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Research on Education in Professional Courses for Graduate Students in Electronic Information

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Abstract: This paper explores the construction of education in master's degree programs in electronic information, emphasizing the importance of moral education in graduate training. It highlights the deep integration of education with professional courses, which is essential for promoting the comprehensive development of electronic information master's students. The article first analyzes the status of IPE implementation in local higher education institutions, pointing out the lack of a systematic IPE framework. It then explores the goals, content, teaching methods, and evaluation mechanisms needed to enhance this framework. By establishing a specific IPE teaching framework, enriching teaching methods, and perfecting the evaluation system, the research focuses on cultivating comprehensive talents with innovative awareness and social responsibility. The implementation employs innovative strategies, including a "five-dimensional approach" to teaching and problem-based learning (PBL) models, aimed at enhancing students' practical abilities, critical thinking, and recognition of their profession. The research results indicate that these measures not only improve teaching effectiveness but also enhance teachers' awareness and capabilities in student cultivation, providing important theoretical support and practical guidance for the implementation of IPE.

Keywords: Curriculum Education System; Electronic Information; Construction of Education; Teaching and Problem-based Learning

1. Introduction

In graduate professional education, besides learning professional theoretical knowledge, students engage in research training activities such as literature reading, academic presentations, experience sharing, and academic exploration under the guidance of their supervisors. The research training process involves academic issues, social philosophical issues, value-related issues, or scientific ethical issues, requiring teachers to provide value-based guidance to students. Moral education is the fundamental task of graduate education, and promoting the organic integration and deep fusion of moral education is crucial to fostering the comprehensive development of graduates in ethics, intellect, physical fitness, aesthetics, and labor skills[1-3].The training of master's degree students differs from the more rigorous training system of undergraduates. In local universities, the training mechanism for professional master's degree students is still being improved, and a universally guiding moral education system for professional master's degree programs has yet to be established[4,5]. Exploring the objectives of the moral education system for master's students in electronic information, as well as the content, teaching methods, and evaluation systems of such education, is of great significance for promoting cross-disciplinary collaboration and deep integration of moral education in the curriculum[6,7].

In graduate moral education, Dawei Zhao et al.[8], drawing on the systemic view of constructivist learning theory, proposed a full-chain graduate course model of "input-process-result" for moral education, along with an innovative development and implementation mechanism for this education; Jibing Sun et al.

proposed constructing moral materials from six dimensions: "nation-school-college-course-teacher-student," forming a "six-integration" model for moral education in graduate courses. They also introduced a four-step teaching method: "case introduction → problem refinement → essence exploration → inductive extension." Xingjian Zhou et al.[9], in response to the current issue of fragmented construction in moral education within graduate professional education, proposed a graduate course moral teaching resource construction involving teachers, students, and administrators. This construction is based on an omni-channel system architecture and an omni-channel resource network that integrates both online and offline resources. Qiang Hu et al.[10], addressing the insufficient depth of integration and lack of synergy in moral education for professional master's students at local universities, established an moral education system for master's students in the field of electronic information. This system includes the objectives, content, teaching methods, and evaluation mechanisms for moral education. Qingquan Fu et al. [10], based on the OBE (Outcome-Based Education) concept, constructed moral elements and implemented them through blended online and offline teaching. This approach aligned professional course teaching with moral education, enhancing students' professional identity and ethical development, while helping them form a correct worldview, outlook on life, and values.

Currently, most research on moral education in master's programs in the electronic information field is based on specific professional courses or supervisors' research directions, exploring curriculum moral education models or teaching methods within a single dimension of a particular course, teaching, or research[11,12]. Systematic construction of professional course moral teaching resources through multi-party participation, multi-dimensional, and multi-channel approaches is relatively scarce[13,14]. In response to the need for effective construction and management of moral teaching resources in graduate professional education, this paper explores the objectives, content, and outcomes of the moral education system for master's students in electronic information, which is of great significance for promoting cross-disciplinary collaboration and deep integration of moral education.

