Curriculum Ideology Integration in Auto Design: Hainan University Vehicle Engineering Case

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Abstract. The abstract should summarize the contents of the paper in short terms, i.e. 150–250 words. Automobile design, as an important engineering course, involves not only professional knowledge but also rich elements of Ideological and Political Education (IPE). This paper explores the integration of IPE into the automobile design curriculum. By incorporating IPE, the goal is to guide students in developing correct values, professional attitudes, and life perspectives, cultivating compound talents with both professional skills and ideological literacy. Through analyzing the characteristics of automobile design courses and the goals of IPE, this study focuses on integrating IPE into the curriculum. It discusses teaching content selection, teaching method reforms, and the organization of practical activities. The aim is to achieve an organic combination of professional education and ideological education, fostering automobile design talents who possess both technical expertise and high moral character, offering insights for the development of IPE in professional courses.

Keywords: Ideological and Political Education in Curriculum, Automobile Design, Teaching Practice, Talent Cultivation

1 Introduction

In today's era of globalization and informatization, education not only carries the mission of imparting knowledge but also bears the responsibility of cultivating talents with noble character, deep patriotism, and a broad international perspective for the new era. Curriculum-based ideological and political education (referred to as "curriculum IPE"), as an essential part of this mission, aims to integrate ideological and political education into various courses. This approach ensures that, while students are learning professional knowledge, they also deeply understand and practice the core socialist values, and form a correct worldview, outlook on life, and values.

General Secretary Xi Jinping emphasized at the National Conference on Ideological and Political Work in Universities that: "We must make good use of classroom teaching as the main channel, and all courses should align with ideological and political theory courses to form a synergistic effect."[1]By deeply exploring the ideological and political elements in various courses and organically integrating them with professional

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knowledge, it is possible to impart knowledge while subtly conducting ideological and political education. This approach helps guide students in establishing correct value orientations and enhances their sense of national pride and cultural confidence [2-5].

Automobile design is a key engineering course that includes both professional knowledge and ideological elements. Integrating ideological and political education into automobile design courses helps students establish correct values, career views, and life views, and trains students with professional and ideological and political literacy. This not only improves students' overall quality but also provides strong talent support for the national automobile industry.

Therefore, how to integrate ideological and political education into automobile design courses is an urgent issue in engineering education. This paper takes the automobile design course of the Vehicle Engineering major at Hainan University as an example to explore the practice of ideological and political education in the course. By analyzing the characteristics of the automobile design course and the goals of ideological and political construction, this paper explains how to implement ideological and political education in teaching content selection, teaching method reform, and practical activity organization, so as to provide references for integrating professional education with ideological and political education.

2 Ideological and Political Education Objectives of the Automobile Design Course

The ideological and political education (IPE) objectives of the automobile design course aim to guide students in establishing correct values, outlooks on life, and professional perspectives through the course. The goal is to cultivate students' patriotism, innovative spirit, practical abilities, teamwork and communication skills, as well as professional ethics and qualities, in order to foster more outstanding talents for the development of China's automotive industry. The main IPE teaching objectives of the automobile design course are as follows:

2.1 Cultivating Students' Patriotism and Social Responsibility

Through the study of the automobile design course, students are guided to gain an in-depth understanding of the development history and current status of China’s automobile industry, thereby enhancing their sense of recognition and pride in the national automotive industry. At the same time, students are encouraged to pay attention to the social impact of automobile design, fostering their social responsibility and sense of mission.

2.2 Cultivating Students' Innovative Spirit and Practical Abilities

As General Secretary Xi Jinping pointed out: "The new era requires inheriting and carrying forward the patriotic spirit that regards the fate of the country and nation as one's own responsibility, and the spirit of scientists with patriotism as their foundation."[6]

The automobile design course has a strong practical and innovative nature. Through the course, students are guided to master the basic principles and methods of automobile design, fostering their innovative thinking and practical abilities. Students are encouraged to participate in automobile design competitions, practical activities, and other related events to improve their hands-on skills and problem-solving abilities.

2.3 Cultivating Students' Teamwork and Communication Skills

Automobile design requires interdisciplinary and cross-field integration, which demands that students possess teamwork and communication abilities. Through course design, group assignments, and other methods, students are guided to learn how to collaborate and communicate effectively with others, thereby cultivating their teamwork spirit and communication skills.

