Article

Design and Exploration of Curriculum Ideological and Political Education in "Linux Basics" Under the Background of the National Strategy of Cyber-Power

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Abstract: In the context of the new era, the advancement of the National Cyber Power Strategy places higher demands on the cultivation of computer-related professionals. Taking the "Linux Basics" course as a case study, this paper explores the design of curriculum-based ideological and political education under the perspective of the Cyber Power Strategy. By analyzing the core elements of the strategy and the principles of ideological and political education in curricula, and integrating them with practical teaching practices, this study proposes embedding ideological and political education into the objectives, content, and teaching methods of professional courses. The goal is to cultivate high-quality technical talents who possess political awareness, professional competence, and a sense of mission, thereby providing strong talent support for the realization of a national Cyber Power.

Keywords: Cyber-Power; curriculum ideological and political education; computer major courses

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1. Introduction

With the deepening development of the digital society, the 13th Five-Year Plan first proposed implementing the strategy of building a Cyber-Power and accelerating the construction of a digital China [1]. Building on this, the 14th Five-Year Plan further emphasized the need to advance the construction of a Cyber-Power, accelerate the development of a digital economy, digital society, and digital government, and leverage digital transformation to drive overall changes in production methods, lifestyles, and governance approaches. It also highlighted the importance of promoting digital industrialization and accelerating the digital transformation of traditional industries [2]. In particular, the digital economy, represented by the industrial Internet and artificial intelligence, has developed rapidly, underscoring the critical role of talent in the construction of a Cyber-Power. The plan emphasizes the cultivation of innovative, application-oriented, and skilled professionals, the implementation of knowledge updating programs and skill enhancement initiatives, and the expansion of high-level engineers and highly skilled talent teams [2].

The Central Cyberspace Affairs Commission has pointed out the necessity of self-reliance and self-strengthening, urging accelerated independent innovation in core technologies within the fields of cybersecurity and informatization [3]. As the most widely used operating system, Linux plays a crucial role across industry, commerce, and consumer electronics. It constitutes the key infrastructure of modern information systems and serves as an important foundation for the self-reliance and innovation of China's information technology industry. Moreover, Linux has facilitated the smooth application of domestic operating systems, such as UOS. Consequently, Linux and its related derivative systems have become compulsory courses for computer science majors.

Implementing ideological and political education through the "Linux Basics" course can not only enhance students' learning outcomes but also strengthen their political awareness, social responsibility, and sense of historical mission. Taking the ideological and political teaching design of the "Linux Basics" course at Changzhou College of Information Technology as an example, this paper organically integrates the strategy of strengthening the country through cybersecurity with the cultivation of professional Linux skills, thereby exploring new approaches for nurturing computer talents in the new era.

2. Analysis of the core elements of the Internet power strategy and ideological and political education in courses

Political identity, professional spirit, and a sense of mission are the core elements of ideological and political education in computer science courses aimed at supporting the Cyber-Power strategy. By shaping students' core values, personal ideals, and beliefs, this approach guides them to develop correct career perspectives, employment attitudes, and professional growth concepts, helping students achieve an organic unity of personal development and national progress while mastering technical skills.

2.1. Political Identity

Within the context of the National Cyber-Power Strategy, fostering political identity constitutes the primary task in cultivating computer science talents. Understanding and recognizing national policies and decisions regarding cyberspace security and independent innovation in information technology helps guide students to actively align with national strategic talent requirements.

For instance, in the disk management project, the relationships among physical volumes, volume groups, and logical volumes in logical volume management are used to illustrate the principle of "learning whatever the country needs me to learn and going wherever the country needs me to go" [4]. This analogy encourages students to become "red and professional" college graduates. By integrating the strategic goal of building a strong Cyber-Power with professional skills training, students can simultaneously master technical competencies and recognize their responsibilities in developing the national information technology industry. In the KVM virtual machine project, the parasitic relationship between the client and the virtual machine is employed to convey the patriotic spirit of "without the skin, where will the hair be attached?" This form of political identity not only stimulates students' intrinsic motivation but also guides them to actively contribute to national strategic needs, enhance their confidence in the country's path, theory, system, and culture (the "four confidences"), and strengthen their awareness of political responsibility (the "four consciousnesses"), preparing them to navigate a complex and rapidly changing world while contributing to technological self-reliance.

