IECE

IECE Transactions on Computer Science
http://dx.doi.org/10.62762/TCS.2024.210691

RESEARCH ARTICLE

Reforming Curriculum Ideology and Political Construction: A Case Study of the 'Information Security' Course

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Abstract

In alignment with the objective of integrating ideological and political education within curricula, this study uses the "Information Security" course as a model to illustrate the approach of embedding core ideologies pertinent to the forefront of international scientific application, national key needs, and the primary battlegrounds of the economy. By weaving frontier science and technology along with national security regulations into the educational practice, this research delves into teaching cases within the information security domain to construct a curriculum system that seamlessly integrates ideological, political, and academic content. The system aims to foster the cultivation and practice of socialist core values, guiding students towards proper personal and professional conduct. This abstract presents a methodology for curriculum reform that not only enriches academic content but also instills ethical and social responsibilities in students, contributing to the holistic development of future professionals.

Academic Editor:
Jinchao Chen

Submitted: 27 September 2024
Accepted: 12 November 2024
Published: 23 November 2024

Vol. 1, **No.** 1, 2024.
10.62762/TCS.2024.210691

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Keywords: curriculum ideological and political education, information safety, curriculum system.

1 Introduction

China's current chairman has emphasized the importance of utilizing classroom teaching as the primary channel for ideological and political work in colleges and universities. He has called for improvements in ideological and political theory courses to enhance their appeal and relevance, ensuring they meet the developmental needs and expectations of students [1]. This approach advocates for the alignment of various academic courses with ideological and political theory courses, creating a synergistic framework. In the context of information security—a core course in information management and information systems majors—there is a particular emphasis on the teaching concept of nurturing morally upright and skilled individuals. This concept integrates professional knowledge with ideological and political education, subtly embedding these elements to instill a sense of responsibility and patriotism while guiding students toward correct life and value perspectives.

A concerted effort is being made to explore the integration of ideological and political elements within the information security curriculum. This involves a shift from isolated ideological and political courses to embedding these themes into professional

Citation
Zheng, P., Wang, X.,& Li, J. (2024). Reforming Curriculum Ideology and Political Construction: A Case Study of the 'Information Security' Course. *IECE Transactions on Computer Science*, 1(1), 26–31.

courses, ensuring that ideological and political education permeates the entire training process for information security professionals. Such an approach aligns with the directives of national conferences on ideological and political work in colleges, the national education conference, and the national conference on undergraduate education in the new era, contributing to the broader effort to build first-class undergraduate education.

Unfortunately, I was unable to find specific scholarly articles directly addressing these topics, but the general concepts and strategies mentioned above align with current educational trends in integrating ideological and political education into various academic disciplines in Chinese higher education [2].

2 Problems in Integrating Professional Courses into Ideological and Political Education at the Present Stage

Under the auspices of national education reform, professional course educators are actively fostering the integration of ideological and political education into their curricula. Nonetheless, the forced insertion of this content occasionally results in a "two skins" phenomenon, where ideological and political education seems detached from professional courses [3]. This abrupt transition can somewhat hinder students' acceptance of ideological and political themes. It is therefore crucial to research how to transform the relationship between ideological and political courses and professional courses from "two layers" to "a game of chess," effectively enhancing educational outcomes.

Currently, the incorporation of ideological and political elements by instructors across various disciplines is characterized by considerable randomness, largely hinging on the personal initiative and innovation of professional course educators. This can sometimes lead to redundant ideological and political content, potentially engendering student aversion [4]. Consequently, it is imperative to approach this integration systematically, starting with the comprehensive curriculum of professional courses and aligning the objectives of ideological and political education within each course. This integration should become a cohesive part of the curriculum teaching system, ensuring a unified delivery of both professional knowledge and ideological education.

3 Professional Curriculum and Curriculum Ideological and Political Collaborative Reform

3.1 Keep up with Graduation Requirements, and Clarify Teaching Objectives and Education Objectives

In the traditional talent training programs, the emphasis has been predominantly on the objectives related to knowledge and skill acquisition. Currently, it is vital to integrate graduation requirements with clear educational objectives and to actualize these objectives starting from the course syllabus. Through both theoretical instruction and practical experimentation within the curriculum, students are expected to acquire foundational theories, knowledge, skills, and the ability for comprehensive application in areas such as cryptography, computer system security, network attack and defense mechanisms, virus analysis and prevention, firewall technology and VPN, security scanning, and intrusion detection. The goal is to equip students with basic knowledge in computer network information security and preliminary skills in information security maintenance; to foster independent thinking and innovation abilities; and to develop competencies in basic network information security settings. Additionally, students should be imbued with sound ideological and moral qualities and possess certain capabilities in information management [5].