2.4 Cultivating Students' Professional Ethics and Qualities

Automobile design involves numerous technical details and safety requirements, requiring students to have a high level of professional ethics and qualities. Through the course, students are guided to establish correct professional values, comply with industry standards, and emphasize product quality and safety, thereby cultivating their professional ethics and qualities.

2.5 Developing Students' Global Perspective and Cultural Confidence

Incorporate cutting-edge global concepts into automobile design courses while emphasizing the unique value of Chinese automobile design on the international stage. This approach helps students learn from international experiences while fostering pride and confidence in Chinese design. By comparing the strengths and weaknesses of Chinese and foreign automobile designs, students are encouraged to explore how to drive innovation and achieve breakthroughs in Chinese automobile design within a global context.

2.6 Developing Students' Awareness of Sustainable Development

Integrate trends in new energy and intelligent connected vehicles to guide students in understanding the environmental impact of automobile design and adopting green design principles. Through case studies, explore how automobile design can balance market demands with environmental protection and social responsibility.

3 Exploring Ideological and Political Elements in Automotive Design Courses

Based on the professional teaching objectives of automotive design courses and the goals of ideological and political education (referred to as "ideological education"), the direction for exploring ideological elements in automotive design courses is outlined below.

3.1 Patriotic Education

By introducing the development history and achievements of China's automotive industry, as well as the country's policy support and investment in automotive design, students' patriotic enthusiasm can be stimulated. Additionally, by comparing domestic and international automotive design differences, students will realize the importance of independent innovation and brand building. This encourages them to contribute to the development of the national automotive industry.

3.2 Cultivation of Innovation Spirit

Automotive design is a field full of innovation and challenges. In the course, advanced design concepts and technologies can be introduced to inspire students' innovative thinking. Through case analysis, group discussions, and other methods, students are guided to actively participate in innovation practices, cultivating their awareness of innovation and practical abilities.

3.3 Craftsmanship Spirit and Professional Ethics

Automotive design is a field full of innovation and challenges. In the course, advanced design concepts and technologies can be introduced to inspire students' innovative thinking. Through case analysis, group discussions, and other methods, students are guided to actively participate in innovation practices, cultivating their awareness of innovation and practical abilities.

3.4 Teamwork and Communication Skills

Automotive design often requires cross-disciplinary and cross-field integration, requiring students to possess strong teamwork and communication skills. In the course, group collaborations, project practices, and other activities can be used to cultivate students' teamwork spirit and communication abilities. Students are also guided to learn to listen to others' opinions, respect diverse viewpoints, and improve the efficiency and quality of team collaboration.

3.5 Environmental Awareness and Sustainable Development

With the growing awareness of environmental protection, automotive design must also consider sustainability issues. In the course, green design concepts and energy-saving technologies can be introduced, guiding students to pay attention to the environmental impact of automotive design, fostering environmental consciousness and a sense of responsibility. Meanwhile, through discussions on the development trends and challenges of new energy vehicles, students' exploratory spirit and innovative consciousness are stimulated.

3.6 Historical and Cultural Heritage

Introduce the historical development of Chinese automobile design, such as classic cases like the Hongqi (Red Flag) car, to help students understand the struggle process of China's automobile industry. Incorporate elements of traditional Chinese culture, such as Chinese red and dragon and phoenix patterns, into automobile design to cultivate students' sense of identity with local culture.

3.7 Social Responsibility and Ethics

Discuss ethical issues in automobile design, such as the safety of autonomous driving technology and privacy protection, and guide students to think about the relationship between technological progress and social responsibility. Through case studies, explore how automobile design can address social problems, such as traffic congestion and environmental pollution.

The exploration and integration of ideological and political elements in automotive design courses is a multidimensional and multifaceted process. By deeply exploring these elements and incorporating them into teaching, students' comprehensive qualities and professional literacy can be comprehensively improved, cultivating more outstanding talents for the development of the national automotive industry.

4 Ideological and Political Teaching Strategies and Practical Approaches in Automotive Design Courses

Incorporating ideological and political elements into automotive design courses requires the use of various teaching strategies and methods to ensure that students not only master professional skills but also receive ideological and political education.

4.1 Formulating Ideological and Political Teaching Strategies for Automotive Design Courses

The ideological and political education in automotive design courses is mainly implemented through three aspects: teaching content, teaching methods, and the teaching environment. The ideological teaching strategy is shown in Figure 1.

