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# *Research and practice on ideological and political team building in packaging engineering courses under the background of engineering education certification*

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**Abstract:** Under the background of professional accreditation of engineering education, the packaging engineering major in colleges and universities actively explores the integration path of professional courses and ideological and political education. Taking the core courses of the packaging engineering major as the research object, this paper constructs a diversified course ideological and political teaching team construction mechanism with the collaborative participation of "on-campus teachers + corporate mentors + industry experts", focusing on the fundamental task of cultivating morality and cultivating people in the undergraduate talent training stage. By sorting out the current situation and outstanding problems of course ideological and political construction, a team formation model and operation guarantee system are proposed, and its application practice in core courses is explained with typical cases. The research results show that the collaborative teaching team effectively promotes the organic integration of ideological and political elements and professional knowledge, significantly improves students' professional knowledge application ability and ideological and moral literacy, and helps cultivate high-quality engineering talents with patriotism, social responsibility and innovative spirit. This research and practice provides new ideas and useful references for the deepening construction of course ideological and political under the background of engineering education accreditation.

**Keywords:** Engineering education certification; Packaging engineering; Ideological and political education in courses; Collaborative education

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## 1. Introduction

At the 2016 National Conference on Ideological and Political Work in Colleges and Universities, General Secretary Xi Jinping clearly stated, "The foundation of a university lies in cultivating morality and educating people." He emphasized the need to integrate ideological and political work into the entire educational process, ensuring comprehensive and all-round education[1, 2]. To implement this requirement, the Ministry of Education issued the "Guiding Outline for Ideological and Political Education in Higher Education Courses" in 2020[3]. This outline stipulates that all universities and all courses must shoulder the mission of educating students, addressing the "two-faced" disconnect between professional education and ideological and political education, and promoting a comprehensive, all-encompassing, full-process, and all-round education framework. Within this policy context, the concept of "ideological and political education in courses" has rapidly permeated all disciplines and programs in higher education, becoming a key strategic initiative for cultivating high-quality individuals with both moral integrity and competence[4, 5].

At the same time, the Engineering Education Professional Accreditation Program, based on the principles of "student-centered, outcome-oriented, and continuous improvement," sets systematic requirements for undergraduate engineering talent development[6, 7]. This accreditation not only requires students to possess solid professional knowledge and practical engineering skills, but also places particular emphasis on the cultivation of non-technical competencies such as social responsibility, professional ethics, integrity, and teamwork. These requirements are highly consistent with the core socialist values advocated by ideological and political education in courses[8, 9]. For example, patriotism and engineering ethics, professional dedication and professional responsibility, integrity and engineering integrity standards, and friendliness and teamwork all embody the resonance of values and capabilities[10]. Therefore, organically integrating ideological and political education into engineering courses is not only an inherent requirement for fulfilling the fundamental task of cultivating morality and educating people, but also an inevitable choice for engineering education accreditation to comprehensively enhance the comprehensive quality of graduates[11, 12]. As scholars such as Qin Lei have emphasized, ideological and political education in courses and engineering accreditation should "move in tandem," synergistically promoting overall improvement in talent development quality[13, 14].

Packaging engineering, as an emerging multidisciplinary field within engineering, encompasses multiple disciplines, including materials science, mechanical engineering, design and art, and food and medicine[15]. Undergraduate talent development requires a focus on both cultivating practical engineering skills and highlighting industry-specific

characteristics and innovative capabilities. In recent years, with the development of "new engineering" and the advancement of engineering education accreditation, many universities across China have gradually strengthened the integration of packaging engineering courses with ideological and political education[16, 17]. For example, some scholars have explored integrating ideological and political elements such as green development concepts, craftsmanship, and national confidence into classroom instruction in the "Packaging Technology" course[18]. They have also introduced case studies of ideological and political education in core courses such as "Packaging Design" and "Food Packaging," achieving positive teaching results. These reforms have fully demonstrated the significant value and practical significance of promoting ideological and political education in the packaging engineering major[19, 20].

