Exploration and Practice of Ideological and Political Education in the Course of Optoelectronic Technology in Military Academy

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Abstract. To fully implement the fundamental task of cultivating morality and educating people for war, integrating ideological and political education elements into the curriculum in a subtle and silent way is an effective way. Taking the course "Optoelectronic Technology" for undergraduate students majoring in Optoelectronic Information Science and Engineering as a carrier, based on the content and characteristics of the course, the ideological and political elements are sorted out, and the methods and approaches for implementing ideological and political education in the course are explored, with the aim of improving the quality of education while transferring knowledge, and providing reference for ideological and political education in other related science and engineering courses.

Keywords: Optoelectronic Technology; Curriculum Ideological and Political Education; Military Academy Education.

1 Introduction

In 2016, General Secretary Xi Jinping attended the National Conference on Ideological and Political Work in Universities and delivered an important speech. President Xi Jinping emphasized at the meeting that ideological and political work in universities is related to the fundamental issue of what kind of people universities cultivate, how to cultivate people, and for whom to cultivate people. We must adhere to the central link of moral education and talent cultivation, and integrate ideological and political work throughout the entire process of education and teaching, achieving full education, full education, and all-round education, and striving to create a new situation for the development of higher education in China. Comprehensively promoting the construction of ideological and political education in courses is a strategic measure to implement the fundamental task of cultivating morality and cultivating talents. All types of courses should go hand in hand with ideological and political education courses, forming a synergistic effect[1].

Military academies are bases for cultivating, providing, and reserving military talents, with the aim of laying a solid talent foundation for winning future wars. Military academy students are a valuable military talent resource for the country, a hope for ensuring the generation of military combat effectiveness, and a backbone of national defense construction. Military academy education should be "oriented towards the battlefield, the army, and the future",

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teaching what is needed for warfare and practicing what is needed for the army, so as to accurately connect the supply side of talent cultivation with the demand side of the future battlefield. As a new force in military education, the education of growth officers bears the heavy responsibility of cultivating high-quality and innovative military talents for our army. This article takes the course "Optoelectronic Technology" in the field of Optoelectronic Information Science and Engineering as an example, integrating ideological and political elements into the course content, integrating ideological and political education with knowledge transmission. Throughout the course teaching process, we always adhere to the central link of cultivating morality and talents, and integrate ideological and political work throughout the entire process of education and teaching. Spring turns rain, moistens things silently, and ultimately implements ideological and political education.

2 Basic information of the course "Optoelectronic technology"

2.1 Course nature and status

The course 'Optoelectronic Technology' is a professional background course for the Optoelectronic Information Science and Engineering major in higher education for growth cadres. The theoretical knowledge of this course mainly covers the basic knowledge of optoelectronic devices commonly used in typical optoelectronic equipment in fields such as space situational awareness and aerospace measurement and control optical measurement. The study of this course plays an important supporting role in deepening students' understanding of the working principles of optoelectronic equipment and laying a solid foundation in the discipline. It lays a foundation for further learning related professional courses and is an important part of cultivating students' ability to analyze and solve engineering and technical problems. It provides theoretical and practical support for students to engage in future work related to optoelectronic equipment application, optoelectronic equipment demonstration, and other related positions.

2.2 Basic Concept of the Course

This course implements the policy of military education in the new era, and establishes the basic concept of putting learning first, discussing teaching based on learning, and promoting mutual benefit between teaching and learning; Emphasizing both a solid theoretical foundation and attaching importance to integrating theory with practice, applying what is learned and promoting learning through application; Adhere to teaching students according to their aptitude and guiding them according to the situation, with a focus on cultivating students' ability to independently discover and solve problems, and strive to stimulate students' internal motivation for learning and innovation. In terms of teaching methods, we will promote a blended online and offline teaching approach. Through cooperation and interaction between teaching and learning, we will stimulate students' enthusiasm and initiative in learning, achieve a harmonious unity of knowledge transmission, ability cultivation, and value cultivation, and form a collaborative force in education.

2.3 Course objectives

Knowledge and Skills: Through the study of this course, students will master the basic theories and knowledge structure of optoelectronic technology, understand the progress and cutting-edge of optoelectronic technology, master the working principles of typical optoelectronic devices such as lasers, beam modulation devices, optoelectronic detection devices, optoelectronic imaging devices, etc., be familiar with laser technology, optical signal detection technology, optoelectronic imaging technology, optoelectronic display technology, etc., and master the basic characteristics of typical devices Typical applications and usage methods, able to apply optoelectronic technology knowledge to design simple optoelectronic modules or systems, providing students with a deep understanding of optoelectronic systems and laying a solid foundation for future work in optoelectronic system demonstration, application, and management.