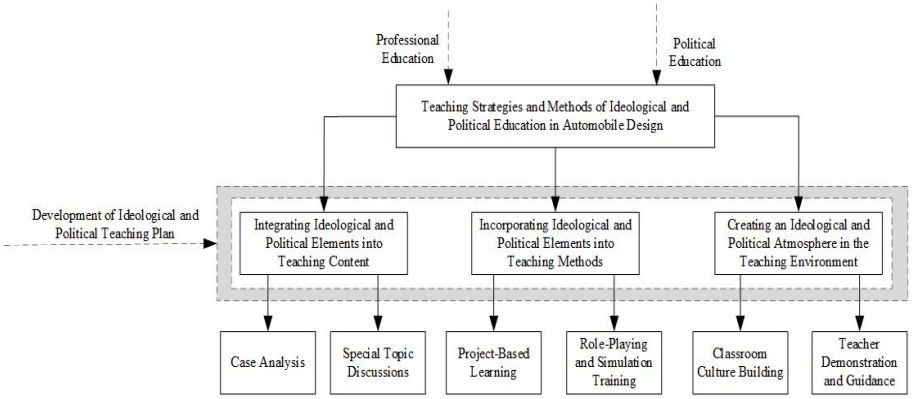

Fig. 1. Ideological and Political Teaching Strategies for Automobile Design Courses.

Incorporating Ideological Elements into Teaching Content.

Introducing Ideological and Political Case Studies into Teaching Content.

When explaining automotive design principles, methods, and practices, ideological and political case studies can be introduced. For example, introducing domestic excellent automotive design works and discussing the design concepts, innovation spirit, and national sentiment behind them will allow students to feel the patriotism and innovative spirit of the designers while learning design techniques. Analyze more top domestic and international automobile design cases, such as BYD's innovations in new energy vehicles and Tesla's intelligent design. This helps students grasp the ideological and political meanings behind these designs.

Setting Up Special Topic Discussions Based on Hot Issues and Controversies in the Automotive Design Field.

Organize special topic discussions focusing on hot issues and controversies in the automotive design field. For example, discussing the development trends of new energy vehicle design, intelligent driving safety issues, how to address climate change and tackle the ethical challenges of intelligent connected vehicles in automobile design and etc., will guide students to pay attention to social responsibility and professional ethics, cultivating critical thinking and problem-solving abilities[7].

Based on the 2020 Vehicle Engineering students at Hainan University, the ideological design of the automotive design course is tailored according to students' professional foundations and course content.

The course's ideological and political design and integration points are shown in Table 1.

Table 1. Ideological and Political Teaching Design and Integration Points - Automobile Design Course for the 2020-Grade Vehicle Engineering Major at Hainan University.

Teaching Content	Ideological and Political Design and Integration Points	Course Ideological and Political Effectiveness
Basic Requirements for Overall Automotive Design	Design Concept of New Energy Vehicles Topic Discussion: Development Trends of New Energy Vehicles Case Study: BYD's Innovation in the New Energy Vehicle (NEV) Sector.	Through the analysis of the design concepts and case studies of typical automotive brands, promote the spirit of innovation in automotive design, introduce the topic of energy crises, and explore the relationship between the automotive design process and sustainable development. This deepens the concept of green mobility and encourages students to develop an awareness of energy conservation and emission reduction.
Selection of Automobile Engines	Introduce the development history of automobile engines, share the achievements of prominent figures in China's automotive industry, and highlight the application of typical domestic engines in representative vehicle models to inspire students' enthusiasm for learning. Case Study: The Hongqi H5 is equipped with FAW Hongqi's CA4GB15TD-30 1.5T engine, which delivers a power output of 258 N·m and achieves a thermal efficiency of 39.06%.	Promoting the rigorous academic attitude and selfless spirit of older scientists, overcoming technical challenges, and independently developing automobiles, highlighting the fine virtues of the Chinese nation.
Selection of Automobile Bodies	Introduce design case studies of typical domestic automobiles. Case Study: The exterior design of Geely's "Panda" reflects the application of Chinese elements in automobile design.	Analyzing the representation of Chinese elements and local culture in automobile design, promoting national spirit, and appreciating the patriotism and innovative spirit of the designers.
Brake System Design	Analyze Brake System Performance and Brake Performance Stability Topic Discussion: Brake Energy Recovery System	Through case analysis of brake system failure, cultivate students' awareness of product quality and the pursuit of excellence with the spirit of craftsmanship.
Suspension System Design	Development and Application of Intelligent Suspension System Special Topic Discussion: Application of Intelligent Control Technology in Automobiles	Inspire students to think about intelligent control. Acknowledge the quality differences between domestic and foreign cars, and motivate students to enhance their overall competence.

