Research on the Application of Vocational and Technical Education Under the Background of Localization of General Teaching Platform

Zhihao Tan and Yanan Di*, Yao Liu and Xun Wang

High-tech institute, Qingzhou, 262500, China

*diyanan0707@126.com

Abstract. With the acceleration of localization of software and hardware equipment of domestic operation platform, vocational and technical education is bound to have a painful period in adapting to the new situation. In view of the adaptability problems that may occur in the aspects of professional teaching content, teaching supporting facilities and teaching evaluation, this paper analyzes the main challenges to vocational and technical education from the origin of the localization of the platform, and prospectively combines the existing artificial intelligence, virtual simulation and other technologies to put forward specific coping strategies, so as to provide useful reference for relevant educators in adapting to the localization of the general teaching platform.

Keywords: Localization, Vocational and technical education, Teaching content, Teaching support, Teaching evaluation.

1 Introduction

The Outline of the Planning for Building a Strong Education Country (2024-2025) explicitly called for vocational and technical education to strengthen the requirements for autonomous and controllable technologies, to promote the in-depth integration of education informatization and industrial needs, and to safeguard the security of educational data. With the rapid development of national equipment localization, the education industry has faced new challenges. Compared with higher education, vocational and technical education emphasizes practicality and job adaptability, mainly focusing on industry needs. Practical courses account for a high proportion, and the teaching content is highly timely and dependent on supporting conditions.

In terms of research on vocational and technical education, it mainly involves teaching preparation, teaching implementation and teaching evaluation. Teaching preparation mainly includes teaching content, teaching supporting facilities and teaching strategies. This paper starts from the source of localization, and studies teaching content, teaching supporting facilities and teaching evaluation in three aspects. For these three aspects, Dongdong Zhao et al.[1] studied the case teaching content system and experimental teaching methods based on the practice of domestic embedded system courses,

© The Author(s) 2025

B. Majoul et al. (eds.), *Proceedings of the 2025 11th International Conference on Humanities and Social Science Research (ICHSSR 2025)*, Advances in Social Science, Education and Humanities Research 945,
https://doi.org/10.2991/978-2-38476-440-2_37

with the domestic Shengteng processor as the core. Feng Yuan[2] elaborated on the necessity of promoting the localization of teaching software, and proposed solutions from the perspectives of education supervisors, textbook publishing, exam organization, and software development. Yong'an Xue et al.[3] addressed the issue of insufficient systematization of Chinese made remote sensing software in surveying and mapping engineering courses, and made improvements from multiple dimensions such as teaching case libraries and blended learning. Hairui Wang et al.[4,5] conducted a research on computer teaching in colleges and universities, and by combining the characteristics of computer teaching and problematic contradictions, they proposed that the teaching reform of the principle of computer composition can be explored in terms of reforming the teaching content, curriculum teaching system, optimizing the talent training system and strengthening the construction of the teacher's team. Chengye Zhang et al.[6] proposed the experiential teaching concept and flipped classroom in response to the localization teaching needs of PIE software, and applied it to undergraduate teaching practice, providing important references for the practical teaching of domestic remote sensing software. Wenyi Ge[7] aimed to cultivate talents in the field of information and innovation, and replaced the Linux operating system programming course experimental platform with a domestic open source operating system platform. He carried out teaching and experimental reforms and integrated ideological and political education into the curriculum.

Although many scholars have conducted research on the application of localization in education, it mainly focuses on certain professional courses or software, with a focus on higher education. Currently, there is a lack of systematic thinking on vocational and technical education, making it difficult to adapt to the new development situation. Therefore, the paper starting from the source of localization and challenges of teaching content, teaching support, and teaching evaluation, proposes specific strategies based on existing technologies such as artificial intelligence and virtual simulation, aiming to provide useful references for relevant educators in adapting to the localization of general teaching platforms.

2 Analysis of Localization of General Teaching Platform

2.1 The Origin of Platform Localization

The history of localization in our country is a struggle from following to running in parallel and then to leading in some fields. Generally speaking, it can be divided into four stages.

One is the early exploration stage. During this stage, the focus was on developing heavy industry, establishing basic industrial systems such as steel, machinery, and chemical engineering. At the same time, there was self-reliance in the field of national defense technology, such as the Two Bombs and One Satellite Project[8].

The second stage is the technology introduction phase. After the reform and opening up, through the strategy of market for technology exchange, advanced foreign technologies were introduced, promoting the development of industries such as automobiles and electronics, and breakthroughs were achieved in key areas such as manned spaceflight[9]and high-speed rail.