However, compared with traditional ideological and political theory courses, this major still faces many challenges in the construction of curriculum ideological and political education (IPE) [21-23]. Professional courses in science and engineering have long focused on the imparting of scientific knowledge and engineering skills, leading to a prominent phenomenon of "two separate tracks" between professional education and IPE, and thus the educational function of courses has not been fully exerted. The sorting and extraction of IPE elements contained in courses such as Packaging Materials Science and Packaging Technology are not systematic or in-depth, with problems like rigid integration and superficial "labeling". Professional course teachers lack backgrounds in IPE, while IPE teachers are not familiar with professional knowledge; the two groups work in isolation, which results in a lack of synergy in promoting IPE. There is a lack of a long-term collaborative education mechanism featuring college-level coordination, school-enterprise cooperation, and expert guidance, so the role of enterprise and industry resources has not been fully utilized. The curriculum system provides insufficient support for the quality dimensions required by engineering accreditation, and the assessment of professional courses lacks clear design for evaluating students' values and attitudes, making it difficult to meet the accreditation requirements for graduates' ideological guidance and value shaping.

In view of this, this study attempts to construct an IPE teaching team with the collaboration of multiple subjects, namely "in-school teachers + enterprise mentors + industry experts". It integrates resources and complements advantages through an inter-subject collaboration mechanism, and conducts practical verification in several core professional courses. The aim is to explore effective implementation paths for IPE in engineering majors, provide references for the construction of IPE systems in similar majors, further improve the educational effectiveness of professional courses, and meet the new requirements of engineering education accreditation.

## 2. Mechanisms for Building Ideological and Political Education Teams

To address the issues mentioned above, this article proposes building a multi-faceted collaborative ideological and political education teaching team comprised of "on-campus + enterprise + industry experts." This will establish a new mechanism for collaborative education among professional and ideological and political teachers, along with industry mentors and experts, to promote the systematic and long-term development of ideological and political education.

## 2.1. Team Composition and Division of Responsibilities

Ideological and political education teaching teams are composed of both on-campus and external personnel, emphasizing the integration and collaboration of multiple disciplines and stakeholders. Specifically, they include:

### 2.1.1. Professional Course Teachers

Professional course teachers are the primary teaching force, shouldering the primary responsibility of imparting professional knowledge and playing a crucial role in guiding values. They must deeply explore the ideological and political elements inherent in their disciplines in their course design and naturally integrate them into classroom instruction, achieving an organic integration of professional knowledge and value formation. Within the team, professional course teachers play a leading role and are the key driving force behind ideological and political education reform.

### 2.1.2. Ideological and Political Education Teachers

Ideological and political education teachers typically come from Marxist colleges or serve as counselors and are proficient in ideological and political education theories and methods. Their primary responsibility is to assist professional course teachers in organizing and refining ideological and political education materials related to their courses, identifying key points from a value-oriented perspective and ensuring that the ideological and political education in these courses is directed correctly and profoundly informed. Furthermore, they can help professional course teachers optimize their delivery, ensuring that ideological and political elements are more relevant to students' lives and thoughts, achieving a "silent" educational effect.

### 2.1.3. Corporate Mentors

Corporate mentors are often engineers, technical experts, or skilled craftsmen from companies in the packaging industry. Familiar with production lines and corporate culture, they can provide authentic and engaging engineering examples and practical cases, naturally integrating professional qualities such as dedication, craftsmanship, and responsibility into the classroom. For example, when teaching a packaging technology course, introducing company product packaging improvement cases not only strengthens quality awareness and innovation, but also enhances students' practical experience and professional identity.

### 2.1.4. Industry Experts

Industry experts often come from industry associations, research institutes, or affiliated universities. They possess a deep understanding of the latest academic disciplines and industry developments, and possess extensive life experience and a broad perspective. They can incorporate the latest technological advances and policy guidance into the curriculum, helping students connect their professional studies with national strategies and societal needs, and strengthening their sense of patriotism and social responsibility. For example, experts can

suggest incorporating the "dual carbon" strategy or green packaging industry policies into teaching, ensuring that the course content remains current.