Reflecting Ideological and Political Elements in Teaching Methods.

Project-Based Learning Integrated with Course Design.

In automotive design course design, project-based learning can be employed to help students combine theoretical knowledge with practical applications, enhancing their practical abilities and innovative thinking.

According to the course design syllabus requirements, a project theme related to automotive design should be selected, integrating ideological and political elements into the course project. This allows students to experience the essence of ideological education through practice. For example, a project titled "Exterior Design of New Energy Vehicles" aims to help students master the basic principles and methods of automotive design, as well as understand the development trends and technical features of new energy vehicles. At the same time, clear project goals can be set, such as completing the creative design of the car exterior, producing design proposals, and creating models.

The project-based learning approach is shown in Figure 2.

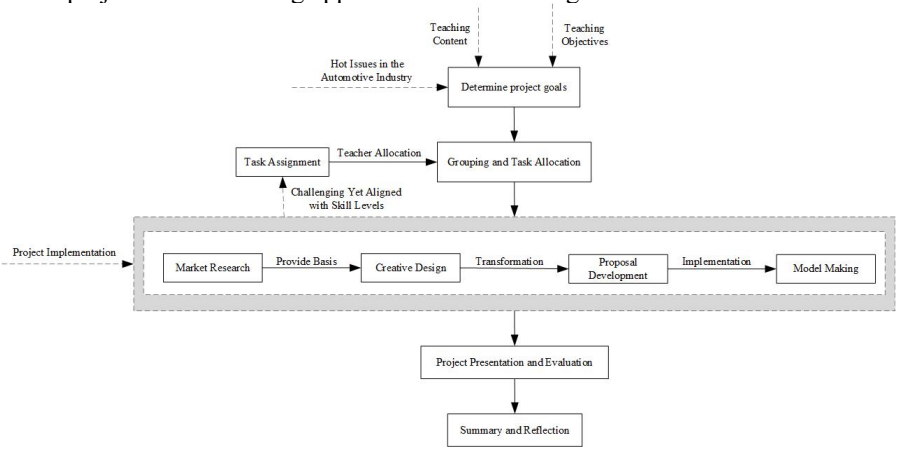

Fig. 2. Project-Based Learning Approach.

Through this approach, students can gain a deeper understanding of automotive design principles and methods, acquire practical skills, and improve problem-solving abilities and innovative thinking. Additionally, project-based learning helps cultivate students' teamwork spirit and sense of responsibility, laying a solid foundation for their future career development.

Automotive Design Team Simulation Training, Strengthening Role-Playing as Designers.

In line with the course design requirements, students can engage in simulated automotive design team work environments, taking on different team roles to experience the importance of teamwork and communication coordination, as shown in Figure 3. During the simulation process, scenarios related to ideological education can be introduced, such as decision-making in the face of ethical dilemmas, allowing students to improve their professional ethics through practice.

An active and positive learning atmosphere should be created in the classroom, emphasizing values such as academic integrity and respect for others' work. In the theoretical teaching, classroom discussions can be set up to cultivate students' teamwork spirit and sense of collective honor through discussions, group assignments, and other methods.

