Occupation and Professional Education Vol. 2 No. 10, 2025

Reconstruction and Optimization of the Cyberspace Security Curriculum System Based on the Ternary Integration of Ideological and Political Education, Science and Education, and Practice

Wei Xu, Hua Li*
School of Artificial Intelligence, Yulin Normal University, Yulin, Guangxi, China
**Corresponding Author*

Abstract: Under the wave of digitization, the importance of cybersecurity in cyberspace is becoming increasingly prominent, and the demand for professional talents in this field is becoming more urgent in society. The requirements for talent quality are also showing a diversified trend. However, there are some shortcomings in the current curriculum system of cybersecurity majors, such as insufficient integration of moral education elements, inadequate coordination mechanism between scientific research and teaching, and weak links in cultivating students' practical abilities. This article deeply analyzes the necessity of reconstructing and optimizing the curriculum system of cyberspace security based on the integration of moral education, science and education, and practice. Elaborate on the specific ideas of reconstruction and practical optimization strategies, in order to build a more scientific and reasonable curriculum system for the field of cybersecurity, and provide practical talent training reference plans that can be referenced by other universities.

Keywords: Cyberspace Security; Curriculum System; Triple Fusion; Refactoring Optimization

1. Introduction

With the increasing status of cybersecurity in cyberspace, the demand for professional talents has sharply increased and the requirements are strict. This field requires composite talents who possess professional skills, political stance, professional ethics, and practical innovation ability. However, the current traditional curriculum system has highlighted problems: ideological and political education permeates through form, and students' ideological and professional skills development is imbalanced; The disconnect between science and education collaboration makes it difficult for students to access cutting-edge knowledge and technology, and limits their innovation ability; The cultivation of practical ability is weak, the practical content is disconnected from the needs, and students' hands-on ability is insufficient, making it difficult to meet the requirements of talent cultivation in the new era[1]. Therefore, it is urgent to reconstruct and optimize the curriculum system. This study breaks down barriers and achieves deep integration of ideological and political education, science and education, and practice. By integrating ideological and political education into professional courses, it cultivates patriotism and social responsibility, promotes the combination of scientific research and teaching, exposes students to cutting-edge knowledge and technology, strengthens practical teaching to enhance students' abilities, and constructs a scientific, reasonable, and efficient curriculum system. From the perspective of talent cultivation, it can cultivate compound talents to meet high-end needs; In terms of professional development, it can promote innovation in teaching modes and methods, and enhance the competitiveness of professional level; Starting from the national strategy, it can provide talent guarantee for safeguarding the sovereignty, security, and development interests of the country's cyberspace[2-4].

2. Theoretical Training of Professionals in Cyberspace Security

The cybersecurity major has interdisciplinary integration, integrating knowledge from multiple disciplines and requiring students to have a broad knowledge base and interdisciplinary

thinking; Rapid technological updates require talents to possess the ability to quickly learn and adapt to new technologies; Practical application orientation is strong, and practical teaching is crucial[5-7]. The overall goal of talent cultivation is to cultivate high-quality composite talents who can engage in various work in the field of cybersecurity. Specific goals include mastering multidisciplinary foundations in knowledge, familiarizing oneself with security concepts and technologies, and understanding regulatory dynamics. In terms of abilities, core abilities such as attack and defense, protection, and evaluation management, as well as general abilities such as programming, analysis, and writing, should be possessed[8]. In terms of quality, they should have good ideological and political, professional ethics, and physical and mental qualities. In terms of talent cultivation standards, knowledge standards cover basic theoretical knowledge, professional core knowledge, and related knowledge; The capability specifications include professional core competencies and general competencies; The quality standards involve ideological and political, professional ethics, and physical and mental qualities[9]. The talent cultivation mode includes "industry university research application" collaborative education, where schools cooperate with enterprises and research institutions to establish bases and provide practical projects and scientific research guidance; Competition driven, encouraging students to participate and exercise their abilities, with support and guidance provided by the school; Personalized cultivation, respecting students' differences, providing personalized plans and guidance; Internationalization training, strengthening international exchange and cooperation, conducting joint training, inviting lectures, and encouraging students to participate in competitions. The cultivation of professionals in cyberspace security is a systematic project. By implementing various modes, it can cultivate more high-quality composite talents that meet the development needs of China's cyberspace security guarantee cause[10,11].