In summary, by integrating multiple roles, the team achieves complementary strengths within and outside the school: professional course teachers are familiar with the curriculum system and student needs, ideological and political course teachers master educational methods and value orientations, corporate mentors bring practical experience from the front lines of production, and industry experts provide cutting-edge disciplinary knowledge and policy background. This multi-stakeholder collaboration helps fully tap into the resources of ideological and political education in the curriculum, fostering a three-pronged educational effort that integrates knowledge transfer, value guidance, and practical guidance.

## 2.2. Team Collaboration Mechanism

To ensure the team's efficient operation, a scientific and standardized collaboration mechanism must be established:

### 2.2.1. Regular Group Lesson Preparation

Team members regularly hold group lesson preparation meetings around course units. Professional course teachers first propose lesson plans and proposed ideological and political elements to be incorporated. The ideological and political course teachers, corporate mentors, and industry experts then discuss how to achieve a natural integration and effective presentation. For example, in the "Packaging Material Selection" module, the team discussed how to incorporate the concept of "green development": experts introduced new developments in environmentally friendly materials, corporate mentors shared practical examples of green packaging, and ideological and political education teachers summarized the social responsibility and sustainable development concepts involved.

### 2.2.2. Co-building a Course Resource Library

The team collaborated to establish a library of ideological and political education materials, including a list of correspondences between ideological and political education elements and course knowledge points, a case library, video materials, and policy document summaries. Each member contributed resources based on their expertise: professional teachers provided information on the history of professional development and China's packaging achievements, ideological and political education teachers provided policy theories and biographies, corporate mentors provided production site cases and corporate culture, and industry experts provided industry standards and strategic policies. Through the development of this resource library, ideological and political education in the course was systematic and shared.

### 2.2.3. Collaborative Teaching Models

In classroom teaching, the team explored various collaborative approaches. For example, corporate mentors and industry experts could directly introduce industry practices into the classroom through special lectures or joint teaching. Professional and ideological and

political education teachers could implement a "dual mentorship system," with the former teaching key points and the latter enhancing their value proposition, achieving two-way collaboration within the classroom. During the practical sessions, corporate mentors provide guidance, helping students receive value guidance and ideological nurturing in real-world situations.

### 2.2.4. Communication Platform

Establish a comprehensive online and offline communication mechanism, such as WeChat groups and online teaching and research platforms, to facilitate real-time communication and feedback. Professional course teachers can consult the team at any time if they encounter difficulties in their teaching, and ideological and political education teachers can also provide new current events or educational resources in a timely manner, ensuring the dynamic updating and continuous improvement of the ideological and political education content.

## 2.3. Operational Management Model

The effective operation of the ideological and political education teaching team requires institutionalized management and organizational support:

### 2.3.1. Goal-Oriented Management

Clearly define annual team development goals, such as completing ideological and political education teaching plans for several core courses, developing demonstration cases, and producing papers on teaching reform. Clearly defining goals helps strengthen team members' sense of responsibility and direction.

### 2.3.2. Division of Labor and Collaborative Advancement

The team can establish several subgroups based on course categories, such as the "Packaging Materials Group" or the "Packaging Technology Group." Each group will be led by a core faculty member, with other members collaborating to regularly report progress and exchange experiences, achieving a positive interaction between the overall and specific areas.

### 2.3.3. Assessment and Incentive Mechanism

Team-building achievements will be incorporated into faculty performance evaluations and professional title reviews, with corresponding workload recognition and rewards provided. Actively participating corporate mentors and industry experts may be awarded letters of appointment or honorary titles, along with financial support, to enhance their participation. Furthermore, regular selections will be made for "Outstanding Ideological and Political Education Teams" and "Outstanding Members" to commend outstanding individuals, set examples, and enhance team cohesion.

Through the development of these mechanisms, a rationally structured, clearly defined division of labor, and efficient ideological and political education teaching team can be gradually formed. Leveraging resources both within and outside the university, ideological

and political education can achieve a deep integration of professional education and value-based guidance, providing solid talent and organizational support for the in-depth advancement of ideological and political education reform within the context of engineering education accreditation.

## 3. Operation and Support System for Course Ideological and Political Education Teams

Once established, a course ideological and political education teaching team must be supported by a comprehensive operation and support system to ensure long-term stability and efficiency. This system primarily encompasses institutional development, funding support, capacity building, teaching research, evaluation and assessment, and continuous improvement.

