

Research on Innovation Models of Smart Campus Network Security Management in Higher Vocational Colleges

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ABSTRACT

With the development of network technology, network security has become a widely concerned issue in the country and society. This article proposes a research approach and construction plan for innovative models of smart campus network security management in vocational colleges: it is necessary to study classics and explore the connotation of network security management in vocational smart campuses, examine the current situation of network security management in vocational smart campuses based on the current situation, comprehensively layout, and build a smart campus network security system for vocational colleges; it is also necessary to put people first, focus on the construction of a talent support system for network security in vocational smart campuses, look to the future, and grasp the future development trend of network security in vocational smart campuses. Optimizing the network security management system of vocational colleges in such way can solve the network security risks existing in the campus network, which enables the security threats of the campus network be well defended, and the schools to have good platforms for educational and teaching activities, administrative management work, information exchange, and resource sharing, ensuring the normal operation of teaching and management work.

Keywords: *Smart campus, Network security management, Innovation model.*

1. INTRODUCTION

In order to deeply implement Xi Jinping's Thought on Socialism with Chinese Characteristics for a New Era and the spirit of the 20th National Congress of the Communist Party of China,[1] fully implement the requirements of documents such as the Education Informatization 2.0 Action Plan, China Education Modernization 2035, and the 14th Five-Year Plan for Education Informatization, various universities have accelerated the construction of smart campus. However, there is still a common phenomenon of "prioritizing construction over security" in the construction process. The higher the level of informatization in colleges and universities, the more serious the security problems they face [2]. The trend of hostile forces in China and foreign countries using the Internet to infiltrate universities is improving, the situation of campus networks and information

security is becoming more and more complex, and the difficulty of security control is also increasing. How to further strengthen the security management of campus networks and information to ensure the safe and stable operation of campus backbone networks and core business systems is of great significance for the construction of smart campuses. This study is based on the aforementioned regulations and policies.

Therefore, the research on innovative models of smart campus network security management in vocational colleges is of great significance and far-reaching impact: it can help to enrich existing theories of campus network management, so as to elaborate on the connection between smart campus construction and network security management and accelerate the digital transformation of vocational colleges combining the theory of smart campus construction with existing network management theories; And it can also help to strengthen the

systematic construction of network management in vocational colleges, strengthen the network security management of various business systems in vocational colleges, provide an efficient, complete, standardized and scientific network security system for the construction of smart campuses, and deeply promote the systematic sorting and transformation of campus network security management.

2. RESEARCH ROUTE FOR INNOVATIVE MODELS OF SMART CAMPUS NETWORK SECURITY MANAGEMENT IN HIGHER VOCATIONAL COLLEGES

2.1 Strengthening Top-level Design

It is suggested to establish a reasonable security organizational structure, strengthen the planning and design of campus network security, ensure that security management activities can be carried out smoothly and orderly, further effectively establish and improve the institutional system of university management in practice, create a school network security community, and inject new vitality into the development of school informatization.

2.2 Enhancing Network Security Operation and Emergency Response Capabilities

A sound security management system can enhance the security defense skills of colleges and universities. Developing reasonable emergency defense plans enables security personnel to handle serious network security incidents correctly, and minimize losses. [3]

2.3 Creating a Dual Loop of "One Drive, Two Wings" for School Network Security

There is a must to optimize the overall security management system and use it as a driving force to promote the implementation of security technology, achieve the "one drive, two wings" of network security, and thus promote the overall development of school network security.

3. SPECIFIC PLAN STEPS FOR BUILDING INNOVATIVE NETWORK SECURITY MANAGEMENT MODELS FOR SMART CAMPUS IN HIGHER VOCATIONAL COLLEGES

3.1 Studying Classics and Exploring the Connotation of Network Security Management in Higher Vocational Smart Campuses

The first is to clarify and research the concepts of smart campus, campus network security, data centers, and propose relevant theories for studying the management mode of smart campus network security. Before studying the management of smart campus network security, it is necessary to clarify and define the relevant concepts of smart campus, campus network security, and data center. At the same time, it is also necessary to propose relevant theories for studying the network security management mode of smart campuses to guide practice and research.

