Exploring Innovative Ideological and Political Education in Professional Courses under the Background of Strengthening Military Engineering in New Engineering Disciplines

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Abstract. Conducting research and practice on ideological and political education in professional courses within military academy engineering disciplines is an essential component of "Strengthening Military Engineering in New Engineering Disciplines." This paper takes the course "Infrared Physics and Technology" as a case study to explore innovative approaches to ideological and political education within specialized courses under the backdrop of strengthening military engineering in new engineering disciplines. By integrating the unique characteristics of the profession and the specific features of the course, and addressing the pain points of ideological and political education, this study proposes and establishes a "Thermal Radiation" approach to ideological and political education. It constructs an immersive, three-dimensional, and distinctive ideological and political education system, implements the organic integration of ideological and political education throughout the entire process, and adheres to the clear direction of cultivating talent for combat. This approach enhances the warmth of teaching and the enthusiasm of learning, strengthens the military flavor, combat flavor, and distinctiveness of the course, and significantly improves the quality and effectiveness of ideological and political education in professional courses. It provides a reference for the practice of "teaching + ideological and political education + combat readiness" trinity in professional course teaching under the context of strengthening military engineering in new engineering disciplines.

Keywords: Ideological and Political Education, Moral Education and Talent Cultivation, Cultivating Talents for Combat

1 Introduction

Strengthening the military and prospering the nation rely crucially on talent, with education as the foundation. Military academies primarily cultivate talents through engineering disciplines, where "Strengthening Military Engineering in New Engineering Disciplines" serves the goal of military enhancement, meets the demands of the armed

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forces, and looks to the future of engineering disciplines and majors. It aims to cultivate a group of outstanding interdisciplinary and compound talents with a strong military background, a deep sense of mission for strengthening the military, and capabilities in innovation, adaptability, leadership, and cross-disciplinary integration. The ideological and political education in military academy courses is an important task in implementing the military education policy of the new era and deepening the teaching reform in military academies. It is a fundamental necessity for persisting in soul-casting and talent cultivation.

The course "Infrared Physics and Technology" is a newly established professional background course following the restructuring of the military combat force system for the "Space Situational Awareness Technology and Command" major, designed to support the development of new quality and new domain combat forces in space situational awareness. To safeguard space interests and seize the strategic high ground in a new round, it is paramount to achieve "clear vision and accurate judgment" in the space domain. As a senior-year professional course, "Infrared Physics and Technology" possesses both strong theoretical and practical characteristics, with a pronounced emphasis on combat readiness and the forging of a spirited ethos.

In the ideological and political education component of the course teaching practice, several issues are primarily present: (1) During the design and implementation process, the integration of ideological and political content with professional course content is not sufficiently close or natural, leading to a lack of distinctiveness in the characteristics of the course's ideological and political education.[1] This is specifically manifested in the insufficient prominence of ideological and political elements that combine with the professional features of situational awareness, the characteristics of infrared technology, and the aerospace background; the integration methods of ideological and political elements are singular, with a predominance of explicit methods, and a lack of vividness and infectiousness in the elements. (2) The penetration of ideological and political teaching is not comprehensive enough, with an uneven distribution of ideological and political elements across the teaching content, showing a patchy and sporadic presence. [2] The basic theoretical part involves the spirit of scientists, and typical applications involve military cases, which are easier to integrate with ideological and political education. However, there is insufficient exploration of ideological and political elements in some theoretical derivation content; the elements are fragmented, scattered, and lack timeliness, resulting in a poor empathetic experience for students. (3) The atmosphere of the ideological and political content for combat is not strong enough. The content of "Infrared Physics and Technology" has dual-use characteristics for both military and civilian purposes, with many infrared-related ideological and political elements.[3] However, the exploration of elements closely related to military history, military cases, military equipment, military applications, and combat spirit is not deep enough, leading to a lack of military flavor and combat flavor, and a lack of focus on teaching for combat. [4]

Since 2017, taking the current military academy reform as an opportunity and guided by the concept of new engineering disciplines, the course "Infrared Physics and Technology" has carried out innovative explorations in ideological and political education within the context of strengthening military engineering in new engineering disciplines.

While imparting professional knowledge, the course focuses on cultivating students' national sentiments, innovative spirit, scientific literacy, and sense of mission, striving to train a new generation of "four-haves" revolutionary soldiers who possess "soul, capability, bloodiness, and character." The course integrates teaching content, ideological and political goals with "educating for combat," forming a trinity of "teaching + ideology + combat" educational orientation. This approach transforms the "thermal radiation" influence of ideological and political teaching into a "temperature" change in students, positively impacting their development.