3. The Current Status of the Cyberspace Security Curriculum System

3.1 In Terms of Ideological and Political Education, There is a Problem of Rigid Integration of Ideological and Political Elements

Some teachers have obvious shortcomings in integrating ideological and political elements into professional courses. From the perspective of integration, the lack of clever design and natural connection is a prominent problem. Some teachers, in the teaching process, only rigidly piece together some ideological and political statements or cases into professional teaching content in order to complete the task of integrating ideological and political education. For example, when explaining the principles of network security technology, suddenly inserting a paragraph related to the current political situation lacks an inherent logical connection between the two, making the entire teaching process appear abrupt. Ideological and political education and professional teaching content are like two pieces of puzzle that cannot be pieced together, with no grid in place.

This simple mechanical assembly method cannot achieve the silent educational effect of moistening things. Ideological and political education should subtly influence students like a gentle spring breeze, but this rigid integration method makes students feel abrupt and resentful, making it difficult for them to truly accept the values conveyed in it. At the same time, there is a serious "two skin" phenomenon between ideological and political education and professional teaching, and the two have not formed an organic integrated collaborative education model. Professional teaching often focuses on imparting knowledge and skills, pursuing students' rapid mastery of professional techniques; However, ideological and political education is relatively independent, without delving deeply into the ideological and political connotations contained in professional courses. This makes it difficult for students to combine their professional knowledge with correct values and outlook on life during the learning process, which is not conducive to cultivating professionals in cyberspace security who possess solid professional skills, as well as a sense of social responsibility and patriotism.

3.2 In Terms of Science and Education Collaboration, the Insufficient Transformation of Scientific Research Achievements Has Become a Prominent Problem

Many universities have invested a large amount of manpower, material resources, and financial

resources in scientific research and have achieved a series of remarkable results, with breakthroughs in key areas such as cryptography, network security attack and defense technology, and data security protection. However, the ability of universities to translate these scientific research achievements into practical teaching content and resources is very limited. Many cutting-edge scientific research achievements only remain at the level of paper publication and academic reports, without systematic sorting and transformation, making it difficult to present them to students in a simple and understandable way that is suitable for teaching. This makes students feel like they are on an "island" of scientific research, unable to access cutting-edge research trends and technological applications in the industry, and there is a certain degree of disconnect between the knowledge they learn and the actual needs of society.

At the same time, the interaction mechanism between scientific research and teaching is not perfect. Teachers often focus more on the development of scientific research projects, pursuing the output of scientific research results and the improvement of academic status, while neglecting the mutual promotion between teaching and scientific research. The school lacks effective incentive mechanisms and does not encourage teachers to integrate scientific research results into teaching at the institutional level, resulting in a lack of motivation and enthusiasm among teachers in the teaching process. In addition, students also lack opportunities and platforms to participate in scientific research projects, making it difficult for them to exercise themselves in a real research environment. They are unable to combine theoretical knowledge with practice, enhance their research abilities and innovative thinking in practice, which undoubtedly restricts the improvement of the quality of talent cultivation in the field of cybersecurity.

3.3 It is an Undeniable Fact that Practical Teaching is Weak in Cultivating Practical Abilities

The proportion of practical teaching is relatively low, and it occupies a relatively peripheral position in the entire curriculum arrangement. When schools formulate teaching plans, they often focus more on imparting theoretical knowledge, allocating a large number of class hours to professional basic courses and theoretical courses, while leaving very few class hours for practical teaching. At the same time, the lack of practical equipment and venues also seriously restricts the development of practical teaching. Due to limited funds and unreasonable planning, the school is unable to equip sufficient and advanced practical equipment, and the practical venues are also very limited. Students often need to queue up to use equipment, and even several people share the same equipment, which greatly reduces the efficiency of practical teaching and cannot meet the needs of students' practical operations.