The second is to clarify the necessity of network security management and analyze the applicability of relevant theories in network security management, while also analyzing the key elements of network security management in vocational colleges. Clarifying the necessity of network security management can help people recognize the importance and urgency of network security management. At the same time, there is a necessity to analyze the applicability of relevant theories in network security management to determine the network security management model suitable for vocational colleges. In addition, there is also a necessity to analyze the key elements of network security management in vocational colleges, including network equipment, data security, access control, etc., in order to establish effective network security management measures.

3.2 Examining the Current Situation of Network Security Management in Higher Vocational Smart Campuses Based on the Current Situation

In China, Fan Lilin (2021), director of the Network Center of Henan Normal University, pointed out the need to explore a sustainable development and management operation approach and practice for cyberspace security construction.

Lu Ye (2022), Deputy Director of the Information Construction and Management Center of Jiangnan University, pointed out that colleges and universities urgently need to establish a sound network security management system. Professor Wu Libing (2022) from the School of Cyber Science and Engineering at Wuhan University pointed out the need to build a campus network security situational awareness platform and strengthen the network security defense line. Song Malin, Vice President of Anhui University of Finance and Economics (2023), pointed out the need to strengthen network risk prevention and control, and improve the network security guarantee system.

In foreign countries, Professor at the Catholic University of Leuven in Belgium Bart Prenee (2015) believed that providing more secure communication mechanisms and technologies can effectively provide more comprehensive protection for campus networks. Jaya Ballo (2015), former Chief Information Security Officer of KPN, a Dutch telecommunications company, believed that campus network security requires comprehensive management, while emphasizing security measures in technology, processes, and personnel aspects. Eduard Kovacs, editor in chief of American security consulting firm Security Week (2015), believed that campus networks need to adopt more detailed and comprehensive security measures to effectively prevent and resist threats to campus networks. Kathy Wang (2020), Chief Security Strategist at Red Canary, a well-known security company in the United States, believed that campus network security should start with internal controls to reduce security vulnerabilities and attack points.

In summary, experts and scholars have conducted extensive research on campus network security management from different perspectives, with different opinions and wisdom, providing reference for this study. In view of this, this study aims to establish a scientific, rigorous, and unified campus network security management system, standardize network information security management systems and regulations, enhance the abilities of management and technical personnel, improve network security work efficiency, reduce network security risks, and effectively ensure the construction of smart campuses in colleges and universities.

3.3 Comprehensive Layout and Construction of a Smart Campus Network Security System for Higher Vocational Colleges

The first is to strengthen the security management of network equipment, by strengthening the security management of network devices, paying attention to hardware conditions, and updating network devices in a timely manner. [4] There is a must to select gateway and core switch equipment with high security and reliability, use hardware firewalls and intrusion prevention systems, design reasonable protection strategies, and deploy and configure firewalls and intrusion prevention systems. In the future, with the advancement of hardware technology, devices can also be upgraded or network devices with better performance and higher security factors can be selected.

The second is to establish and improve network security standards and systems. Making network security standards and systems can guide internal network security practices within organizations, ensure effective implementation of various security measures, and provide guidance on responding to network security incidents.

The third is to deploy a unified identity authentication system and access control mechanism. The application of VPN encryption technology and identity authentication technology, by deploying a unified identity authentication system and access control mechanism, including mandatory access control and autonomous access control, while timely updating and patching vulnerabilities, configuring strong passwords and access control, can prevent unauthorized access and potential attacks, and ensure that only authorized users can access network resources, thereby reducing potential security risks.

The fourth is to strengthen the encryption, backup, and recovery of network data. By encrypting network data, the confidentiality of the data can be protected. Meanwhile, regularly backing up data and establishing a recovery mechanism can prevent data loss and disaster recovery.

The fifth is to establish emergency plans and response mechanisms. Developing emergency plans and response mechanisms can help organizations respond to cybersecurity incidents in a timely manner, reduce losses, and quickly restore normal operations.