The educational aim is to ensure students are well-versed in national guidelines, policies, laws, and regulations pertinent to information security, to inspire a love for the motherland, and to instill a firm belief that the development and application of information security technology should not compromise the interests of the state and lawful individuals. Students should be able to discern legal from illegal activities and be familiar with the professional ethics and standards of honesty, fairness, and integrity, adhering to these principles in real life, academic, and professional settings. Moreover, in alignment with the focus on international scientific application frontiers, major national needs, and the primary economic battleground [6], it is crucial to integrate cutting-edge science and technology into curriculum practices. This approach aims to motivate students to engage diligently in their studies and tackle critical technological challenges.

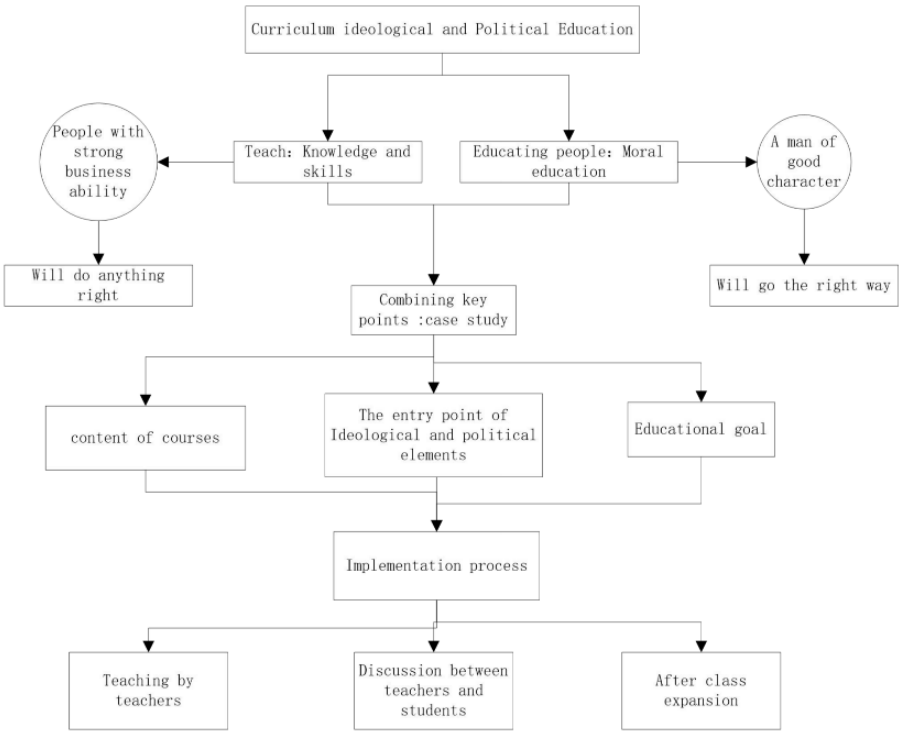

Figure 1. The specific implementation process.

3.2 Persisting in Problem Orientation and Reforming Teaching Methods

This course primarily employs a pedagogical approach that amalgamates theoretical instruction, classroom discussions, and computer-based experiments. It emphasizes an heuristic teaching methodology, centering on problem-solving as the principal guide. This strategy actively fosters students' ability to think independently, design information security frameworks on their own, and progressively develop their capabilities in analysis, problem-solving, and innovation. Concurrently, enhancing interaction with students in the classroom, alongside promoting teamwork for efficient classroom discussions, is deemed essential for the timely analysis and evaluation of educational outcomes. The ideological and political teaching system within professional courses is meticulously crafted from the course content, experimental components, interactive exchanges, and group discussions. This design aims to evoke emotional resonance among students and stimulate their motivation to learn, thereby effectively nurturing high-caliber technical professionals endowed with patriotism and a strong sense of responsibility.

4 Specific case studies

By establishing the teaching and educational objectives of the course, the curriculum seamlessly integrates professional and ideological and political education. For instance, in the information security course, the teaching objective is to ensure students grasp the fundamental concepts of computer internet information security, comprehend the basic strategies and common practices for designing and maintaining secure network information systems, and are capable of applying theoretical knowledge to resolve real-world network security challenges. The ideological and political education goal is to develop elite information security professionals who are committed to fulfilling their national and historical duties, steadfastly engaging with the cutting-edge of global science and technology, addressing significant national demands, and contributing to the primary economic frontiers, while continuously advancing the breadth and depth of their technological expertise. The specific implementation process is illustrated in Figure 1.

4.1 Case Study of Ideological and Political Education

Course Content: Cryptography and public key infrastructure.

Teaching Objectives and Requirements: Students are expected to master the basic concepts of cryptography, including traditional cryptography, public key cryptography, and public key infrastructure.