2. The Objectives of the Moral Education System in the Curriculum.

The objectives of the moral education system for professional master's students in the field of electronic information aim to integrate moral education into professional courses, fostering well-rounded development in ethics, intellect, and physical health. This system seeks to strengthen students' ideals, beliefs, and sense of social responsibility, while cultivating their humanistic literacy and ethical values, as well as their innovation awareness and global perspective[15,16]. At the same time, it encourages students to understand the relationship between technology and society from diverse perspectives, enabling them to flexibly respond to technological challenges in future studies and work, while practicing the core values. The goal is to cultivate comprehensive talents who not only possess solid professional knowledge but also strong moral qualities, contributing to the advancement of science and technology as well as social development. The moral education system in electronic information courses is divided into moral, knowledge, and skill-based objectives.

(1) Moral Objectives: Strengthen students' education in ideals and beliefs, helping them establish core values and solidify their faith. Through course content, guide students to enhance their sense of social responsibility, recognizing the significant role of electronic information technology in societal development, and deepen their understanding of national policies and legal regulations. At the same time, improve students' humanistic literacy and overall qualities by cultivating good communication skills and critical thinking. Inspire their innovative spirit and practical abilities, encouraging them to face the challenges of technological change with confidence.

(2) Knowledge Objectives: Master the fundamental theories, core concepts, and developmental trends of electronic information technology, enabling students to stay at the forefront of this rapidly evolving field and establish a solid professional foundation. Acquire a strong theoretical background and broad specialized knowledge relevant to their industry or professional field, such as big data analysis, intelligent control, and cutting-edge technologies like autonomous systems. Gain proficiency in using professional tools and

techniques such as electronic circuit design, embedded system development, signal processing and analysis, and communication system design. Be adept in software development and system integration using mainstream programming languages to meet the demands of a rapidly changing industry and technological advancements.

(3) Skill Objectives: Develop the ability to apply electronic information technology to solve practical problems, enhancing critical thinking and innovative capabilities. Students should be capable of analyzing and designing in complex electronic systems and information network environments, independently completing project development, and effectively identifying and solving engineering problems. Additionally, they should possess strong communication and collaboration skills to adapt to multidisciplinary team environments, bridging the gap between technical and non-technical personnel.

3. The Main Practices for Constructing Moral Education in the Curriculum

3.1 The "Moral Education Outline for Graduate Courses in Electronic Information" Has Been Formulated

Guided by the goal of cultivating "pillars of society and professional elites," moral education elements embedded in the Electronic Information Engineering curriculum are explored from various dimensions, including "global awareness and vision," "patriotism and responsibility," "cultural heritage and value leadership," "craftsmanship and professional ethics," "engineering thinking and innovation capability," and "school affiliation and professional pride." These elements serve as a reference for the drafting of professional course syllabi with integrated moral content and for the organic integration of professional and moral education. This standard also supports the construction of a "matrix of professional courses supporting moral education goals" and a "matrix of extracurricular activities supporting moral education goals," as shown in Tables 1 and 2.

3.2 Constructing a "Two-Way Connectivity" Implementation Model for Empowering Graduate Professional Courses with Digital Transformation in Moral Education

The top-down, gradual advancement of the "Discipline-Course-Classroom" model[17]provides entry points for incorporating moral elements, effectively addressing the challenge of building moral education into courses. Intelligent technologies supported by 5G networks, big data, AIoT, and edge computing offer digital empowerment for the implementation of moral education. By leveraging data flow, this promotes the bottom-up dynamic planning of moral education through the "Classroom Data Sets—Course Image Chain—Professional Capability Stack," forming a "discipline-civic integration" course pathway and a "problem-oriented" classroom pathway, as shown in Figure 1