### 3.1. Institutional Support

Schools and colleges should develop supporting institutional documents to incorporate the development of course ideological and political education teaching teams into their overall talent development plans. The team's role, division of responsibilities, and work processes should be clearly defined to ensure a well-defined structure. For example, the teaching management system should stipulate that each professional course must develop an ideological and political education integration plan, which must be reviewed and filed with the course ideological and political education team. A teaching quality monitoring and feedback mechanism should be established to ensure that ideological and political education elements are implemented as required. Furthermore, the engineering education accreditation work plan should incorporate course ideological and political education into the matrix supporting training objectives and graduation requirements, with particular emphasis on the institutionalized implementation of ideological and political education indicators. Through institutional design, the development of course ideological and political education teams should be closely integrated with daily teaching management to foster a long-term, effective mechanism.

### 3.2. Funding Support

Funding is a crucial prerequisite for team building. Schools should set aside dedicated funds to support the daily activities of the ideological and political education team, such as collective lesson preparation and discussion, case study development, and research on educational reform topics. Furthermore, professional teachers should be encouraged to visit businesses, industry associations, and revolutionary education bases to collect frontline teaching materials. Team members should be supported in participating in training and academic exchanges to enhance their comprehensive capabilities. Necessary transportation subsidies and remuneration should be provided to hired corporate mentors and industry experts. Adequate funding not only ensures the smooth implementation of team activities but also effectively enhances member participation and engagement.

## 3.3. Capacity Building

Improving the overall quality of the team is key to the high-quality implementation of ideological and political education in courses. First, ideological and political literacy training should be strengthened for professional course teachers. Faculty from the School of Marxism should be invited to teach them ideological and political education theory and the policies and guidelines of the new era to help them enhance their understanding of policies and their ability to guide values. Second, ideological and political education teachers should be encouraged to study the fundamentals of packaging engineering and industry developments to better align with the professional curriculum. Furthermore, by inviting teachers of demonstration courses to share their experiences and organizing visits to excellent classes, team members can be encouraged to renew their perspectives and improve their teaching methods, thereby fostering a positive learning community.

## 3.4. Teaching Research and Resource Development

Teams should be encouraged to conduct research in their teaching practice to promote the integration and dissemination of findings. Teams can actively apply for teaching reform projects at all levels, such as "Research on Ideological and Political Education Models in the Context of Engineering Education Certification" and "Evaluation Mechanisms for Ideological and Political Education Effectiveness Based on Collaborative Education," closely integrating theoretical research with classroom practice. At the same time, the ideological and political education resource library should be gradually improved, integrating case studies, courseware, textbooks, and video materials to achieve resource sharing. Particular emphasis should be placed on developing textbooks or handouts that incorporate ideological and political elements, systematizing and integrating scattered materials into teaching materials for easier dissemination and application. Schools can also establish "Ideological and Political Education Case Libraries" or online sharing platforms to compile outstanding case studies from various disciplines for teachers to reference.

## 3.5. Evaluation and Assessment

Establishing a scientific evaluation system is crucial for ensuring the quality of ideological and political education in courses. First, questionnaires, interviews, and discussions can be used to collect student feedback on ideological and political education, including dimensions such as learning interest, value gains, and improved abilities. Second, value-oriented indicators should be incorporated into course assessments, such as assessing students' social responsibility and ethical awareness in essays and project reports. At the same time, college supervisors should regularly observe classes to assess the depth of ideological and political integration and its effectiveness. Outstanding courses and teams should be rewarded, and existing issues should be promptly addressed, creating a virtuous cycle of "evaluation drives development, and evaluation drives improvement."

## 3.6. Continuous Improvement

Drawing on the "continuous improvement" philosophy of engineering education

accreditation, course ideological and political teams should adopt a PDCA cycle. Comprehensive summaries and evaluations should be conducted each semester or academic year: successful experiences with ideological and political integration should be reviewed, shortcomings analyzed, and the actual results and gaps in student quality improvement should be identified. Based on this, work plans for the next phase should be formulated. For example, support could be increased for courses with weak ideological and political integration, and case studies with unsatisfactory student feedback should be updated and optimized. Through continuous review, feedback, and adjustment, the dynamic adaptability and sustainable development of team building can be ensured.