The third stage is the autonomous acceleration phase. After 2000, relying on policy driven initiatives, SMIC initiated the localization of chip manufacturing, while Huawei and ZTE rose to prominence, driving the development of 5G technology.

The fourth stage is the comprehensive promotion phase. The 14th Five-Year Plan and Made in China 2025 have witnessed the birth of a large number of landmark achievements, including Changjiang Storage's flash memory technology[10], Huawei HiSilicon's chip design, the global networking of the Beidou satellite navigation system, and international leadership in quantum communication.

With the development of localization, the localization of information technology in China has emerged, including the era of nuclear and high-tech industries before 2013, which saw the emergence of prototypes such as Hanka and Kingsoft Office Software, leading the international market at one point; In 2013, influenced by the Prism scandal in the United States, [11]China began actively promoting the elimination of IOE, which means removing the monopolies of foreign giants such as IBM, Oracle, and EMC in operating systems, databases, and other areas. The demand for information security further promoted the development of information localization; From 2016 to 2018, with the rapid development of the semiconductor chip industry, China has ushered in a new era of safety and reliability, and the level of localization has significantly improved; Since 2018, pilot projects have been launched by the Party, government, and military, gradually expanding to finance, education information, energy, healthcare, transportation, aerospace, and other industries, forming a 2+8 information and innovation industry pattern.

In the field of educational research, Chinese universities such as Harbin Institute of Technology and Harbin Institute of Engineering have been banned from using the American commercial mathematics software MATLAB, attempting to suppress the pace of China's technological development. In a sense, this can be seen as an attempt to localize the domestic universal teaching platform. It can be said that the development of domestic operating platform equipment is an inevitable result of the comprehensive effects of multiple factors such as national security, economic development, technological independence, and international competition.

Overall, the localization of platform equipment is not only a short-term strategy to cope with external pressure, but also a long-term strategy to ensure national security, promote economic transformation, and enhance international competitiveness. It can be said that localization is the core driving force for a country to move from a manufacturing powerhouse to a manufacturing powerhouse, and vocational and technical education must do a good job in applied research under this long-term background.

2.2 The Current Situation of Platform Localization

At present, the domestic host hardware platform shows a diversified development trend, mainly including X86 architecture, ARM architecture, MPIS, Loongson, Phytium, Huawei series and other types. For details, please refer to Table 1.

In addition to the host hardware architecture, its supporting peripherals have also been localized and adapted in production: Taking printers as an example, there is a completely independent Bentu series, the first high-speed laser printer equipped with

Loongson 2P0500, Extreme Print. For an other example, the graphics card series includes brands such as Moore Thread, Jingjiawei, Cambricon, and Haiguang Information that have mastered domestic core technologies. A group of compatible brand manufacturers have also emerged for high-speed cameras, keyboards, mice, and so on.

For domestic software platforms, the main distinctions are operating system software, application service support software, and professional application software.

(1) Domestic operating system. After years of development, the platform has formed an autonomous ecosystem covering various scenarios such as desktop, server, mobile, and embedded. Desktop operating systems are mainly aimed at office substitution, software and hardware compatibility, and security controllability, including Galaxy Kirin, Tongxin, Zhongbiao Kirin, etc; The servers and cloud computing operating systems are mainly aimed at high computing power scheduling and cloud edge collaboration, including open-source Euler and Huawei Cloud; Mobile and Internet of Things operating systems are mainly aimed at device collaboration, low power consumption, and security privacy, including HarmonyOS and Alibaba Cloud; Embedded and dedicated operating systems include Nuwa, Puhua, and other operating systems. It is not difficult to find that currently domestic operating systems can support domestic CPU architectures such as Phytium and Loongson, but there is still room for growth in the mobile ecosystem.

(2) Support software for application services. In terms of cloud services, it covers multi-level services such as Infrastructure as a Service, Platform as a Service and Software as a Service, mainly including Alibaba Cloud, Tencent Cloud, Huawei Cloud, Inspur Cloud, Tianyi Cloud, Mobile Cloud, etc; Domestic databases have gone from being usable to being easy to use, mainly including Dameng Database (DM), Nanda General (GBase), KingbaseES, Huawei GaussDB with superior security performance; Programming tools include IDE, code editor, development framework, etc., mainly including Huawei, ByteDance, etc; Other system tools and software, drivers are generally developed synchronously with hardware. For other system tools and software, drivers are generally developed in parallel with the hardware, for example, 360 Security Guard for system optimization, Kingsoft AntiVirus Intrusion Detection System for security protection, FusionSphere for virtualization software, and Ai Digital for backup and recovery.