Table 1. Matrix of Course System Supporting Moral Education Goals

		Global Vision with a Sense of Universal Responsibility	Patriotism and Sense of Responsibility	Cultural Inheritance and Value Guidance	Craftsmanship and Professional Skills	Engineering Thinking and Innovation Ability	College Affiliation and Professional Pride
Electronic Information and Control Systems Engineer	Discussion on Research Directions		•	•			•
	Disciplinary Content and Development	•	•				•
	Master of Electronic Information and Control Science			•	•	•	
	Applied Engineering and Seminars		•	•		•	
	Innovative Thinking and Practice				•	•	
	Analysis and Discussion of Major Engineering Cases		•		•		
	Analysis of		•	•	•		

	Professional Technology and Its Social Impact						
Electronic Information					•	•	
Control Science		•	•				

Table 2. Support Matrix for Extracurricular Activities and Moral Education Objectives

	Global Vision with a Sense of Universal Responsibility	Patriotism and Sense of Responsibility	Cultural Inheritance and Value Guidance	Craftsmanship and Professional Skills	Engineering Thinking and Innovation Ability	College Affiliation and Professional Pride
Themed Group Day	•	•	•			•
Traditional Culture		•	•			•
Classic Reading		•	•			
College Stories		•	•		•	•
Excellence in Intelligence	•	•	•	•	•	•
Social Practice		•	•	•	•	•
School-Enterprise Communication	•	•	•	•	•	
Career Planning	•	•		•		
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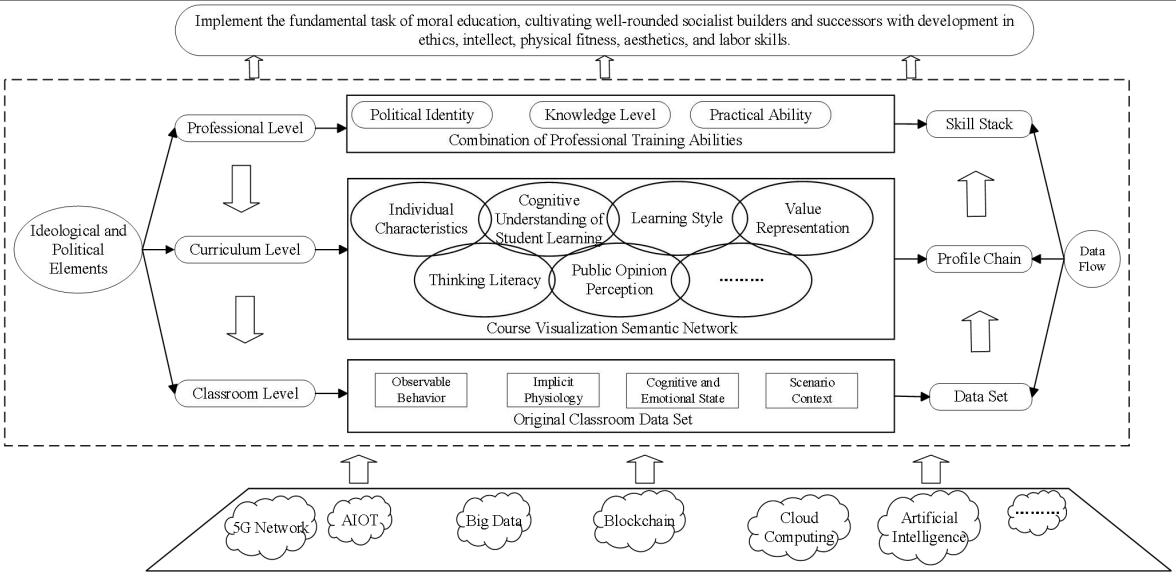

Figure 1. Implementation Model for "Two-Way Connectivity" in Graduate Professional Courses Empowered by Digital Transformation

3.3 Innovative Practices in Professional Course Moral Education with a "Five-Dimensional Integration" Approach

From the five aspects of "reconstructing course content," "enriching teaching activities," "developing teaching resources," "guiding application of knowledge," and "improving teaching evaluation," a "Five-Dimensional Integration" approach to teaching design, innovation, and practice has been adopted[18]. This approach reconstructs course content with a focus on core theoretical foundations and cutting-edge discipline materials; enriches teaching activities with moral education as guidance

and student-teacher interaction as orientation; and develops teaching resources using modern technology as a means and self-driven learning as a goal. The "Five-Dimensional Integration" innovative teaching scheme for professional course moral education is illustrated in Figure 2.

