousness and innovation ability).

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5.3. Process of evaluation method

Change the final evaluation method of "one examination determines life", adopt process evaluation, pay attention to the evaluation of students 'learning process. The evaluation runs through the whole teaching process: in the classroom, evaluate the students 'ideological and political accomplishment performance by observing the students' participation and discussing the speeches; after class, understand the students 'understanding of ideological and political elements through homework, online learning and experience; in the practice link (such as curriculum design and project practice), comprehensively evaluate the students' professional ability and ideological and political accomplishment through periodic inspection, mid-term report and final achievement. The result of process evaluation accounts for 40% of the total score, the final examination score accounts for 40%, and the evaluation score of ideological and political literacy accounts for 20%, so as to ensure that students always attach importance to the cultivation of ideological and political literacy in the process of learning.

6. Effect and Reflection on Ideological and Political Teaching Reform of Mechanical Design Course

6.1. Implement achievements

In order to test the effect of ideological and political teaching reform, the students of Grade 2022 majoring in mechanical design and manufacturing and automation in a university were divided into experimental group (implementing ideological and political teaching reform) and control group (adopting traditional teaching mode). The results of reform were summarized by comparing and analyzing the academic achievements, practical achievements and ideological and political accomplishment of the two groups of students.

1.Students 'enthusiasm for learning and professional achievements have increased significantly

The study enthusiasm of the experimental group is obviously higher than that of the control group: in class, the number of students participating in discussion and asking questions in the experimental group is more; the study time, homework completion rate and case discussion participation in the online platform are higher than those in the control group. The final examination results showed that the average score of the experimental group (82.5 points) was higher than that of the control group (76.3 points), and the pass rate (98.2%) was higher than that of the control group (92.1%), which indicated that the integration of curriculum thought and politics not only did not affect the learning of professional knowledge, but stimulated the students 'learning motivation and improved the learning effect.

2.Students 'professional ability and innovation consciousness have been obviously enhanced

In the course design link, the design scheme of the experimental group students is more innovative and reasonable, for example, the "intelligent garbage sorting robot" designed by the group combines mechanical design and intelligent technology, reflecting innovative thinking; the course design report of the experimental group students is of higher quality, and is superior to the control group in terms of structural integrity, data accuracy and scheme innovation. In the "Mechanical Innovation Design Competition" organized by the school,

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8 students in the experimental group won the prize, while only 3 students in the control group won the prize, which shows that the reform of ideological and political teaching has effectively improved the students 'professional ability and innovation consciousness.

3.Students 'ideological and political literacy has been effectively cultivated

Through questionnaire survey and interview, it is found that the experimental group students have a deeper understanding of the development process and achievements of China's machinery industry, 92% of the students said that they are proud of the development of China's machinery industry, 85% of the students said that they are willing to join the machinery industry and contribute to the construction of a national manufacturing power. In terms of craftsman spirit, 88% of the students said that they would pay more attention to details in the design process and pursue excellence. In terms of engineering ethics awareness, 90% of students said that "safety, environmental protection and other factors will be considered when designing." The ideological and political literacy of the students in the control group was significantly lower than that of the experimental group, which indicated that the ideological and political teaching reform of the curriculum effectively cultivated the students 'ideological and political literacy.

6.2. Existing problems and reflections

Although the ideological and political teaching reform of the curriculum has achieved certain results, some problems have been found in the implementation process: firstly, some teachers 'ideological and political consciousness and ability are insufficient, the excavation of ideological and political elements is not deep enough, and there is a phenomenon of "rigid implantation"; secondly, the excavation and integration of ideological and political elements are not systematic enough, and the ideological and political elements in some chapters are scattered and lack coherence; Thirdly, the subjectivity of ideological and political accomplishment evaluation is strong, and the evaluation index is not detailed enough, so it is difficult to accurately quantify the students 'ideological and political accomplishment level.

In view of these problems, the future needs to be improved from the following aspects: First, strengthen the cultivation of teachers 'ideological and political ability in curriculum. Through special training, teaching seminars, school-enterprise exchanges and other activities, teachers 'cognitive level and practical ability of curriculum thinking will be improved. For example, invite experts in the ideological and political field to carry out special lectures on "excavation and integration skills of ideological and political elements in courses," organize teachers to participate in practical investigation of enterprises in machinery industry, and deeply understand the ideological and political materials in the development of the industry; establish "curriculum ideological and political teaching team," carry out collective preparation, jointly excavate the ideological and political elements of each chapter, design teaching scheme, and avoid the problem of ideological and political integration caused by "fighting alone"; Encourage teachers to participate in curriculum ideological and political teaching reform projects and teaching competitions, promote teaching through competitions, and improve teachers 'innovative ability in curriculum ideological and political teaching.

The second is to systematically integrate the ideological and political elements and construct the "mechanical design curriculum ideological and political element atlas". According to the sequence of course chapters, sort out the ideological and political elements corresponding to each knowledge module, define the inte-

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gration points, integration methods and teaching objectives of ideological and political elements, and form a systematic and structured ideological and political element system. For example, in the "Basic Theory of Mechanical Design" module, it corresponds to "scientific thinking and rigorous spirit"; in the "Parts Design" module, it corresponds to "craftsman spirit, innovation consciousness, and family and country feelings"; in the "Curriculum Design" module, it corresponds to "Engineering ethics, teamwork". At the same time, in combination with the latest development trends of the machinery industry (such as intelligent manufacturing, green manufacturing, breakthrough in localization of high-end equipment, etc.), the map of ideological and political elements shall be updated in time to ensure the timeliness and consistency of ideological and political contents and avoid "fragmentation" of ideological and political elements.