More importantly, there is a serious disconnect between practical content and actual needs. The design of practical projects is often too theoretical and idealistic, without closely integrating with the practical problems and challenges in the field of cybersecurity. Teachers often design practical projects from the perspective of teaching convenience, without fully considering the actual needs of the industry. This makes it difficult for students to come into contact with real work scenarios and complex problems during the practical process, resulting in a significant gap between the knowledge and skills learned and the actual job requirements. Therefore, students find it difficult to quickly adapt to the actual work environment after graduation, and often feel at a loss when facing practical problems, unable to effectively solve them.

4. Optimization Strategies and Implementation Measures for Curriculum System

4.1 Optimization Strategies for Ideological and Political Education

Strengthening communication and cooperation between ideological and political teachers and professional teachers is key. Ideological and political teachers have a solid foundation in ideological and political theory, while professional teachers are familiar with the professional knowledge system of cybersecurity. The two jointly explore the ideological and political elements in professional courses through regular exchange seminars, joint lesson preparation, and other activities. For example, when explaining network security attack and defense techniques, national security awareness education can be integrated to help students understand the importance of maintaining

cybersecurity for national sovereignty and development; When introducing cryptography courses, combining the wisdom of ancient Chinese cryptography with the crucial role of modern cryptography in international competition, it inspires students' sense of national pride and responsibility. Through this deep cooperation, we can break down the barriers between ideological and political education and professional teaching, and achieve the organic integration of ideological and political education and professional teaching.

Innovative methods of ideological and political education are equally indispensable. Traditional ideological and political education mainly focuses on theoretical lectures, with low student participation. Adopting case-based teaching, selecting real cases in the field of cybersecurity, such as major cybersecurity incidents, cybersecurity heroic deeds, etc., guiding students to analyze and discuss, and draw positive energy and values from them. Project based teaching allows students to complete ideological and political projects related to cybersecurity in groups, such as designing cybersecurity publicity plans, conducting cybersecurity research, etc. In the practical process, it cultivates students' teamwork spirit, social responsibility, and innovative thinking, enhances the attractiveness and infectiousness of ideological and political education, and truly immerses ideological and political education in their minds and hearts.

4.2 Strategy for Collaborative Optimization of Science and Education

Establishing an interactive mechanism between scientific research and teaching is the foundation. Schools should establish specialized communication platforms and regularly organize scientific research and teaching experience sharing meetings, allowing teachers to freely express themselves and exchange research progress and teaching experiences. At the same time, incentive policies should be formulated to encourage teachers to introduce scientific research results into classroom teaching. For example, when teachers explain network security attack and defense techniques, they can incorporate real-life cases and solutions encountered in their research projects, allowing students to be exposed to cutting-edge industry knowledge and practical application scenarios, making the teaching content more timely and practical. In addition, teachers with outstanding scientific research achievements can be invited to give special lectures, broaden students' academic horizons, and stimulate their interest in scientific research.

Conducting research-oriented teaching projects is an important approach. Design a series of challenging teaching projects based on research hotspots and practical needs in the field of cybersecurity, such as network security vulnerability mining and analysis, research on new encryption algorithms, etc. Guide students to participate in projects in small groups and carry out scientific research practice under the guidance of teachers. During the project implementation process, students not only gain a deep understanding of professional knowledge, but also develop teamwork, problem-solving, and innovation abilities. By participating in scientific research projects, students can adapt to the pace and requirements of scientific research work in advance, laying a solid foundation for future academic research or career development, and achieving a positive interaction and mutual improvement between teaching and research.