(3) Professional application software. Application software is software that provides users with specific needs, mainly divided into office, multimedia processing, social, communication, education and learning, life services, finance, healthcare, and emerging AI driven application software. Taking office software as an example, there are WPS Office, Zhongbiao PwC Office Software, Feishu, etc. At present, application software has achieved multi scenario coverage and deep mapping from general tools to vertical industries, from consumer level to enterprise level, and emerging forces such as Deepseek and manus have emerged. Among them, AI embedding, cross end collaboration, and innovation adaptation are the future trends. At present, adapting professional teaching software for fields such as telemetry and aerospace remains a major challenge.

Table 1. Architecture of domestic host hardware platform.

Architecture	Manufacturer	Characteristic
X86	Hygon	Compatible with mainstream hardware ecosystems, suitable for scenarios such as servers and AI
	zhaoxin	Suitable for desktop office
ARM	Phytium	Suitable for cloud terminals and embedded devices
	Kunpeng	Widely used in servers and mobile devices
MIPS	Loongson(Early)	Such as Loongson 3A4000, Loongson 3A3000
Loongson	Loongson	Compatible with Linux and some Windows system applications
Phytium	Phytium	Compatible with ARM but with higher autonomy
Alpha	ShenWei	Used for supercomputing and servers, with strong performance

3 Analysis of Vocational and Technical Education Under Localization

In view of the current situation of platform localization development, vocational and technical education needs to be closely combined with professional characteristics and carry out corresponding practice, exploration and innovation to ensure the quality and efficiency of education. Here we mainly analyze it from three dimensions: teaching content, teaching supporting facilities and teaching evaluation.

Algorithms

3.1 Analysis of Teaching Content

The localization and adaptation of teaching content is an inevitable trend in the future, and different majors need to make adjustments to varying degrees.

For computer courses, localization has the highest degree of substitution, involving all aspects of software and hardware. The teaching content needs to be updated and migrated in operating systems, programming development, databases, cloud computing, network services, and other aspects according to the current development status. This type of course requires a full system localization of alternative design in terms of teaching content, textbooks, software, etc.

For design courses such as graphic design, the original tool Photoshop needs to be considered for replacement with software such as Light and Shadow Magic Hand and Tu Mao; In terms of video editing, the original Premiere needs to be considered as a substitute for Capcut or bcut; In terms of industrial design, AutoCAD is considered to be replaced by Zhongwang CAD. The change of this professional course not only needs to effectively solve the problem of difficult habit transfer between teachers and

students, but also needs to consider the updating of professional theoretical content caused by the addition or deletion of some functions.

For office skills courses, document processing can be replaced with WPS Office, data visualization needs to be replaced with Eternal BI and Nine Chapters Cloud Extreme, and collaborative office can be replaced with software such as Feishu and DingTalk. These software have similar operating habits to previous application software, with only differences in advanced applications such as shortcut keys. Therefore, only partial content chapters need to be adapted.

The skill oriented nature of vocational and technical education requires different design ideas to be adopted for localization adaptation according to different professional teaching contents, ensuring intensive and efficient teaching.

3.2 Analysis of Teaching Supporting Facilities

Teaching support is a comprehensive guarantee system that supports the efficient implementation of teaching activities, generally covering aspects such as teaching facilities, teaching resources, and teacher capabilities.

In terms of teaching facilities, we have gradually achieved domestic production, interactive whiteboards, recording systems, and multi screen interactive smart teaching support. The changes in operation and use are basically the same as the original functions. Practical training equipment and virtual simulation platforms, such as industrial robots, Huazhong CNC lathes, and Zhongwang 3D virtual training systems, are gradually entering the classroom.

In terms of learning resources, for different professional courses, the current focus is mainly on universal domestic textbooks, with a focus on group lectures. However, the specialized and targeted design of domestic textbook systems is insufficient, making it difficult to support future practical training needs. At present, digital tools such as MindMaster and iFlytek homework management are serving areas such as course preparation and homework management. For video resources for service teaching, MOOCs and other platforms are still in their infancy.

In terms of teacher competence matching, it mainly relies on the professional consciousness of educators, and there is insufficient emphasis on domestic training, teaching ability generation, characteristic case studies, educational reform projects, professional title evaluation, and other aspects.