Through multi-dimensional measures such as institutional arrangements, funding, training, research, evaluation, and improvement, course ideological and political teaching teams can achieve standardized and regular operations, effectively fulfilling their role in talent development. This not only provides solid support for the ideological and political reform of packaging engineering courses, but also accumulates organizational experience and practical paths that can be used as reference for other engineering majors to promote the construction of ideological and political courses.

## 4. Case Study of Ideological and Political Education Teams in Courses

To test the effectiveness of the aforementioned ideological and political education teaching team mechanism, the Packaging Engineering major at Hunan University of Technology selected the core course "Packaging Technology" as a pilot program and implemented collaborative team building and teaching reforms. The following is a specific case study for this course.

### 4.1. Case Study Background

"Packaging Technology" is a core, required course in the Packaging Engineering major. It primarily covers the packaging process flow, equipment principles, and design methods for various product packaging applications. It is a crucial course for cultivating students' process design capabilities and innovative thinking. Previous teaching focused heavily on explaining engineering principles and technical methods, resulting in low student interest and insufficient educational effectiveness. To address the university's requirements for ideological and political education in courses and align with the graduation requirements for engineering education certification, the college decided to establish an ideological and political education teaching team for this course to implement collaborative educational reforms. The team consists of two course lecturers, one ideological and political education instructor, a senior engineer from a leading local packaging company, and an expert recommended by an industry association. Professor Zhang serves as the lead.

### 4.2. Team Preparation and Ideological and Political Elements

Before the course began, the team held several collective lesson preparation meetings, reviewing the course content chapter by chapter and exploring potential ideological and political elements and case studies as entry points. Led by Professor Zhang, the team developed a systematic approach to the course's ideological and political design, laying the

foundation for subsequent implementation.

## 4.3. Packaging History and Achievements Module

In the introductory section, the team decided to introduce the history of the development of China's packaging industry, highlighting its achievements and representative figures. The ideological and political instructor suggested incorporating case studies such as packaging support during the "Two Bombs and One Satellite" era and the rise of domestic packaging companies after the reform and opening up policy to foster patriotism in students. The corporate mentor added a case study of a state-owned enterprise's packaging workshop's transformation from manual to automated operations, highlighting the country's industrialization process. Ultimately, the course featured a special topic titled "The Development Path of China's Packaging Industry," which helped students gain a deeper understanding of the close connection between their professional development and the nation's destiny.

## 4.4. Materials and Environmental Protection Module

When teaching the selection of packaging materials, the team focused on the concepts of ecological civilization and sustainable development. Industry experts provided the latest technical information on biodegradable materials, and corporate mentors shared examples of their companies' environmental practices in response to the "plastic ban." Professional teachers organized a class discussion titled "Plastic or Paper Packaging? - Balancing Environmental Protection and Functionality," guiding students to consider the social responsibility of engineering decisions. Ideological and political education teachers elevated the discussion to the perspective of socialist ecological civilization, helping students understand that engineering choices must serve the broader goal of harmonious development between people and the environment.

## 4.5. Craftsmanship and Ingenuity Module

In the mechanical packaging process section, a corporate mentor shared his personal experience of meticulously polishing equipment and pursuing ultimate quality at his company for decades, exemplifying the spirit of craftsmanship and dedication. In class, ideological and political education teachers further guided students to explore the "Connotation of the Craftsman Spirit in the New Era," prompting them to reflect on how to practice this pursuit of excellence and dedication in their future careers. This session effectively stimulated students' learning motivation, with students generally stating that "studying this profession is not just about mastering technology, but also about cultivating attitudes."

## 4.6. Safety and Responsibility Module

In the food packaging safety section, the team designed case studies. By comparing domestic and international food and pharmaceutical packaging safety incidents, students gained a direct understanding of the importance of quality management systems. The company instructors explained risk prevention and control measures based on actual

production practices. Industry experts introduced national and industry safety standards. Professional teachers taught key technical points and emphasized the engineering philosophy of prioritizing consumer safety. The Ideological and Political Education instructor then led a student discussion on "Engineering Ethics and Social Responsibility," guiding students to cultivate the conscience and sense of responsibility that engineers possess.