Process and Method: The teaching of this course adheres to the organization and implementation of the method of "precise teaching and guidance by teachers, autonomous learning by students, and practical discussion and sublimation". The focus of the content is on the basic theory and typical applications of optoelectronic technology, using multimedia electronic lesson plans for theoretical teaching. The "evaluation and teaching integration" effect evaluation method is adopted, and electronic means are used to interact with students in class and record and analyze their performance to improve teaching effectiveness; Autonomous learning is mainly based on textbooks and reference materials, supplemented by online course resources, optoelectronic design materials, and academic paper materials, providing traction for students' independent innovation; The time content is carried out through two forms: course experiments and group implementation to carry out exploratory course production, supplemented by problem discussion and communication, to improve students' collaborative and analytical problem-solving abilities[2]. Carry out ideological and political education through the integration of scientific development history, scientist stories, cutting-edge technological advancements, and technological innovation cases in the curriculum, and strengthen the cultivation of moral education in the college.

Emotional Attitude and Values: Cultivate students' learning attitudes and habits of self-directed learning, diligent learning, and lifelong learning, stimulate students' innovative motivation of not fearing authority, facing difficulties, and daring to innovate, cultivate students' reverence for advanced models, subtly cultivate students' love for science and technology work and aerospace industry, and establish students' lofty aspirations of serving the country through science and technology and revitalizing the military through science and technology.

3 Exploration and implementation of ideological and political elements in the course of optoelectronic technology

Optoelectronics technology is an emerging comprehensive discipline formed by the intersection of optics and electronics. As one of the basic technologies of the national information industry, it has considerable application value in military, computer, energy, and medical fields. The course of "Optoelectronic Technology" mainly teaches the basic laws of

light radiation, light sources and light propagation, the propagation of light radiation, beam modulation and scanning, detection technology of light radiation, optoelectronic imaging systems, display technology, and application examples of optoelectronic technology. Based on the content and characteristics of the above courses, the fusion points of ideological and political elements and professional knowledge are deeply explored (see Table 1), and the path design for integrating ideological and political elements is studied, Integrating ideological and political elements such as the history of scientific development, the deeds of typical figures, the Sino US technology war, the Four Confidences, the spirit of science, the spirit of craftsmanship, patriotism, and innovative thinking into classroom teaching in a timely and appropriate manner, in order to stimulate students' patriotism while transmitting knowledge, and experience the mission of optical and electrical professionals in revitalizing the country through technology and strengthening the military through technology.

Table 1. Design of Ideological and Political Education for the Course of Optoelectronic Technology.

Course Sections	Course knowledge points	Ideological and political entry point	Ideological and political goals
Chapter 1 Basic laws of light radiation, light sources, and light propagation	Basic knowledge of radiometry and photometry	Similarity between radiation and luminosity	Dialectical thinking
	Laser Principles	Development of the first laser in China	Patriotic sentiment and correct values
		China's "Shenguang" Super Laser	Craftsmanship spirit, scientific spirit
	Basic theories and laws of optical frequency electromagnetic waves[3]	Application of Total Reflection: Fiber Optic	Patriotic sentiment
	Rayleigh scattering	Why is the sky blue? Why is the evening sun red?	Exploration spirit and scientific
Chapter 2 Propagation of light radiation	Propagation of Light Waves in Electrooptic Crystals	Shenguang 2 Super Large KDP Crystal	Craftsmanship spirit spirit
		KBBF crystal	Four Confidences and National Feelings
	Propagation of light waves in acoustooptic crystals	Ramanas diffraction, Bragg diffraction, and quantitative and qualitative change	Philosophy
		The overall relationship of natural sciences	Philosophy
Chapter 3 Modulation and scanning of light beams	Principles of beam modulation and electro-optic modulation	China's World's First Quantum Communication Satellite Mozi	Four Confidences
		Laser eavesdropping technology	Innovative and critical spirit
		Development of high-speed electro-optic modulators at home and abroad	National confidence and patriotism

	Acousto optic modulation and magneto optic modulation	The Achievements of China's Optical Communication	scientific spirit
	Beam scanning technology and spatial light modulator	Construction and the Suppression of 5G	Patriotic sentiment
		New MEMS Beam Scanning Technology	Four Confidences
		LCD implementation of multi beam modulation scanning in LiDAR	creative spirit
Chapter 4 Detection Technology of Light Radiation	Fundamentals of Photoelectric Detectors	A Brief History of the Development of Photodetectors	scientific spirit
		Hypothesis of geomagnetic field supported by thermoelectric effect	creative spirit
	Photoconductive device	The Sensitization Process of Photosensitive Resistors and Their Relationship with Grinding and Success	Devote oneself to the mission
		The Application of Photosensitive Resistors in Optoelectronic Imaging Systems to Avoid Direct Solar Radiation	creative spirit
	Photovoltaic detector	Achievements in China's photovoltaic industry	Four Confidences
		Application of Four Quadrant Detector Precision Guidance	Building a strong military through technology
Chapter 5 Optoelectronic imaging system	Principles of CCD devices	Suez Canal Congestion Practice	Professional identity