3.3 Analysis of Teaching Evaluation

Teaching evaluation is the core key of the education quality assurance system, reflected in quality monitoring, resource optimization, and teaching reform orientation. At present, the Zhengfang Academic Affairs System and Qingguo Software Teaching Management Platform can adapt to the domestic environment. However, overall, due to the lack of nationwide production of hardware environment, this aspect is still mainly based on the Windows operating system. Domestic applications are seriously lagging behind future development needs, and there is insufficient forward-looking application research.

4 Optimization and Upgrading of Teaching Content

4.1 Assessment of Content Adaptability

According to the characteristics of different majors, the focus of optimizing and upgrading their teaching content is different, and it is necessary to conduct adaptability evaluation to enhance the pertinence of vocational and technical education. The adaptability evaluation mainly includes three aspects:

The first aspect is demand-oriented. In response to the reality of localization, it is necessary to closely match the national strategies, industrial development, and individual student needs, and combine with plans such as Made in China 2025 to design top-level teaching syllabi and talent training programs. At the same time, it is necessary to combine the actual organization of professional localization. For example, for computer majors, their localization development process is relatively fast, and their basic operational content should be appropriately reduced.

The second aspect is fundamental skills. Vocational and technical education places the greatest emphasis on practical operational skills and requires thorough research, including from employers, graduates, peers, etc. After collecting basic data, language modeling tools such as Deepseek can be used to summarize and extract knowledge points, providing a basis for the current professional content needs under localization.

The third aspect is the technological ecosystem. The process of localization development is influenced by various factors, such as the development of localization technology, training conditions, school enterprise collaboration ecology, etc. Therefore, in the process of optimizing and upgrading teaching content, it is not only necessary to do a good job in current evaluation design, but also to have a basic evaluation of future development trends. We should develop teaching content and optimize the schedule based on the semester plan, so as to find a balance between teaching design and teaching implementation.

4.2 Reconstruction of Knowledge Capability Graph

On the basis of evaluating the adaptability of knowledge points, we need to reconstruct the curriculum system from knowledge stacking to ability graph, which is also suitable for the design of future digital teaching.

The reconstruction of the knowledge ability graph requires bold and resolute deletion of some courses, and the courage to self innovate; For most knowledge points, AI technology can be used to restructure them at the knowledge point level, such as arranging and combining them based on course modules, optimizing layout based on theoretical practice, and finalizing order based on logical structure; At the same time, for partially isolated knowledge points, which are relatively scattered, independent, and difficult to integrate, alternative solutions need to be considered, including knowledge point selection and specific integration.

The reconstruction of the knowledge ability graph inevitably requires synchronous design of teaching strategies, striving to achieve a transition from one-way indoctrination to multi-dimensional interaction, and can be explored in practical aspects such as

virtual real integration teaching, project-based learning, and interdisciplinary collaboration. For example, the knowledge graph construction of the communication principle course, as shown in Figure 1.

The knowledge graph construction of the communication principle course uses the method of module hierarchy + association mapping to build the knowledge graph. The specific steps are as follows:

(1) Demand analysis and module division: based on the curriculum and industry standards, the knowledge system is divided into five core modules: signal and system, communication channel, coding and modulation, system architecture, and network technology.

(2) Node definition and relationship sorting: sort out the content of each knowledge node and the relationship between each knowledge point according to the curriculum teaching plan and curriculum teaching design.

(3) The association between core modules is analyzed by DeepSeek+XMind.

(4) The frontier technology expansion interface will be reserved and accessed at any time with the development of new technology.

(5) Visual realization: use DeepSeek+Xmind to generate knowledge map.

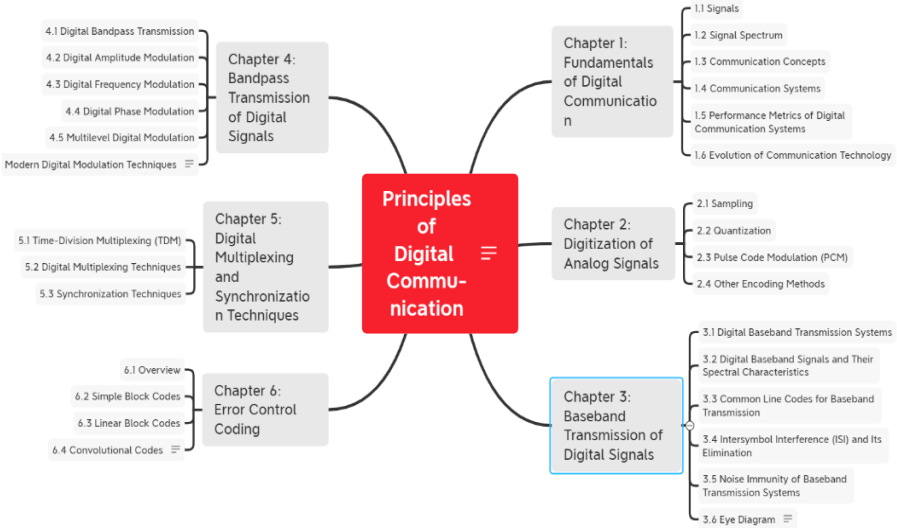

Fig. 1. The knowledge map of the communication principles course.