## 4.7. Collaborative Teaching Implementation

Throughout the semester, the team rigorously adhered to the teaching plan. In the introductory topic, "History of the Development of the Packaging Industry," professional instructors, Ideological and Political Education instructors, and industry experts jointly taught the course, giving students their first comprehensive understanding of the deep connection between their field and national development. The class was enthusiastically received. In the "Packaging Line Design" section, the company instructors brought real-world projects into the classroom, detailing the entire process from production line design to commissioning. Students were deeply impressed by the close integration of theory and practice, significantly increasing their interest in learning. After class, the team also organized a company visit for students, allowing them to experience modern packaging production firsthand.

## 4.8. Co-teacher Collaboration and Classroom Innovation

The Ideological and Political Education instructor participated throughout the course, and some sections adopted a "dual-teacher co-teaching" model. For example, when teaching "Green Packaging," a professional teacher explained the technical solutions while the ideological and political education teacher supplemented the concept of ecological civilization. During the "Engineering Ethics" discussion, one teacher raised real-world issues while the other explored value propositions. This collaborative approach not only deepened the teaching process but also enhanced students' shared values.

## 4.9. Project-Based Practical Assignments

The team designed a comprehensive group project: "Design an environmentally friendly packaging solution for a traditional cultural product and explain the social value of the design." Under the team's guidance, students completed their proposals. Their final presentation showcased both technical creativity and incorporated reflections on cultural heritage, environmental protection, and rural revitalization. Industry experts and corporate mentors jointly reviewed the work, providing feedback from both professional and ideological and political perspectives, effectively strengthening students' comprehensive abilities.

## 4.10. Teaching Feedback and Continuous Optimization

Throughout the teaching process, the team held biweekly meetings to share classroom observations and student feedback, and to make dynamic adjustments. For example, when students struggled to understand certain case studies mid-term, the team supplemented the lesson with accessible video materials. When individual classes showed low learning

enthusiasm, the ideological and political education teacher suggested adding videos on patriotic struggle, significantly improving the class's effectiveness. Through team collaboration and continuous optimization, course teaching has achieved a deep integration of knowledge imparting and value guidance, and student participation and satisfaction have been significantly improved.

## 5. Analysis of the Effectiveness of the Course Ideological and Political Education Team

The implementation of the "on-campus + enterprise + industry expert" ideological and political education teaching team model in the "Packaging Technology" course has achieved significant results, as reflected in the following aspects.

### 5.1. Significant Improvement in Students' Overall Quality

Post-course questionnaires and interviews revealed that the vast majority of students expressed a positive attitude towards the integration of ideological and political elements into the professional curriculum. Students generally felt that the course not only imparted packaging technology knowledge but also provided a profound ideological education. First, students' sense of value identification was significantly enhanced: 95% of students expressed a stronger love for the major and expressed a desire to contribute to the national packaging industry. Over 90% of students recognized the importance of craftsmanship and social responsibility for engineers and expressed a willingness to practice them in their future work. Second, students' learning motivation and higher-order thinking skills were enhanced: 72% of students felt that their analytical and problem-solving skills had been honed through the introduction of case studies and social issue analysis. In their course papers, many students spontaneously included ethical and environmental considerations, demonstrating strong critical thinking and innovative thinking.

To improve the quantitative evaluation, the team specially designed a Likert 5-point scale questionnaire to quantitatively analyze the impact of ideological and political education on students' values from dimensions such as professional values, sense of social responsibility, and engineering ethics cognition. The survey results showed that students' scores in all indicators were significantly higher than those before the course ($p<0.05$).This demonstrates that the integration of ideological and political education into the curriculum has effectively promoted the coordinated development of students' knowledge, abilities, and qualities, and is highly consistent with the talent development goals of engineering education certification.