4.3 Optimization Strategies for Practical Teaching

Strengthening the construction of practical teaching bases is an important guarantee. Schools should actively establish long-term and stable cooperative relationships with well-known enterprises in the field of cybersecurity, and jointly create high-quality practical teaching bases. By signing a cooperation agreement to clarify the rights and obligations of both parties, the enterprise provides students with a real practical environment, such as a network security attack and defense exercise platform, data processing center, etc., allowing students to be exposed to cutting-edge technology and equipment in the industry. Schools can invite senior engineers from enterprises to serve as practical guidance teachers, regularly hold lectures and guide practical courses on campus, and share practical work experience and cases. At the same time, arrange students to intern and practice in enterprises, participate in actual projects of enterprises, so that students can adapt to the workplace environment in advance, understand industry trends and needs, and lay a solid foundation for smooth entry into enterprise work after graduation.

Optimizing practical teaching content is the core

point. Schools should closely integrate industry demands and actual projects of enterprises to carefully design practical courses. For example, developing a series of targeted practical projects around core skills such as network security protection, data encryption and decryption, vulnerability mining and repair. In the practical process, emphasis is placed on cultivating students' practical operation ability and problem-solving ability, guiding them to apply the theoretical knowledge they have learned to analyze and solve network security problems encountered in practice. By continuously optimizing practical teaching content, we aim to align students' learning with market demand and enhance their employment competitiveness.

4.4 Implement Safeguard Measures

The construction of teaching staff is a core element in improving teaching quality. On the one hand, we will strengthen the training of teachers' ideological and political literacy, regularly organize special lectures and seminars on ideological and political education, invite experts and scholars in the field of ideological and political education to come to the school for exchange and guidance, guide teachers to deeply understand the importance of ideological and political education, and integrate ideological and political education concepts into daily teaching. On the other hand, enhancing teachers' research capabilities, encouraging them to participate in national, provincial, and ministerial level research projects, collaborating with research institutions and enterprises for research, timely grasping the latest trends and technologies in the industry, and transforming research results into teaching content. At the same time, we will strengthen the cultivation of practical teaching abilities, arrange teachers to work in enterprises for training, participate in practical project development, accumulate practical experience, in order to better guide students' practical operations.

The construction of teaching resources is an important support for the smooth implementation of teaching activities. Integrate on campus and off campus teaching resources, break down resource barriers, and achieve resource sharing. On campus, make full use of resources such as laboratories and libraries, optimize resource allocation, and improve resource utilization. Outside of school, establish cooperative relationships with cybersecurity companies and research institutions to obtain practical project cases, technical materials, etc. Build a rich and diverse teaching case library, collect and organize typical cases in the field of cybersecurity, covering different technical directions and application scenarios, and provide vivid and lively materials for teaching. Build a practical project library, design layered and classified practical projects based on industry needs and student ability levels, and meet the practical needs of students at different stages.

The reform of the evaluation system is a key link in testing the quality of talent cultivation. Establish a diversified evaluation system that comprehensively considers students' ideological and political performance, knowledge mastery, practical abilities, and other aspects. Adopting a combination of process evaluation and summative evaluation to comprehensively and objectively evaluate students' learning outcomes, stimulate their learning enthusiasm and initiative, and promote their comprehensive development.

5. Conclusions and Prospects

In terms of main achievements, the curriculum system is more complete and distinctive. The deep integration of ideological and political elements has changed the phenomenon of "two skins" between ideological and political education and professional teaching in the past, allowing students to receive ideological and political education unconsciously while learning professional knowledge, cultivating students' patriotism, social responsibility, and professional ethics, and providing ideal and responsible professional talents for the field of cyberspace security. The strengthening of science and education collaboration enables scientific research achievements to be timely transformed into teaching resources. Teachers introduce cutting-edge scientific research trends into the classroom, stimulating students' interest in learning and innovative thinking. At the same time, carrying out research-oriented teaching projects and guiding students to participate in research projects effectively enhances their research abilities and problem-solving skills. The optimization of practical teaching, through strengthening the construction of practical teaching bases and optimizing practical teaching content, provides students with a real practical environment, enabling them to be exposed to practical projects in the industry, and improving their practical operation ability and employment

competitiveness.