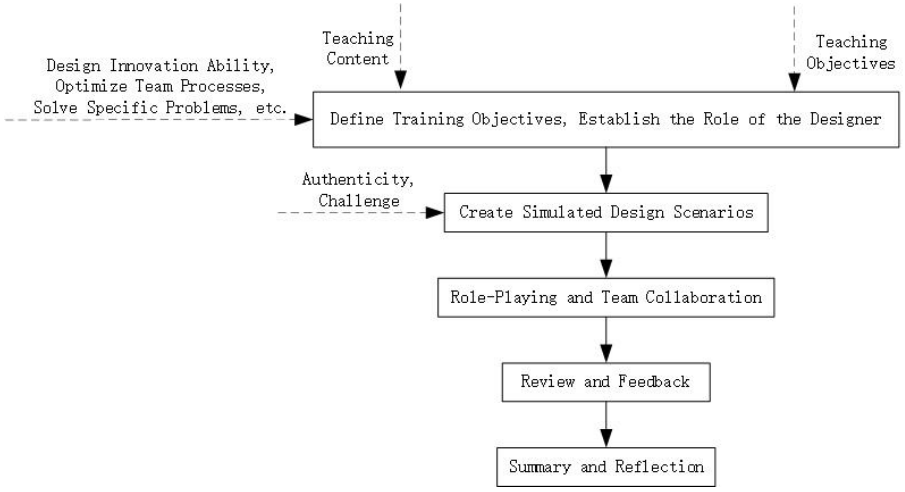

Fig. 3. Team Simulation Training Mode.

Creating an Ideological Atmosphere in the Teaching Environment.

Classroom Culture Construction.

In the classroom, create a positive and uplifting learning atmosphere that emphasizes values such as academic integrity and respect for others' work. In theoretical teaching, classroom discussions, interactions, and other activities included. Use methods like discussions, small debates, scenario simulations, and group work to foster students' teamwork and collective pride, and help them experience the essence of ideological and political education through practice.

Teacher Demonstration and Guidance.

As General Secretary Xi Jinping stated during his visit to Renmin University of China, "To cultivate builders and successors of social construction, it is urgently needed that our teachers not only be proficient in professional knowledge and be good 'subject teachers,' but also cultivate virtue and become 'teachers of people,' striving to be the unifiers of 'transmitting knowledge, teaching, and resolving doubts' as both 'subject teachers' and 'teachers of people'."[8] Teachers should play a demonstrative role in the teaching process, influencing students through their words and actions. They should also guide students to pay attention to the latest trends and cutting-edge technologies in the automotive design field, sparking their exploratory spirit and innovative consciousness.

Teachers are crucial in ideological and political education. They can positively influence students by modeling rigorous scholarship, optimism, and patriotism. For example, by discussing China's auto industry growth and citing innovative domestic brands like Hongqi and BYD, teachers can inspire students' patriotism and responsibility. Moreover, teachers can integrate ideological and political elements into lessons using case studies, discussions, and simulations. When covering automobile design, they can highlight new energy vehicle innovations to stress independent innovation's importance. Classroom discussions can prompt students to reflect on social and professional ethics, while scenario simulations can offer hands-on ideological and political education experiences.

Integrating ideological and political elements into automotive design courses requires a multifaceted approach. By optimizing teaching content, methods, and the learning environment, ideological education can be organically integrated with professional education. This not only enhances students' professional competence but also cultivates their moral qualities and sense of social responsibility.

4.2 Practical Pathways for Ideological and Political Education in Automotive Design Courses

Course Integration and Embedding Ideological Elements.

Textbook Revision and Course Design.

In automotive design textbooks, content related to Chinese traditional culture, socialist core values, the cultural essence of Chinese automobile design, and social responsibility and other relevant topics can be incorporated, ensuring that students receive ideological education while learning professional knowledge. Course design should fully reflect the goals of ideological education, naturally embedding ideological elements into the teaching process.

Special Lectures and Reports.

Invite experts, scholars, or industry leaders from the automotive design field to give special lectures or reports that combine ideological education, sharing their design philosophies, professional ethics, and social responsibility experiences, and practices in ideological and political education in automotive design, including how to reflect patriotism in design and how to incorporate social responsibility into technology.

Combining Practical Teaching with Ideological Activities.

University-Industry Collaboration and Internships.

In his speech on May 29, 2023, during the fifth collective study session of the Political Bureau, Xi Jinping emphasized that classroom teaching and practical teaching should be organically combined. He stressed the importance of utilizing rich historical and cultural resources, closely connecting the struggles of the Communist Party of China and the Chinese people, and deeply understanding the intrinsic principles of the

Sinicization of Marxism. This helps deepen the understanding of why history and the people chose the Communist Party of China and socialism, further strengthening the "four confidences."