2 Ideological and Political Education Philosophy

The course employs a thermal radiation perspective for ideological and political education design, stating that "all things in the world are constantly emitting thermal radiation, which is invisible to the human eye but sometimes perceptible as heat." Drawing from the principles and characteristics of thermal radiation, the course has distilled and practiced a "Thermal Radiation" ideological and political concept that is unique to this subject. It proposes innovative measures in building a three-dimensional ideological and political system and implementing comprehensive ideological and political teaching, offering methods and pathways to address challenging issues in the ideological and political education of military academies. [5]

2.1 Ideological and Political Education Design, Emphasizing the "Special" Characteristic

Drawing from the distinctive features of our discipline in aerospace and military fields, and targeting the identity characteristics and thinking habits of student cadres, military talents, and the "Post-00s" generation, the course "Infrared Physics and Technology" emphasizes the characteristics of "red," "heat," and "warmth." Inspired by the features of infrared radiation—"invisible, omnipresent, and highly sensitive"—we design an ideological and political education with distinctive course features.

2.2 Ideological and Political Education in Courses, Emphasizing the "Military" Characteristic

In the ideological and political education within courses, emphasizing the "military" aspect primarily involves strengthening military characteristics. The teaching content should be closely integrated with the realities of the military, deeply tapping into military resources, and incorporating knowledge from military theory, military history, and military technology into professional teaching. This approach allows students to gain a deeper understanding of the military's development and current status while learning professional knowledge, thereby enhancing their sense of identification with and pride in the military. [6]

Firstly, in terms of national sentiment, the course aims to guide students to recognize the significant role of infrared technology in national security and defense construction,

stimulating their patriotic emotions and aspirations to serve the country. Secondly, in terms of the spirit of innovation, the course encourages students to bravely explore unknown fields, propose new ideas and solutions, and fosters their awareness and practical ability for innovation. Thirdly, in terms of scientific literacy, the course cultivates students' research methods and ways of thinking, enhancing their scientific literacy and comprehensive abilities. Fourthly, in terms of mission and responsibility, the course develops students' sense of responsibility and mission, motivating them to be courageous in taking on responsibilities and to serve with loyalty in their future work. The mind map of the ideological and political education objectives for this course is as follows，shown in Figure 1.

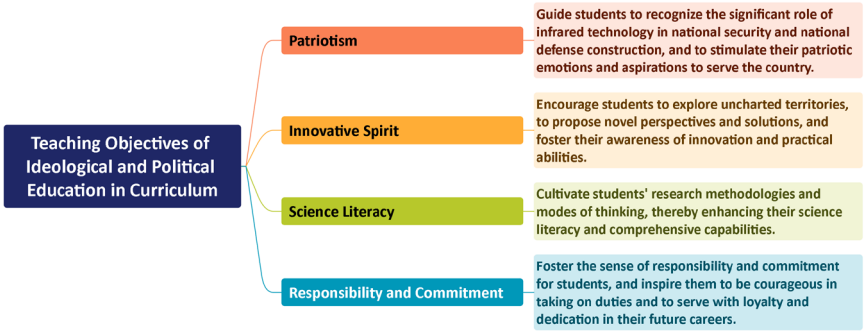

Fig. 1. Teaching objectives of ideological and political education.

3 Ideological and Political Education System

Just as "infrared rays" are invisible yet perceptible, ideological and political education, while not as tangible as concrete knowledge and skills, constantly influences students' thoughts and behaviors. The design of ideological and political education in this course, based on the attributes of situational awareness and the characteristics of military talent cultivation, constructs a three-dimensional system for the integration of ideological and political education that is "not seen, but felt."

3.1 Reshaping the Curriculum Knowledge System

Deconstructing and reorganizing the curriculum knowledge system and structural framework, the course teaching objectives are refined into four components: foundational concepts, process derivation, practical operations, and core applications. This establishes a hierarchical system of objectives that progresses from "concepts—principles—methods," moving from the specific to the general and from parts to the whole. Additionally, it creates an integrated content supply for ideological and political education in the course, represented as "points—lines—surfaces," thereby reflecting the fundamental requirements for learning professional course knowledge. [4] The curriculum knowledge system is depicted in Figure 2.

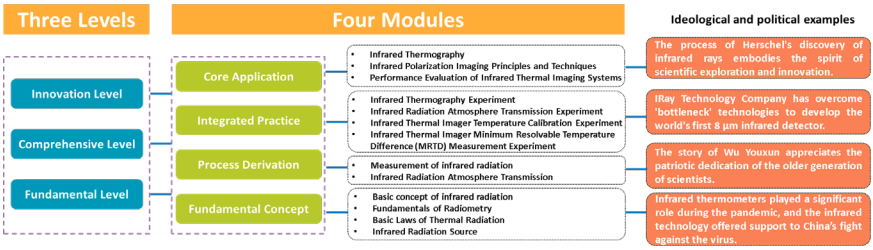

Fig. 2. Curriculum knowledge system.