In terms of experience, the organic integration of ideological and political education, science and education, and practice requires the establishment of effective communication mechanisms and collaborative platforms to promote communication and cooperation among ideological and political teachers, professional teachers, and researchers. At the same time, it is necessary to dynamically adjust the curriculum system and teaching content according to industry needs and student characteristics, ensuring the timeliness and pertinence of the curriculum system. These achievements and experiences provide useful references and inspirations for the reform and optimization of other professional curriculum systems.

In the future, we will further expand the scope of research, collaborate with more universities and enterprises to conduct cross regional and cross industry research, and enhance the universality of research results. Establish a long-term tracking and evaluation mechanism, continuously monitor students' career development after graduation, and adjust the curriculum system in a timely manner based on feedback. At the same time, we will conduct in-depth research on the internal mechanism of the integration of ideological and political education, science and education, and practice, construct a scientifically reasonable quantitative evaluation system, and accurately optimize the integration methods and content. Continuously introducing new technologies and methods, such as using big data and artificial intelligence technology to analyze students' learning behavior and needs, achieving dynamic optimization of the curriculum system, further improving the quality of talent cultivation in the field of cybersecurity, and providing stronger talent support for industry development.

Acknowledgments

This paper is supported by the 2025 Yulin Normal University Teaching Reform Project, which explores the diversified collaborative network space security talent training mode of "ideological and political education, science and education, and practice" (2025XJJGYB04)

References

[1] Haodong Lu, Liqin Qian, Minjia Shi. An infinite family of binary cyclic codes and two infinite families of ternary cyclic codes with good parameters. Cryptography and Communications, 2025, 17(5):1407-1425.

[2] Banjar A, Dawood H, Zeb J B. Sports video summarization using acoustic symmetric ternary codes and SVM. Applied acoustics, 2024, 216(Jan.): 109795.1-109795.10.

[3] Zhang L, Wang G, You X, et al. Research on Basic Concept and Conceptual Model of Cyberspace Map. Journal of Geomatics, 2023, 15(2): 45-53.

[4] Zhang L, Wang G, You X, et al. Research on the Cyberspace Map and Its Conceptual Model. ISPRS International Journal of Geo-Information, 2023, 12(9):16.

[5] Yang Y, Wu B, Zhao K, et al. Tweet Stance Detection: A Two-stage DC-BILSTM Model Based on Semantic Attention//2020 IEEE Fifth International Conference on Data Science in Cyberspace (DSC). IEEE, 2020.

[6] Shi X, Liu Y. Network Big Data: Current Status and Future Trends// 2017 IEEE International Conference on Big Data. 2017: 1230-1235.

[7] Tengfei W, Renfeng M A, Bo H, et al. The Theoretical Perspective of the Production of Space of Old Industrial Districts based on Creative Fix: A Case of Creative 1956 Industrial Park. Modern Urban Research, 2019.

[8] Ma J, Li Z, Bi Y,et al. Training of Outstanding Talents in Cyberspace Security under the Background of Digital Intelligence. Advances in Intelligent Systems Research, 2024:112-120.

[9] Hai-Lun L, Yuan-Zhuo W, Yan-Tao J, et al. Network Big Data Oriented Knowledge Fusion Methods: A Survey. Chinese Journal of Computers, 2017.

[10] Abiteboul S. Issues in ethical data management//International Symposium. 2017:1-1.

[11] Yu-Long Z, Jin Y E. Research on DDo S attack detection and judgment based on stream eigenvalues of software defined networks. Journal of Guangxi University (Natural Science Edition), 2017.