2.2. Professionalism

Professionalism is an essential quality for highly skilled technical personnel, requiring students to cultivate a diligent, responsible, and detail-oriented work ethic grounded in solid professional knowledge. For example, by studying the Linux file system architecture and mastering basic operation and maintenance commands, students can appreciate the rigor and precision inherent in Linux command design. They can understand the craftsman spirit of meticulously checking parameters during critical operations, recognize the principle of "greater ability, greater responsibility" when executing high-privilege commands with `sudo`, and internalize the pragmatic spirit of "building a towering structure from the ground up" when handling complex tasks. Through the integration of project practice with ideological and political elements, students are encouraged to develop a conscientious, excellence-seeking, and meticulous work ethic. This approach enables

students to consciously engage in professional education while acquiring technical skills, fostering the development of highly skilled professionals.

2.3. Mission and Responsibility

A strong sense of mission and responsibility is another core element that computer science students must deeply understand and practice. In the Linux Basics course, mission and responsibility should be closely integrated with professional skills training, guiding students to link their personal development with national progress. For example, in studying the Linux open-source concept, students are encouraged to recognize the value of global cooperation, peace, and shared development. During the web application system deployment project, students learn from the spirit of dedication exemplified by "forgetting oneself to serve the people" [5], reinforcing the connection between personal value and national development. Ultimately, students are guided to internalize values related to safeguarding peace, contributing to society, and proactively assuming social responsibility.

3. Design of Ideological and Political Program for the Course "Linux Basics"

3.1. Teaching Objective Design

By closely integrating national strategic needs with professional skills training, we have redefined the teaching objectives [6]. Building on a scientific framework of the three major goals-knowledge, skills, and personal qualities-we incorporate the spirit of patriotism and the principles of dialectical materialism to formulate the ideological and political objectives. The specific teaching objectives of the course are shown in Table 1.

Table 1. Teaching objectives of the course "Linux Basics".

Serial number	Classification	Specific content
1	Knowledge Objectives	(1) Understand the basic concepts and principles of Linux system management. (2) Master the disk management, file system management, user management, permission management, software package management, and process management of the Linux operating system. (3) Master the configuration, management and security of various services under Linux (DHCP service, DNS service, database service, storage service, firewall, etc.). (4) Master Shell operations. (5) Master the deployment of simple WEB application systems.
2	Ability Goals	（1）Proficient in installing and using the Linux operating system. （2）Be able to skillfully use the Linux operating system GUI for system operation and management. （3）Able to use common Linux terminal commands for system operation and management. （4）Able to understand and handle various prompt messages in Linux operation and maintenance.
3	Quality Goals	（1）Cultivate students' awareness and ability of active learning and develop good learning habits. （2）Cultivate students' sense of teamwork. （3）Improve students' problem awareness level. （4）Cultivate students' network service management and security literacy under Linux.

4	Ideological and political goals	（1）Cultivate students' patriotism and inspire their passion for learning and active progress . （2）Cultivate students to understand the origin, development and future of the Linux operating system through the perspective of historical materialism . （3）Cultivate students to master the methodology of understanding and solving problems through the viewpoint of dialectical materialism .

These teaching objectives closely align national strategic needs with students' personal development, achieving a unified vision of skills and values. The knowledge objective enables students to systematically acquire Linux system operation skills; the competence objective emphasizes cultivating practical operational and problem-solving abilities, allowing students to apply their knowledge flexibly in real-world scenarios; and the quality objective focuses on enhancing students' overall literacy, fostering a strong professional ethic through teamwork, active learning, and other formative experiences.

By integrating ideological and political elements, this multi-level and multi-dimensional teaching objective design further strengthens the educational function of the course and provides robust support for achieving the professional program's overarching goal of "moral education and talent cultivation." The ideological and political objective design acts as a "catalyst," enriching the knowledge, competence, and quality objectives with values-oriented guidance.

3.2. Integration of teaching content and ideological and political education

The ideological and political development of the "Linux Basics" course seeks to organically integrate professional teaching content with ideological and political elements in the context of a Cyber-Powerful nation, conveying these elements subtly and effectively to achieve the teaching objectives. In practice, the implementation begins with the core skills of operating and maintaining the Linux system, while exploring relevant ideological and political dimensions through the lens of the Cyber-Power Strategy.