The sixth is to strengthen network security management and collaborate with relevant departments or organizations to build a defense system for network security. It is necessary to establish a dedicated department, hire professional personnel, and carry out network security management. At the same time, network security is a shared responsibility. Collaborating with relevant departments or organizations to build a defense system for network security can improve the security of the entire network ecosystem.

3.4 Putting People First and Focusing on the Construction of a Talent Support System for Network Security in Higher Vocational Smart Campuses

The first is to vigorously introduce network technology talents, drive the stock with increment, and optimize the structure of the information technology team. By introducing network technology talents, there is a must to increase talent resources, enhance the overall quality and ability of the information technology team, and promote the development of the network security field.

The second is to further improve the system and mechanism of orderly flow, and vigorously create a good environment for attracting, nurturing, utilizing, and managing talents. There is a necessity to establish a sound mobility mechanism, including talent attraction, education, employment, and management, to provide a better development environment and opportunities for network technology talents, and promote the flow and exchange of talents.

The third is to establish a hierarchical training system and optimize training and management processes. By establishing a hierarchical training system, targeted training of cybersecurity talents can be carried out according to different levels and needs, thereby improving the effectiveness of training and management.

The fourth is to build a network security professional talent cultivation system and create a professional network security talent team. It is a must to establish a specialized network security talent cultivation system, including relevant curriculum design, practical training, and certification mechanisms, to cultivate a professional network security talent team and meet the needs of the network security industry.

3.5 Looking to the Future and Grasping the Future Development Trend of Network Security in Higher Vocational Smart Campuses

Firstly, the construction of a comprehensive governance system for network security will be sounder. With the continuous evolution of network security threats, building a comprehensive governance system will become an important task of network security. This includes formulating relevant policies and regulations, strengthening supervision and law enforcement, and promoting enterprises and institutions to strengthen network security management.

Secondly, the security of network equipment and data will continue to be highly valued. With the popularization of the Internet and the improvement of information technology, the security of network equipment and data will become a focus of attention. Enhancing the security protection of network equipment and the encryption, backup, and recovery of data will continue to be valued and strengthened.

Thirdly, the network information security management system and regulations will become increasingly perfect. In order to cope with the constantly changing network security threats, relevant departments and institutions will further improve the network information security management system and regulations, in order to enhance the protection and response capabilities of network security.

Fourthly, the student-centered network security management model will become more mature. With the popularization and promotion of network security education, the student-centered network security management model will receive more practice and exploration. This includes cultivating students' awareness and skills in cybersecurity, establishing cooperation mechanisms between schools and families, and jointly protecting the security of students in cyberspace.

4. CONCLUSION

There are two innovations in this article: the first is the research perspective innovation. This study attempts to integrate security technologies such as cloud security, antivirus, intrusion detection, as well as firewall and VPN technologies, to explore the design scheme of campus network security in universities. Based on the current

characteristics of campus network security, the design ideas of campus network security can be proposed, and a deep protection system based on the security domain can be designed; The second is the academic viewpoint innovation. Based on practical considerations, this study proposes to divide the campus network into nine security zones according to different functional characteristics, and design security protection schemes for important security zones, and provides suggestions for introducing third-party security services to construct a comprehensive campus network security prevention system, which can help fundamentally improve management efficiency and achieve intelligent management of campus networks.

The research on innovative models of smart campus network security management in vocational colleges has rich value connotations and development prospects: it provides intellectual support for the construction of smart campuses in Liaoning higher vocational colleges. This study can help schools develop more scientific and reasonable network security management strategies and norms, and provide more reliable network security guarantees for school decision-making; It can also help to optimize the network management mode and process of schools, improve management efficiency and efficiency, and enhance the core competitiveness of higher vocational colleges. At the same time, the study will inject new momentum into the construction of a smart campus for higher vocational education in Liaoning. Through this study, the researchers can promote the digital transformation and modernization development of vocational colleges, and promote the informationization construction of vocational colleges to develop in a more in-depth, comprehensive, and collaborative direction; this study can also promote the integration and development of vocational colleges and society, provide more reliable and efficient data support for their communication and cooperation, and thus achieve mutual benefit and win-win between vocational colleges and society.

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