3.2 Constructing the Course Ideological and Political Education System

Integrating the requirements of ideological and political education within the curriculum, this paper strengthens the structured design and establishes an immersive ideological and political education system characterized by "one core, two main lines, three dimensions, and four integrations." The core of the course focuses on "upholding the characteristics of aerospace situational awareness and cultivating military talents for a strong military and a strong nation" (one core). This is achieved through a teacher-led and student-centered approach (two main lines), seamlessly incorporating national sentiment, a sense of mission, scientific literacy, and innovative spirit into the teaching process across foundational concepts, process derivation, and core applications (three dimensions and four integrations). This approach significantly enhances the educational function of the course. Course Ideological and Political Education System shown in Figure 3.

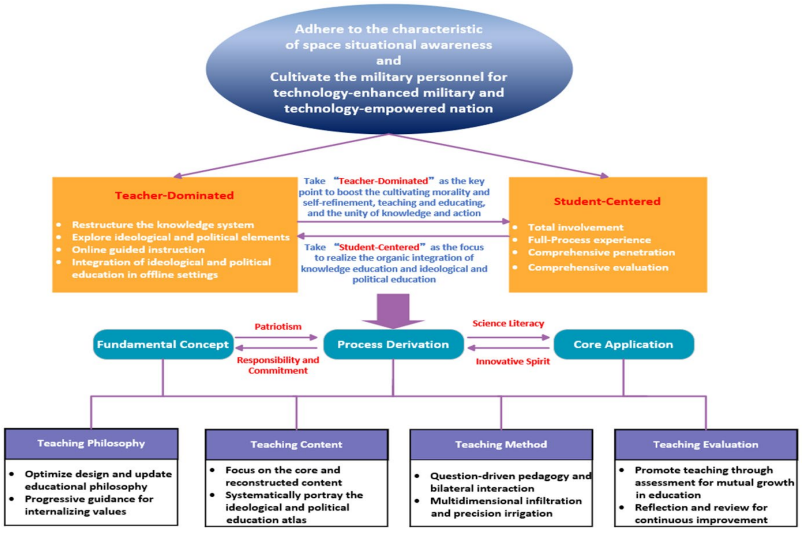

Fig. 3. Ideological and Political Education System.

4 BOPPPS+ Teaching Model

The course implements an integrated ideological and political BOPPPS teaching model, incorporating elements of ideological and political education into the six teaching segments: course introduction, learning objectives, pre-assessment, participatory learning, post-assessment, and summary. This establishes a deep coupling between professional knowledge and ideological and political elements in the processes of "guiding, teaching, learning, applying, and evaluating," thereby enhancing the "warmth" of teaching and the "enthusiasm" of student learning. [7]

4.1 Course Introduction

Prior to the class, information such as videos, news articles, and research papers is disseminated through popular platforms like Douyin, Bilibili, and WeChat. During the class, portable infrared devices are utilized for demonstrations, case analyses, and small experiments to capture students' attention. This approach stimulates multiple senses, creating resonance with students through various modalities, including sound, light, shadow, and imagery. [8]

4.2 Pre-assessment

In addition to assessing knowledge-based elements, the examination incorporates humanistic and timely ideological and political elements, thereby stimulating students' interest in understanding and tracking developments within the discipline.

4.3 Participatory Learning

Emphasizing the central role of students, the teaching approach focuses on employing various methods such as heuristic, problem-based, cooperative learning, and inquiry-based learning. It integrates theoretical knowledge with infrared equipment and aerospace applications, subtly incorporating ideological and political elements into lectures, discussions, demonstrations, and assignments. Through open-ended, experiential, and project-based practical exercises, the training not only increases the challenge of the course but also fosters a spirit of craftsmanship. [9]

4.4 Post-assessment

Emphasize the evaluation of process participation, enthusiasm, and completion, while also focusing on the assessment of ideological and political goals such as attitudes and emotions.

4.5 One Case for Exsample

Taking the laboratory session "Infrared Facial Temperature Measurement" as an example, the implementation process of the BOPPPS teaching model is depicted in Figure 4. In this class, course ideological and political content has been integrated into every teaching segment, much like "thermal radiation is omnipresent.