The alignment between specific teaching content and ideological and political elements is summarized in Table 2.

Table 2. Ideological and political elements design of core skills points in the course "Linux Basics"

Serial number	Core skill points	Ideological and political elements
1	Introduction to Linux operating system and file system	"Who" created Linux?
2	Linux basic operating instructions	High-rise buildings rise from the ground, but we must keep our feet on the ground and do practical things.
3	Linux disk and file system management	I am a brick of the motherland, I will move wherever I am needed
4	Network Management	Only an open China can become a modern China
5	Software management, process management	The significance and value of product life cycle management
6	User and group management	The significance of the population census and economic census
7	File system permission management	National security and confidentiality knowledge

8	Disk Array RAID and Logical Volume Management	Modernization of China's national governance system and governance capacity
9	DHCP and DNS services	China's domain name resolution service system
10	KVM virtual machine and database services	The Chinese people's feelings of family and country: If the country is gone, where will the family go?
11	WEB application system deployment	I will be selfless and live up to the people.

Through the integration of these ideological and political elements, the "Linux Fundamentals" course achieves an organic fusion of teaching content and values education. These elements enrich the project-based content, and by employing analogies, they not only make technical concepts easier to understand and master but also subtly instill in students the principles of political identity, professionalism, and mission responsibility. This approach ensures a unified pathway for both knowledge acquisition and value guidance, providing a foundation that avoids the rigid, didactic nature often associated with traditional ideological and political courses.

3.3. Innovation in teaching methods

Flexible teaching methods serve as a catalyst for activating ideological and political elements within courses. By adopting a student-centered learning model, designing appropriate project-based teaching carriers, and leveraging methods such as flipped classrooms and group discussions, educators can stimulate students' independent learning and creative thinking.

In practice, the course is structured into three phases: before class, during class, and after class, with corresponding teaching activities and instructional plans designed for each stage. Targeted integration points for ideological and political education are embedded throughout to ensure the effectiveness of values-oriented instruction. The alignment of teaching phases, activities, and ideological-political elements is summarized in Table 3.

Table 3. Innovative design of teaching methods for the course "Linux Basics"

Serial number	stage	Teaching Methods	Ideological and political integration points
1	Before class	Task-driven and autonomous learning	By assigning before-class tasks related to national strategies, such as "The Development History of Domestic Operating Systems", students are guided to enhance their awareness of scientific and technological self-reliance in the process of consulting materials.
2	During class	Flipped classroom and scenario simulation	Based on real cases, we design simulation scenarios, such as "Analysis of a Data Leakage Incident in a Certain Enterprise," to help students understand the importance of information security and cultivate a spirit of teamwork in the process of problem-solving.
3	After class	Project practice and reflection summary	Comprehensive practical projects are arranged in conjunction with the course content, such as "Design of Campus Network Optimization Solution Based on Linux", requiring students to apply the knowledge they have learned in practice and write reflective reports to deepen their understanding of technological ethics and social responsibility.

Innovative teaching methods not only effectively enhance students' interest and engagement in learning activities but also enable them to fully demonstrate comprehensive qualities such as professional competence, collaboration, and communication skills. For instance, during group discussions and problem-solving exercises, students can gain a deeper understanding of the significance and value of independent innovation through collaborative work. By guiding students to engage in multi-angle, multi-level, and multi-faceted discussions, they develop a sense of the overall situation and strategic thinking, achieving a deep integration of professional skills and ideological and political education. These flexible, diverse, and innovative teaching approaches ensure the effective realization of ideological and political education objectives within the course, thereby providing strong support for achieving the overarching goals of professional education.

4. Evaluation design of ideological and political education implementation in courses

4.1. Professional evaluation

Professional evaluation serves as a direct means of assessing the effectiveness of course training, measuring students' mastery of Linux system operation and maintenance knowledge. This evaluation comprises three key components: knowledge assessment, skill assessment, and innovation assessment.

In designing the evaluation content, ideological and political elements are incorporated to examine students' understanding and practical application of values-oriented principles. Multiple evaluation channels are employed, including students' pre-class preparation, classroom participation, completion of after-class assignments, skill assessments, and theoretical examinations. This comprehensive approach provides a holistic evaluation of students' learning outcomes and professional development. The specific design of the evaluation plan is presented in Table 4.