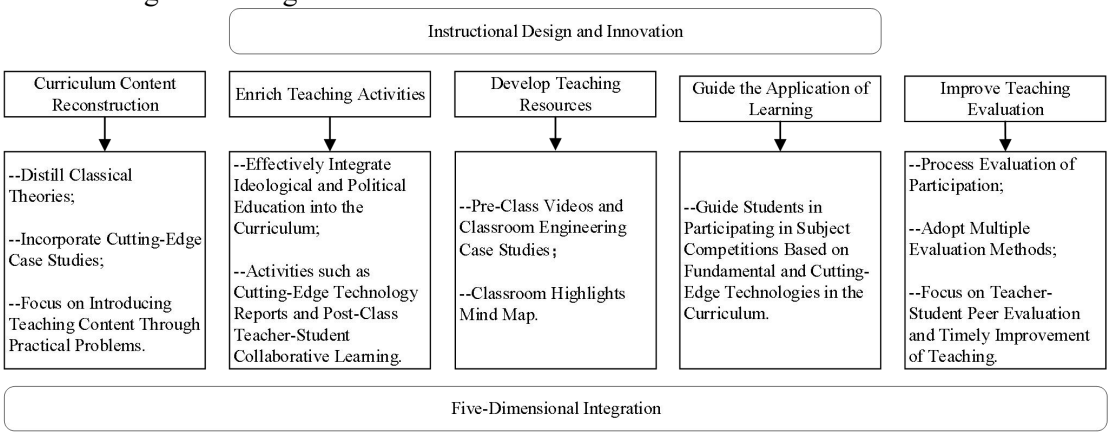

Figure 2. Innovation in Professional Course Teaching Design

3.4 Teaching Practice of Professional Courses Using PBL Model Integrated with Moral Education Cases

In the teaching practice of professional courses, the aim is to guide university students in establishing a correct outlook on life, values, and the world, while strengthening their sense of responsibility and historical mission. For the programming design course, a PBL (Problem-Based Learning) teaching model integrated with moral education cases has been adopted[19]. By incorporating current events and hot topics into the course, moral cases are designed as the background for implementing the PBL model. This approach stimulates students' interest in learning, develops their ability to solve real-world problems, and conveys the core values of the new era, while reinforcing students' sense of responsibility and historical mission, as shown in Figure 3.

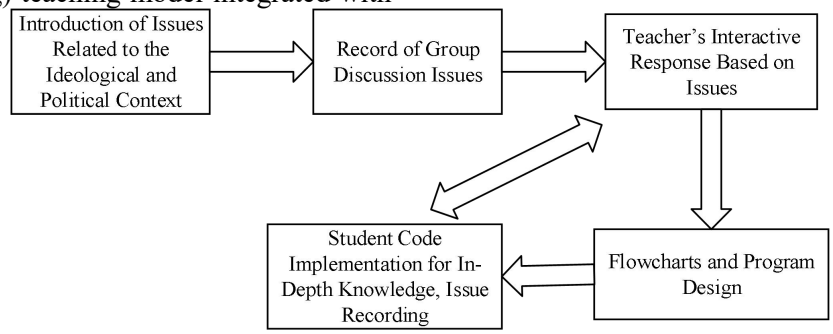

Figure 3. Implementation Process of Moral Case-Based Curriculum Teaching in the PBL Teaching Model

4. Achievements in the Moral Construction of Control and Electronic Information Professional Courses

(1) The integration of moral elements into the teaching content has enhanced the overall teaching effectiveness: Students conduct case analyses while teachers observe and record all students' performance during this process. The evaluation focuses on students' verbal expression, logical thinking, and teamwork during the discussion and analysis. This approach guides students to develop a sense of mission and responsibility as material contributors and helps them realize the practical value of the knowledge acquired in the classroom. As a result, it enhances students' interest in and passion for the control and electronic information professional courses.