5 Echelon Design of Teaching Support

5.1 System Adaptability Analysis

Teaching support is not a one-time task that can be achieved overnight. We should pay attention to its objective laws and implement it according to the idea of hierarchical design, gradual improvement, and upgrading while building.

In terms of teaching facilities, taking the computer network major as an example, for the replacement and upgrade of operating systems, we need to evaluate the professional

construction funds and make judgments on future equipment conditions based on actual situations. We should gradually build in the order of primary and secondary use in the current industry field. For equipment software that is temporarily difficult to localize, consideration should be given to using virtualization technology for training, or actively developing model training systems to solve the problem, ultimately forming an analysis report on the teaching facility situation.

In terms of teaching resources, we need to sort out the current situation of curriculum construction, including the list of textbooks, carrier form and localization rate. On this basis, we will fully demonstrate the needs of editing domestic textbooks, fully consider the actual strength of the team, and form a feasible editing plan. Synchronization can comprehensively consider the needs of course video resources, 3D models, animations, and MOOC construction.

In terms of teacher competence matching, the evaluation mainly combines the personal characteristics of educators to assess their development potential and current abilities, providing first-hand information for the effective implementation of domestic education reform.

Through the analysis of teaching support, it can be divided into three types of construction goals: platform transplantation, platform migration, and platform reconstruction. The first type is based on existing technology without adjustment, and the following focuses on solving the latter two types of problems.

5.2 Platform Migration

Platform migration is the second evaluation form, a bold attempt at teaching support, and an effective measure to reduce teaching costs. Taking the Kylin operating system as an example, students majoring in networking need to master its deployment and basic operation and maintenance, requiring the use of multiple hosts, usually solved by virtual machines. However, for the domestic platform, currently it mainly supports crossover software, but there are some problems, such as small memory presets and only 32-bit operating systems. The degree of support of the domestic platform for mature VMware, virtual box and other software is not clear. In the process of practice and exploration, we need to consider the CPU architecture, virtualization support and other conditions. Moreover, for Huawei routing and switching equipment, it often relies on the ENSP software for simulation, so it can be solved by using crossover and other solutions. It is not difficult to find that platform migration needs to consider a variety of factors, with high technical requirements and instability, but corresponding solutions are bound to appear in the future.

5.3 Platform Reconfiguration

For the unsuccessful migration after many attempts, the platform should be reconstructed to adapt to the localization situation. During refactoring, the developed modules need to be classified to avoid repeated development. Secondly, when refactoring, we should consider that it should have good cross platform, support the operating

platform as widely as possible, or demonstrate the necessity of multi platform development synchronously.

The flow chart of teaching supporting echelon design is shown in Figure 2.

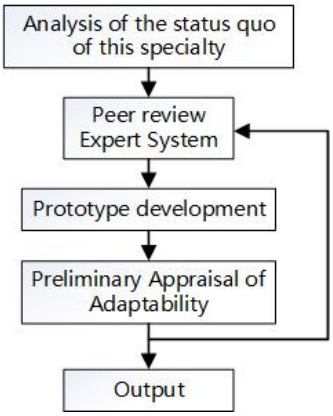

Fig. 2. Flow chart of teaching supporting echelon design

6 Popularization and Application of Teaching Evaluation

6.1 Improve the Recognition of Teachers and Students

At present, the slow development of teaching evaluation in the process of localization is largely due to its low recognition between teachers and students. At present, the rapid development of AI technology provides a development channel for the teaching evaluation system platform, but it needs to strengthen the publicity and promotion. On the one hand, it expounds the importance of the application of localization teaching evaluation. On the other hand, it establishes the development idea of using first to form ecology, and then optimizing and improving the effectiveness. Through continuous optimization, it ensures the accuracy and recognition of the evaluation, and provides really effective guidance and suggestions based on intelligent analysis algorithm.