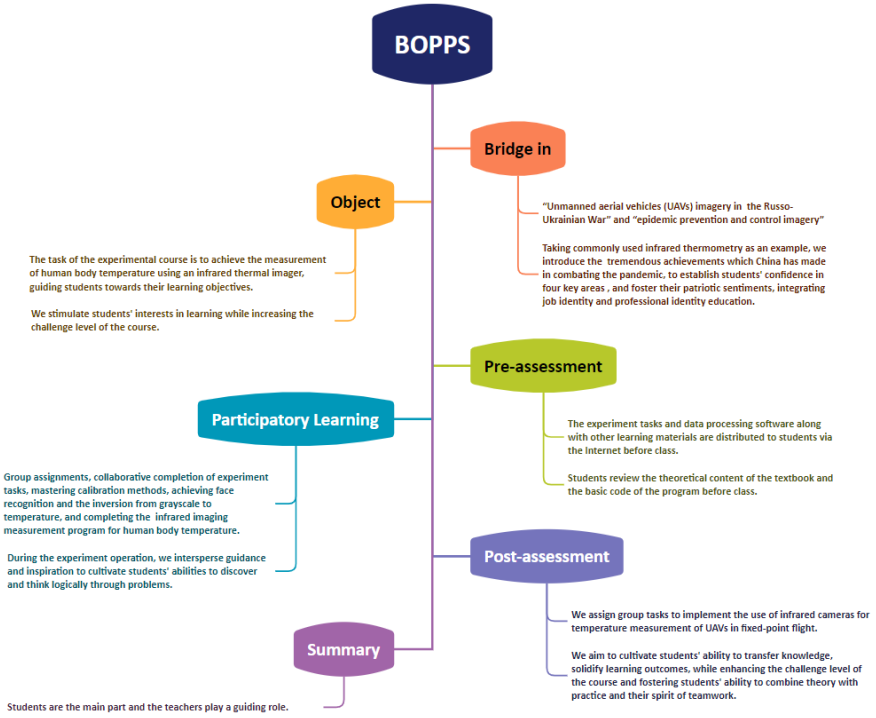

Fig. 4. BOPPPS+ teaching model implementation process.

5 Conclusion

Whereas the ideological and political education methods reported in other literature are all based on course knowledge, this paper updates the concepts and methods of ideological and political education by integrating the political education process into the teaching process, expanding from a single point of political education to an integrated system. This paper, taking the course "Infrared Physics and Technology" as a case study, explores innovative measures for integrating ideological and political education within specialized courses under the context of strengthening military engineering in new engineering disciplines. By establishing an educational orientation that integrates "teaching + ideology + combat readiness" within the framework of strengthening military engineering in new engineering disciplines, this study proposes and establishes a

"thermal radiation" approach to ideological and political education. It constructs an immersive, three-dimensional, and distinctive ideological and political education system, implements the organic integration of ideological and political education throughout the entire process, and adheres to a clear orientation of educating for combat. This approach enhances the warmth of teaching and the enthusiasm of learning, strengthens the course's military flavor, and significantly improves the quality and effectiveness of ideological and political education within specialized courses. It provides a reference for the practice of integrating "teaching + ideology + combat readiness" in the teaching of specialized courses under the context of strengthening military engineering in new engineering disciplines.

Since the implementation of the ideological and political education reform in the course "Infrared Physics and Technology," there has been a significant improvement in students' course performance, with the excellent rate increasing from 2.5% to 13.9%, shown in Fig. 5. The enthusiasm and internal motivation for learning have noticeably increased, with some students commenting, "The integration of ideological and political education in the course not only enhances the interest in learning but also strengthens the firm belief in serving the country through learning." The practice of ideological and political education in "Infrared Physics and Technology" has had a strong radiating effect on several professional background courses such as "Optoelectronic Technology," "Physical Optics," and "Space Target Electro-Optical Detection Technology," closely coordinating and carrying out matrix and systematic ideological and political education among courses. Currently, the ideological and political education model proposed in this paper has been applied to the "Space Target Electro-Optical Detection Technology" course in our major for two semesters, and both teachers and students have provided positive feedback. This supports the construction of a new type of professional talent training system aimed at cultivating military personnel in the field of situational awareness.

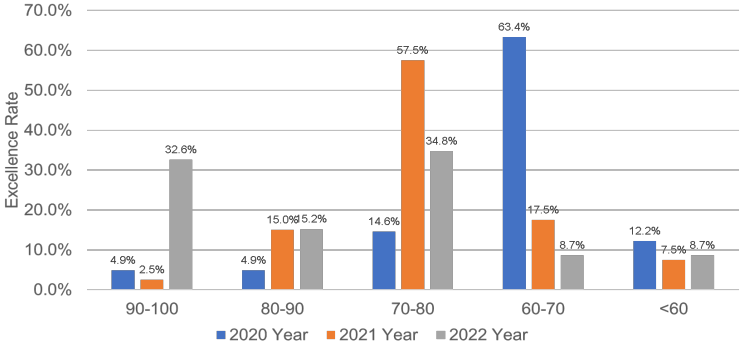

Fig. 5. Student academic performance improvement

Owing to the scarcity of time and evaluative methodologies, the efficacy of the adopted curriculum-based ideological and political education reforms has yet to be subjected to comparative quantitative analysis. The next step will involve conducting a comprehensive and multi-point "infrared precise temperature measurement" style of effectiveness evaluation throughout the entire process, which will provide a reference

for the ideological and political education in specialized courses within military engineering disciplines at military academies.

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