Third, refine the evaluation indicators of ideological and political literacy and improve the objectivity and operability of evaluation. The evaluation index of ideological and political literacy will be further quantified and the "evaluation scale of ideological and political literacy" will be formulated. For example, in the dimension of "family feelings", quantifiable indicators such as "can accurately explain more than 3 major achievements of China's machinery industry","actively pay attention to the cutting-edge dynamics of machinery industry and write more than 1 piece of perception" are set, and different scores are given respectively; In the dimension of "craftsman spirit", set indicators such as "error rate of design scheme data is less than 5%","revision times of curriculum design report shall not exceed 2 times" and "actively optimize design details more than 2 times" to measure students 'craftsman spirit performance through specific data. At the same time, introduce "ideological and political accomplishment growth file" to record the changes of students 'ideological and political accomplishment in the learning process (such as family feelings embodied in classroom speech, craftsman spirit displayed in design process, team cooperation ability in project cooperation, etc.), and comprehensively and objectively evaluate students' ideological and political accomplishment through the combination of process records and quantitative indicators.

7. Future expectations

The ideological and political teaching reform of Mechanical Design is a long-term and systematic project, which needs continuous exploration and improvement. In the future, reform can be deepened in the following three directions.

First, promote the education mode of "government-school-enterprise cooperation". Strengthen cooperation with government departments and machinery manufacturing enterprises, and establish "curriculum ideological and political practice base". For example, cooperate with local machinery industry associations to invite industry experts to participate in the design of curriculum ideological and political teaching schemes; cooperate with high-end equipment manufacturing enterprises (For example, high-speed rail manufacturing enterprises and aero-engine manufacturing enterprises) cooperate to transform the real design projects and engineering cases of enterprises into curriculum ideological and political teaching materials, so as to deepen students 'understanding of family feelings and social responsibilities in the process of contacting the actual needs of the industry; invite excellent engineers of enterprises to serve as external tutors to guide students' curriculum design and practice projects, and transmit the craftsman spirit and professional accomplishment of the industry.

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The second is to integrate the concept of "new engineering" and innovate the ideological and political content of the curriculum. With the advancement of "new engineering" construction, new technologies and new formats continue to emerge in the field of mechanical design (such as the integration of artificial intelligence and mechanical design, the application of digital twin technology in mechanical design, and the deepening of green manufacturing concepts). These new contents should be integrated into the ideological and political teaching of the course in time: for example, when explaining the mechanical system design, the application of artificial intelligence technology in mechanical fault diagnosis should be introduced, and the innovation self-confidence of students should be stimulated in combination with the development achievements in the field of artificial intelligence in our country; When explaining green design, combining with the goal of "double carbon", guide students to think about how mechanical design contributes to the realization of carbon neutralization, and cultivate students 'ecological awareness and social responsibility.

Third, use "digital technology" to improve the ideological and political teaching effect of the course. With the help of virtual reality (VR), augmented reality (AR) and other digital technologies, immersive curriculum ideological and political teaching situation is created. For example, VR technology is used to restore the design and manufacturing process of China's major mechanical equipment (such as the Three Gorges Project generator set and C919 large aircraft), so that students can experience the importance of mechanical design and the powerful strength of China's machinery industry; AR technology is used to display the internal structure and working principle of mechanical parts, and the hard process of scientists developing parts is embedded while explaining professional knowledge, so that students can feel the spirit of scientists in interactive learning. In addition, the "Mechanical Design Course Ideological and Political Digital Resource Library" has been developed to integrate ideological and political cases, celebrity deeds, industry trends, virtual simulation experiments and other resources to achieve the sharing and efficient use of resources and provide strong support for ideological and political teaching in the course.

8. Conclusion

Under the guidance of the fundamental task of "establishing morality and building people", the ideological and political teaching reform of Mechanical Design course realizes the organic integration of professional education and ideological and political education by reconstructing teaching objectives, optimizing teaching contents, innovating teaching methods and perfecting evaluation system. Practice shows that the integration of ideological and political curriculum not only stimulates students 'enthusiasm for learning, improves students' professional ability and innovation consciousness, but also effectively cultivates students 'ideological and political qualities such as family feelings, craftsman spirit, engineering ethics consciousness, etc., laying a solid foundation for cultivating high-quality mechanical engineering talents with both ability and political integrity.

Although there are still problems in the reform process, such as insufficient teachers 'ability, unsystematic integration of ideological and political elements, and insufficient refinement of evaluation indicators, the ideological and political teaching reform of Mechanical Design course will continue to deepen through continuous strengthening of teacher training, systematic construction of ideological and political element system, refinement of evaluation indicators, deepening of "government-school-enterprise cooperation" in educating

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people in the future, integration of "new engineering" concept and utilization of digital technology. To cultivate more outstanding talents with firm ideals and beliefs, solid professional skills and strong sense of social responsibility for the construction of a powerful manufacturing country in China.

Funding

This article is a research outcome of the following projects: the 2022 University-level Teaching Reform Project; the Construction Project of College Head Teacher Studios in Guizhou Province (Qianying Head Teacher Studio); the second batch of Provincial-level Golden Courses in Guizhou Province (Sensor Technology, No. 2024JKHH0092); the 2024 Teaching Content and Curriculum System Reform Project for Institutions of Higher Education in Guizhou Province ("One Core, Two Wings, Three Integrations and Four Combinations" Reform for High-level Science and Engineering Talent Cultivation, No. GZJG2024076); and the 2024 Postgraduate Education and Teaching Reform Project in Guizhou Province (Research on the Cultivation of First-class Master's Students in Physics in Guizhou Province from the Perspective of New Quality Productive Forces, No. 2024YJSJGXM043).

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