6.2 Customized Functions According to Requirements

After the localization platform is launched, its localization service has a high cost performance ratio. However, for the system, the more comprehensive is not the better, but the more suitable is the better, that is, it supports personalized function customization, but generally should have diversified evaluation methods, such as process evaluation, comprehensive quality evaluation, historical evaluation and so on; Secondly, we should be able to reserve the ability to connect with the general education evaluation system in the future, and make data preparation for the development of education big data; Finally, it should be compatible with the existing education management systems, such as OA office system, educational administration system, smart classroom equipment, etc.

6.3 Manage Data Well

On the one hand, data management can effectively serve the teaching evaluation of colleges and universities, automatically generate the teaching quality analysis report, professional evaluation report,curriculum evaluation report, and support students' data operation, teaching evaluation and learning evaluation, and team building planning; On the other hand, the teaching evaluation data involves the privacy of teachers and students and the core information of the school, so it should be carefully managed in the process of construction and promotion, and strictly comply with the relevant laws of national information management.

7 Conclusion

To sum up, the domestic application of the general teaching platform will continue to develop in depth, and will have a significant impact on vocational and technical education for a considerable period of time in the future. In view of the new situation of localization development, in addition to the optimization and upgrading of teaching content, the echelon design of teaching supporting facilities, and the promotion and application of teaching evaluation proposed in this paper, with the development of information technology and the innovation of education and teaching, there will be more exploration and practice programs in the future. The research on case teaching, teaching aids upgrading and model training development for the localization of courses will be more focused and feasible, so as to further improve the quality and efficiency of vocational and technical education.

References

1. Dongdong Zhao, Peng Chen, Haixia wang, Yingtian Hu, and Ronghua Liang.2023. Teaching reform and practice based on domestic shengteng processor[J]. Journal of higher education, 2023,9 (08): 148-151.doi:10.19980/j.cn23-1593/g4.2023.08.036.
2. Feng Yuan.2023. Promote the localization of teaching software and enhance the awareness of self-control[J]. Journal of Fujian Institute of education, 2023,24 (03): 63-65+94.
3. Yongan Xue, Mingmei Zhang, Fang Ren, Wenzhi Zhang, and Guangchun Liu. 2023. Research on teaching reform of Surveying and mapping engineering course enabled by domestic remote sensing software[J]. China modern education equipment, 2023, No.409(09):32-35.doi:10.13492/.cnki.cmee.2023.09.039.
4. Hairui Wang, Hongwei Yang, and Lei Wu. 2022. Research on computer teaching in Colleges and Universities Based on localization alternative environment[J]. education and teaching forum, 2022, No.599(48):65-68.
5. Hairui Wang, Shengmin Pan, Ya Li, Lei Wu, Shunjian Meng. 2023. Teaching reform of computer composition principles under the background of localization[J]. software guide, 2023,22 (06): 70-74.
6. Chengye Zhang, Jun Li, Hengqian Zhao, Dongsheng Liu, Fang Ren, and Hongpeng Wang. 2023. Application of pie series remote sensing software in experiential teaching of Surveying and mapping specialty [J]. Beijing surveying and mapping, 2023, v.37(09):1320-1325.DOI:10.19580/j.cnki.1007-3000.2023.09.022.

7. Wenyi Ge, Jinnan Gong, and Guanghui Pan, 2024. Exploration on the teaching reform of Linux operating system programming for the cultivation of information innovation talents [J]. computer knowledge and technology, 2024, v.20(21):142-144. DOI:10.14004/j.cnki.ckt.2024.1076.
8. Ping Long, Xia Wang. 2025. Far reaching influence and experience enlightenment of the party and the state's major decision on "two bombs and one satellite" [J]. Leadership Science Forum, 2025, No.232(02):80-84.DOI:10.19299/j.cnki.42-1837/C.2025.02.019.
9. Xin Sun. 2023. The road to the sky: from Shenzhou 1 to Shenzhou 15 [J]. Yan Huang Chun Qiu, 2023, No.370(01):67-71.
10. Zhongwei Dong. 2022. Patent status analysis of chip manufacturing industry [J]. China high tech, 2022, No.116(08):104-106.DOI: 10.13535/j.cnki.10-1507/n.2022.08.45.
11. Feng Guo, Hua Zhao, Yang Liu, Yenan Ji, and Yongzhen An. 2024. Research review and Enlightenment of "Snowden incident" [J]. information security and communication confidentiality, 2024, No.363(02):40-50.

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (http://creativecommons.org/licenses/by-nc/4.0/), which permits any noncommercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.