Industry-university cooperation is crucial for ideological and political education in courses[9]. Here are ways to integrate it deeply into curriculum design and teaching while embedding ideological elements: ① Invite corporate engineers or designers to help design course outlines. Align content with industry needs and cutting-edge tech, develop custom textbooks, and incorporate industry standards, innovation, and social responsibility. ② Companies can offer internships and use culture-focused lectures and project practice to convey social responsibility and professional ethics. For example, guide students to focus on eco-design or problem-solving in society. ③ Organize design competitions or social research activities, such as "Green Mobility" or "New Energy Vehicle Design" contests, to foster students' social responsibility and innovation. ④ Company mentors can assess students' practical performance, and schools can adjust teaching based on feedback to merge ideological and professional education effectively.

Through university-industry cooperation, students can participate in automotive design projects, gaining insights into cutting-edge industry technologies and market dynamics. During internships, students can be guided to focus on social responsibility, professional ethics, and teamwork, cultivating their overall qualities. This makes students enhance their professional skills and strengthen social responsibility and ethics in practice. Through this approach, it provides a strong guarantee for cultivating automotive design talent with both moral integrity and professional competence.

Ideological Practice Activities on Automotive Design.

Organize ideological practice activities centered on automotive design, such as design competitions and social research[10].

Design competitions focus on themes like green mobility, cultural heritage, and smart futures. Students design new energy vehicles in teams, integrating cultural elements or exploring intelligent driving tech. Their designs are assessed by industry experts and teachers on innovation and social responsibility. Activities like project showcases and defense sessions help students develop presentation and teamwork skills.

Social research projects explore topics such as environmental impacts of car design, new energy vehicle adoption, and cultural elements in design. Students conduct field research in groups, collect data, and write reports. Classroom discussions based on these reports guide students to consider the social responsibilities of design, and expert feedback helps enhance their problem-solving abilities.

These activities allow students to experience the entire process of automotive design, helping them develop practical skills and innovative thinking. Additionally, through these activities, teachers can guide students to focus on social issues and consider how design can address them, thereby reinforcing their sense of social responsibility and deepening their understanding of ideological education.

Campus Culture and Ideological Atmosphere Building.

Automotive Design Cultural Festival.

Host an automotive design cultural festival to showcase students' design works, with industry experts invited to provide feedback and guidance. Through this cultural event, a strong automotive design atmosphere can be cultivated, enhance students' sense of participation and accomplishment, stimulating students' innovative spirit and patriotism.

Campus Cultural Walls and Bulletin Boards.

Use campus cultural walls and bulletin boards to display the development process of China's automobile industry, role models in the industry, outstanding student works, and posters on ideological and political topics. This allows students to be influenced by ideological and political education in their daily lives. Through continuous impact, it helps students establish correct values and professional views, creating a good environment for training well-rounded automotive design talent.

Integrating Online Platforms and Ideological Resources.

Online Courses and Teaching Resources.

Create high-quality teaching videos and develop online courses on automobile design and ideological and political education through internet platforms. Explain the ideological and political aspects of automobile design using practical cases, and integrate high-quality ideological resources and provide students with rich learning materials. Through online learning, students can access ideological education anytime and anywhere.

Social Media and Interactive Communication.

Leverage social media platforms to create automotive design ideological education groups or official accounts, inviting both teachers and students to participate in discussions and exchanges. Through interactive communication, students can deepen their understanding of ideological education, forming a positive learning atmosphere.

Establishing a Diversified Evaluation System to Promote Comprehensive Development.

In evaluating automotive design courses, a diversified evaluation system should be established that not only focuses on students' mastery of professional knowledge but also considers their ideological and political qualities and overall abilities. Evaluation indicators include mastery of professional knowledge, ideological and political literacy, innovation and practical abilities, and communication skills. Through comprehensive assessments of students' design works, practical performance, and classroom discussions, by establishing a diversified evaluation system, a holistic view of their learning outcomes and ideological education effectiveness can be obtained. And can promptly identify and address issues in teaching.

This evaluation system not only improves students' professional skills but also effectively fosters their social responsibility and professional ethics, providing a strong guarantee for training well-rounded automotive design talent.

5 Conclusion

The pathways for implementing ideological and political education in automotive design courses are diverse, requiring the combined efforts of schools, teachers, and students to organically integrate ideological education with professional education. By optimizing course design, strengthening practical teaching, and establishing a diversified evaluation system that combines professional knowledge with ideological and political literacy to assess comprehensive abilities, ideological education can be effectively incorporated into automotive design courses, cultivating automotive design professionals who are both skilled and virtuous. This not only improves the quality of education in automotive design but also provides strong talent support for the development of the national automotive industry.

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