Starting Point of Ideological and Political Elements: The course introduces the rapid advancement of quantum technology and its implications on existing cryptographic schemes. Given the potential for adversaries to utilize quantum algorithms, many number-theory-based cryptographic schemes become vulnerable. In 2006, Re-gev proposed that lattice-based cryptosystems could resist quantum algorithm attacks [7]. Currently, there are no quantum algorithms that significantly enhance the solution to lattice problems, with the best-known algorithms only achieving sub-exponential runtime or yielding poor approximations. This aspect is used to encourage students to think critically and explore, fostering a spirit of craftsmanship and research.

Educational Goal: Through exploring traditional and public key cryptography, students will learn about the impact of quantum technology on existing technologies, while being guided to develop a spirit of craftsmanship and research. Implementation Process:

1. Teachers Teach: The instruction covers the mathematical foundations of cryptography, basic concepts of cryptography, symmetric cryptography, asymmetric cryptography, and public key infrastructure, interspersed with ideological and political elements.
2. Discussion between Teachers and Students: The discussions challenge students to consider whether a quantum attack-resistant location-based service scheme can be constructed under the standard model and whether such a scheme can avoid key misuse. These discussions guide students to engage in thoughtful exploration and research, cultivating their skills in problem-solving and analysis.
3. Expand After Class: Post-class activities encourage further exploration into quantum algorithm technology, enhancing understanding of its advancements and their implications on current technologies. This helps to elevate the authority of ideological and political education and stimulates students' curiosity and investigative spirit.

4.2 Case Study of Ideological and Political Education

Course Content: Network attack technology and defense foundation.

Teaching Objectives and Requirements: Students are expected to understand the concept of hackers and modes of hacker attacks, master network attack technologies and principles, and become proficient in the use of network attack tools and attack prevention methods.

Starting Point of Ideological and Political Elements: The course addresses a significant incident on March 22, 2014, when it was revealed that the Ctrip system had activated a debugging function on the user payment service interface. This error caused all data packets sent to the bank for cardholder verification to be stored on a local server, exposing sensitive information such as the credit card user's ID card, card number, CVV code, and potentially leading to massive leaks of bank card information [8]. This incident sparked widespread debate about the risks of e-commerce websites storing sensitive user information. The "Network Security Law" is emphasized, which mandates that network operators ensure the security of their networks, rectify vulnerabilities promptly, and uphold their legal responsibilities to prevent personal information breaches, with penalties up to 500,000 Yuan and up to 1 million Yuan for operators of critical information infrastructure [9].

Educational Goal: The course utilizes an integrated teaching mode of "teaching, learning, and doing" to not only impart knowledge of network attacks but also, through the use of specific case studies, naturally incorporate legal knowledge about the "Network Security Law". This approach educates students on the proper learning and application of network security and defense technologies, encourages the strict regulation of their own online behavior, maintains the information security of individuals, enterprises, organizations, and nations, and promotes active participation in building network security [10]. Implementation Process:

1. Teachers Teach: Coverage includes discussions on hackers; network attack technology and principles; network attack tools; and network attack prevention, interspersed with ideological and political elements.
2. Discussion Between Teachers and Students: Students are grouped to discuss cases relevant to the network security law. Each group designates a student to summarize the discussion, followed by critiques from both peers and teachers. This method broadens their knowledge scope and fosters a comprehensive awareness of network

security throughout the discussion.

3. Expand After Class: Post-class, students are provided with reports related to the network security law to enhance their security awareness and help standardize their network behaviors.

5 Conclusion

The successful integration of ideological and political education into the curriculum enhances students' awareness of national security and their responsibility to prevent potential crises. This understanding fosters a sense of urgency and dedication, motivating students to excel in their studies and develop a passion for their professional knowledge and skills. Beyond technical proficiency, students gain a deeper understanding of ethical responsibilities and industry standards, enabling them to address practical challenges in the information security sector effectively.

Looking ahead, the integration of artificial intelligence (AI) into this educational framework presents a promising avenue for future research. AI technologies, such as natural language processing, machine learning, and adaptive learning systems, can enhance the personalization and scalability of ideological and political education. For instance, AI-powered tools could analyze course content to identify opportunities for embedding ideological elements and provide tailored learning experiences that align with individual student needs [11–15]. Additionally, AI-driven analytics could evaluate the effectiveness of integrated curricula by tracking students' progress and attitudes, offering insights to refine teaching strategies further. By leveraging AI, this holistic approach can be optimized to cultivate highly skilled, ethically grounded professionals prepared to meet the evolving demands of the information security field.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Funding

This work was supported by 2019 Shaanxi higher education teaching reform research project "ideological and political research and practice of 'information security' course in the era of big data" of funding agency under Grant 19BY135.

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