3.1 Reviewing the disciplinary background and strengthening mission responsibility

In 1960, the birth of the world's first ruby laser marked the beginning of the development of optoelectronic technology. In recent years, through continuous research and practice by scientists, optoelectronic technology has achieved vigorous development[4]. The United States has designated optoelectronics technology as a national key development technology, established several optoelectronics technology centers, and established the "Optics Valley" centered around the University of Arizona in 1998. The defense demand of the United States is one of the driving forces for the development of the optoelectronics industry, and it has included optoelectronics technology in the "Key Technologies of the Department of Defense" research program, such as "Airborne Laser" and "Space Based Laser" research; In the 1980s, the optoelectronics industry flourished in Japan, where Japan had a long-standing monopoly in fields such as semiconductor lasers, laser printers, and liquid crystal displays; The

development of optoelectronic technology in China started relatively late, but it has developed rapidly in China, reaching the world's advanced level. The reason why optoelectronic technology has achieved such rapid development in China is due to the Chinese government's emphasis and strong investment in scientific research and development, as well as the exploration and innovation of high-quality scientific research teams[5]. This cultivates students' national confidence, scientific spirit, and mission as optoelectronic personnel.

3.2 Based on professional knowledge, firm in the four confidences

The second chapter of Optoelectronic Technology, "Propagation of Light Radiation," includes the knowledge of the propagation of light waves in electro-optic crystals. In this section, in addition to introducing professional knowledge such as the variation of electroinduced refractive index and electro-optic phase delay, a nonlinear optical crystal, potassium fluoborate beryllite crystal (KBBF crystal), which can directly double the frequency to generate deep ultraviolet lasers, will be introduced in the theoretical teaching process. In 1990, Academician Chen Chuangtian led a team to successfully develop the world's first KBBF crystal, which was 15 years ahead of the United States. It was not until 2016 that the United States finally broke through China's technological blockade[6]. However, by this time, China had already successfully developed the second generation KBBF crystal. The KBBF crystal, as the core component of lithography machines, has made China's scientific and technological system proud. Through the development process of KBBF crystals, we aim to strengthen students' four confidences, cultivate their sense of national pride and self-confidence, encourage them to firmly believe and study hard, and shine brightly in the cause of building a strong military.

3.3 Introduce practical cases and cultivate a strong sense of patriotism

When teaching the professional knowledge points of direct detection and coherent detection, the Chang'e-4 relay satellite "Queqiao" is used as an application case to stimulate students' interest in learning. Queqiao can conduct ground to moon laser ranging experiments through its laser corner reflector, undertaking the pioneering research work of the Tianqin Project. The principle of laser ranging is to shoot a highly isotropic pulse laser beam at an angle reflector placed on the surface of a satellite, and calculate the distance between the earth and the moon through the time difference between sending and receiving. Since the 1960s, the United States and the Soviet Union have placed five mirrors at different positions on the lunar surface. Subsequently, many countries around the world have conducted Earth Moon ranging experiments, and China joined the ranks of Earth Moon ranging in 1972. However, as of 2017, only the United States, France, Italy, and Germany in the world had the ability to accurately measure the distance between the Earth and the moon with lasers, and China has yet to achieve technological breakthroughs in this field. Until 2018, the Tianqin team of Sun Yat sen University, through cooperation with the Yunnan Observatory of the Chinese Academy of Sciences, upgraded the satellite laser ranging system in Kunming, and finally measured the distance between the earth and the moon[7]. This is the first time that Chinese people have successfully used laser to accurately measure the distance between the Earth and the moon, making China the fifth country in the world to achieve precise laser measurement of the Earth and the moon.

4 Conclusion

Promoting the construction of ideological and political education in courses is an important measure to implement General Secretary Xi Jinping emphasis at the National Conference on Ideological and Political Work in Higher Education Institutions on "guarding a certain channel, cultivating a responsible field, and enabling various courses to go hand in hand with ideological and political education courses, forming a synergistic effect". In the education and teaching process of military academies, in order to fully implement the fundamental task of cultivating morality and cultivating talents, professional course teachers should deeply explore the ideological and political elements contained in each course, always remember the responsibility of teaching and educating people, and shape a "warm" classroom atmosphere. At the same time, the teaching process should be student-centered, using a combination of heuristic, case-based, lecturing, individualized, and step-by-step teaching methods. With a highly responsible attitude, efforts should be made to cultivate high-quality aerospace measurement and control officers who can win the information war.

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