### 5.2. Improved Teaching Quality and Classroom Effectiveness

Course assessment results show that the introduction of ideological and political elements did not weaken students' mastery of professional knowledge. On the contrary, the intuitive case-based teaching approach led to a deeper understanding, resulting in a slight improvement in final grades compared to previous years. Students also performed well in assessments related to ideological and political education, demonstrating their ability to closely connect their acquired professional knowledge with real-world situations. For example, a student team proposed a solution, "Using Intelligent Packaging Technology to

Address Rural Food Safety Issues," which demonstrated both technical feasibility and social benefits, and received high praise from the team's experts. The college's teaching supervisor commented that the course "created a lively classroom atmosphere, engaged students, and achieved a balanced approach to knowledge transfer and value-oriented development, truly embodying the 'silent' effect." The university's final teaching review also gave the course an excellent rating.

## 5.3. Professional Growth of the Faculty

Building an ideological and political education team not only promotes student growth but also fosters the development of the faculty. Collaboration with ideological and political education teachers and industry experts broadened the scope of professional course teachers and strengthened their awareness and ability to educate students. They were able to more systematically explore ideological and political elements within the curriculum and integrate them naturally into their teaching designs. Through in-depth teaching in the professional classroom, ideological and political education teachers became familiar with the specifics of the Packaging Engineering discipline, enriched their own case studies, and enhanced the impact of their classes. Through their participation in teaching, industry mentors and experts deepened their understanding of university talent development and felt the impact of their own experience and values in educating students. One industry mentor commented, "Seeing students reflect on how technology can serve society gives me a glimpse into the future backbone of the industry." It can be said that through collaborative collaboration, team members achieved a win-win situation in both professional development and self-improvement.

## 5.4. Program Development and Certification Support

The successful pilot of this course has further enhanced the Packaging Engineering program's talent development program. The college explicitly states in its training objectives "cultivating students' sense of social responsibility and patriotism," added a "Professional Ethics and Responsibility" indicator to its graduation requirements, and designated core courses such as "Packaging Technology" as support. This course was designated a university-level model course for ideological and political education and cited as a case study in the engineering education accreditation self-evaluation report.

To verify the promotability of the model, the team conducted expanded tests in two courses, Packaging Materials Science and Transport Packaging. The results showed that the pilot courses achieved similar outcomes in terms of students' learning engagement and value identification, proving that the model has good universality.

Based on this experience, the college also plans to promote the team-based collaborative education model in other core courses, gradually realizing the full coverage of curriculum ideological and political education (IPE) in professional courses. In the recent self-evaluation report for engineering education accreditation, the major cited cases and data of IPE reform to prove that the cultivation of graduates in engineering ethics and social responsibility meets the requirements. This provides strong support for engineering accreditation experts during their on-campus inspection.

It can be predicted that the promotion of this teaching team construction model will help the major achieve better results in the new round of engineering accreditation and realize the continuous improvement of talent cultivation quality.

## 5.5. Demonstration and Radiation Effect

The practical results of this ideological and political education team have had a positive impact both within and beyond the university. Other colleges on campus have actively observed and learned from their model, and their collective lesson preparation and collaborative teaching model has been promoted campus-wide by the university's Teaching Steering Committee. After learning about this experience through seminars, fellow universities believe that this model provides an effective solution to the common challenge of integrating professional courses with ideological and political education in engineering colleges. A relevant educational research journal reported on the team's reform experience, acclaiming it as "exploring a new path for the deep integration of professional courses and ideological and political education." Team members also published a paper summarizing their experience in a core journal, furthering academic attention to ideological and political education in engineering education.

Through the development and implementation of this ideological and political education teaching team, the core course of the Packaging Engineering major has achieved an organic integration of knowledge transfer, capacity building, and value formation. The comprehensive quality of students has been improved, the teaching ability of teachers has been significantly enhanced, and the development and certification of majors have been promoted, creating a positive impact. Through expanded verification and quantitative evaluation across multiple courses, the promotability and effectiveness of this model have been further proven.

This practice fully demonstrates the feasibility and effectiveness of the "campus + enterprise + industry experts" collaborative education model in the packaging engineering major, and also provides valuable experience and reference for the ideological and political development of other engineering majors.