(2) By integrating moral education with the curriculum system, the teaching level of the course team has been significantly improved: Since the course construction began, the teaching level of the course team has significantly improved. Especially for young teachers, integrating moral education with the curriculum system has greatly enhanced their teaching abilities, with evaluations consistently

rated as good or above. The integration of moral education into professional courses has allowed teachers to truly appreciate the importance of teaching and experience a sense of pride and accomplishment in their profession. It has also highlighted the significance of learning professional courses.

(3) A mixed teaching model for professional courses based on the OBE (Outcomes-Based Education) concept has been established, enhancing students' ability to develop a correct worldview: Using the "outcome-oriented, student-centered, teacher-led organization, and continuous improvement" reverse design educational philosophy, and based on the characteristics, teaching objectives, and content of the course, the moral elements in each chapter were thoroughly explored. The OBE (Outcomes-Based Education) concept was used to construct these elements, which were then implemented through a blended teaching model combining online and offline methods. This integration of professional course teaching and moral education achieved a synergistic effect. Through the construction and implementation of these course elements, students' recognition of and professional ethics in control and electronic information were enhanced, helping them develop a correct worldview, outlook on life, and values[20].

(4) Enhancing Teachers' Awareness and Capability in Course Moral Education: It has promoted the further strengthening of teachers' educational awareness, helping them to identify the right approach to education and improve their teaching capabilities, ensuring the effective implementation and impact of moral education in professional courses. A high-quality resource-sharing mechanism has been perfected, and a platform for the exchange of curriculum-based moral education has been established. Regular exchanges of exemplary experiences, on-site teaching observations, and teacher training activities are carried out by region and academic discipline. Modern information technology is fully utilized to facilitate the sharing and utilization of high-quality resources among universities across different regions, levels, and types.

(5) Establishing a Quality Evaluation System and Incentive Mechanism for Moral Education in Control and Electronic Information Courses: A multi-dimensional assessment and evaluation system for the effectiveness of moral education in the curriculum has been established, along with a supervision and inspection mechanism. Scientific and diverse evaluation standards for professional courses incorporating moral education have been formulated. A quality evaluation system has been developed, including evaluation indicators and methods at multiple levels, assessing both course design and teaching implementation. An incentive mechanism has been created to encourage teachers and students to actively participate in the construction of moral education in professional courses. A feedback mechanism has also been established, collecting and providing timely feedback on the effectiveness and issues of this construction through student evaluations and teacher assessments.

5. Conclusion and Outlook

With the rapid development of technology, especially the continuous emergence of cutting-edge technologies such as artificial intelligence, big data, and cloud computing, new opportunities and challenges have been presented to education. The moral education in graduate courses of electronic information must also keep pace with the times, thereby promoting the development of curriculum-based moral education. This paper delves into the construction of moral education for master's students in the field of electronic information, emphasizing that in addition to strengthening the study of professional theoretical knowledge, it remains crucial to encourage students to participate in both online and offline research training. By summarizing existing research and practical experiences, we propose a systematic model for curriculum-based moral education, aiming to achieve the comprehensive development of ethics, intellect, physical fitness, aesthetics, and labor skills, and to cultivate well-rounded talents with innovative abilities and a sense of social responsibility.

In the next phase of moral education construction for electronic information graduate courses, several key aspects will be emphasized: deepening the organic integration of moral education with professional courses and flexibly incorporating moral elements into course design; constructing a scientific and reasonable multi-dimensional evaluation system to comprehensively assess the impact of moral education on students' overall qualities, professional ethics, and sense of social

responsibility; continuously training and enhancing teachers' awareness of their educational role and teaching abilities, conducting interdisciplinary research on moral education, and drawing on successful cases to enrich practical theory; course design should focus more on the central role of students, encouraging active participation in discussions on moral content to improve critical thinking and independent learning skills, thus deepening their understanding of the relationship between technology and society. We hope to achieve more breakthroughs in the field of moral education, contributing to the cultivation of high-quality talents with a global vision and humanistic care.

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