# 6. Summary and Outlook

Against the backdrop of engineering education professional accreditation, promoting ideological and political education in university packaging engineering programs presents both a challenge and an opportunity. This paper, using the core courses of the packaging engineering program as a research vehicle, explores a reform approach for building a multifaceted collaborative teaching team comprised of "on-campus, enterprise, and industry experts." Through current situation analysis, team mechanism design, practical implementation, and effectiveness testing, the following key conclusions are drawn:

Collaborative teams are a crucial tool for promoting ideological and political education reform. Teaching teams with diverse participation can pool their wisdom and systematically explore the ideological and political education resources embedded in professional courses, achieving a deep integration of professional knowledge and value guidance. Teamwork effectively overcomes the limitations of individual teachers in their understanding and

implementation of ideological and political education, fostering a collaborative classroom education effort and significantly enhancing the effectiveness of the curriculum. Practice demonstrates the universal applicability of this model to engineering majors and represents a natural shift from individual ideological and political education to collaborative education.

Integrating ideological and political education into courses promotes the achievement of engineering education goals. Through collaborative development of the teaching team, the core socialist values are integrated throughout the entire curriculum, not only strengthening students' values but also enhancing their comprehensive abilities. Students develop a sense of patriotism, responsibility, integrity, and cooperation, which aligns closely with the non-technical competence requirements of engineering education accreditation for graduates. Ideological and political education in courses and engineering education accreditation complement each other, forming a mutually reinforcing relationship and providing a strong foundation for cultivating new-generation engineering talents with both integrity and competence.

Institutionalized support and continuous improvement are key to the long-term effectiveness of reform. Building an ideological and political education team is not a one-time initiative; it requires multiple safeguards, including institutional systems, funding, and training, to ensure its long-term effectiveness. Furthermore, drawing on the concept of "continuous improvement" in engineering education accreditation, we should establish a regular evaluation and feedback mechanism to timely optimize team operations and teaching methods, thereby achieving the normalization and long-term effectiveness of ideological and political education reform and avoiding superficial formalities.

Ideological and political education reform in courses has broad application value and development prospects. This study uses the packaging engineering major as a case study, and its concepts and approaches offer valuable insights for other engineering majors and even interdisciplinary courses. my country's higher education is currently comprehensively promoting the "three-dimensional education" model, and ideological and political education in courses has become a key breakthrough in improving the quality of talent development. With the widespread establishment of collaborative teaching teams, the improvement of ideological and political education case libraries, and the expansion of the "dual-qualified" faculty, ideological and political education in colleges and universities will gradually become more systematic and standardized. Especially in the context of the development of "new engineering, new agriculture, new medicine, and new liberal arts," ideological and political education in courses will be more widely integrated into innovation, entrepreneurship, and interdisciplinary education, helping to cultivate interdisciplinary talents with both a sense of social responsibility and a humanistic spirit, providing strong support for serving national strategies and the connotation-oriented development of higher education.

However, this study still has certain limitations. Due to time and resource constraints, the team-building model was only implemented in depth in one course, and its effectiveness in scaling up to other courses requires further verification. Furthermore, quantitative evaluation of the effectiveness of ideological and political education in courses remains difficult, and how to scientifically assess students' ideological and moral development remains an urgent issue. Future research will further promote the application of the team model across all majors and strengthen dynamic tracking research on the improvement of

students' ideological and political literacy to provide more comprehensive data support. At the same time, we need to explore the application of information technology in ideological and political education, such as leveraging online platforms for collaborative lesson preparation between schools and enterprises and developing virtual simulation case studies, to explore new avenues for ideological and political education.

Overall, ideological and political education reform within the context of engineering education accreditation is a systematic, long-term educational innovation project. By pooling team wisdom and integrating industry-university resources, the educational value inherent in professional courses is being deeply explored, and ideological and political education is being subtly integrated into every course. The exploration and practice of the ideological and political education teaching team in the Packaging Engineering major has provided new approaches to talent cultivation in engineering disciplines and accumulated replicable experience for universities to fulfill their fundamental mission of cultivating moral integrity and educating people. Looking ahead, ideological and political education will undoubtedly play a role in the broader educational landscape, helping to cultivate high-quality engineering talents capable of shouldering the great responsibility of national rejuvenation.

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## Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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