Table 4. Design of the professional evaluation scheme for the course "Linux Basics"

Serial number	Evaluation Dimensions	Evaluation indicators	Evaluation method
1	Knowledge Evaluation	The degree of understanding of the basic concepts and principles of the Linux system	Before-class preparation report, classroom questions, theory test
2	Skill-based evaluation	Practical operation and problem-solving skills	Experimental operation assessment and project practice results display
3	Innovation Evaluation	Ability to use technology to optimize and innovate in complex scenarios	Comprehensive project implementation and innovative design proposal submission

The above evaluation scheme demonstrates that knowledge-based assessment focuses on understanding principles, primarily achieved through instruction and independent study; skill-based assessment emphasizes solving practical problems, primarily through hands-on training and project-based practice; and innovation-based assessment highlights the integrated application of knowledge and abilities, primarily evaluated through the execution of complex, integrative projects. These three evaluation dimensions provide a comprehensive understanding of students' achievements in mastering course content. By combining multi-dimensional assessment data for holistic analysis, this approach not only reflects students' grasp of professional knowledge but also effectively evaluates their innovative capabilities in practical applications. Moreover, the evaluation results enable instructors to promptly adjust teaching strategies, further optimize the integration of course content with ideological and political elements, and enhance the overall quality of the course.

4.2. Behavioral Evaluation

Behavioral evaluation serves as the ultimate demonstration of the effectiveness of ideological and political education within the course. It focuses on assessing changes in students' attitudes, habits, and values throughout the learning process. Behavioral evaluation is primarily conducted through comprehensive assessments, including participation in course activities, classroom behavior observations, project outcomes review, and peer collaboration and mutual evaluation. The specific design of the behavioral evaluation plan is presented in Table 5.

Table 5. Design of behavioral evaluation scheme for the course "Linux Basics"

Serial number	Evaluation Dimensions	Evaluation indicators	Evaluation method
1	Learning attitude	Classroom participation and concentration	Classroom observation records and teacher-student interaction feedback
2	Behavioral habits	Learning ability and task completion	Quality of Before-class preparation and submission of homework
3	Values	Teamwork awareness and sense of responsibility	Group discussion performance and mutual evaluation of project collaboration

Behavioral assessments provide a deeper understanding of students' overall performance in the course, particularly regarding shifts in their ideological perspectives and behavioral patterns. By examining the implicit outcomes of students' learning and combining multi-angle evaluation data, behavioral assessments offer instructors comprehensive teaching feedback, enabling further optimization of course design and implementation strategies. This approach effectively supports the achievement of ideological and political education objectives within the course.

5. Effects of Ideological and Political Education in Courses

Since its launch on the "Xueyin Online" learning platform, the "Linux Basics" course has offered 13 online sessions across multiple majors. The course has accumulated over 5.78 million views, with more than 3,700 students enrolled and over 22,000 interactive engagements. It provides diverse ideological and political learning resources, including videos and case studies, allowing students to learn, communicate, and interact online. For example, in the Information Security Technology program at Changzhou College of Information and Technology, student completion rates on the platform exceed 95%. The cloud-based platform also enhances students' technical skills and engagement in course discussions, fostering a strong sense of achievement and positive learning outcomes. Student self-directed learning is fully supported, with 100% active campus users, and the 13th session achieved a pass rate of 94.28%, demonstrating the course's proven effectiveness in teaching practice.

6. Conclusion

Taking the "Linux Basics" course for computer science majors as a starting point, this study integrates ideological and political elements aligned with the National Cyber-Power Strategy-a crucial factor for the future of China's information industry-throughout the entire teaching process. This paper presents a comprehensive case study of ideological and political education in a computer science curriculum.

Implemented for many years as a foundational course in the Software and Big Data College and the Cyberspace Security College at Changzhou College of Information Technology, the course not only effectively imparts technical knowledge of the Linux operating system but also subtly cultivates students' patriotism, professionalism, and sense of

mission. This multi-dimensional educational model lays a solid foundation of ideology and technical capability for students' future career development.

Students majoring in Blockchain Technology and Software Technology have demonstrated outstanding skills and professionalism at the World Vocational College Skills Competition, winning consecutive gold medals and bringing honor to Jiangsu Province and the university. Graduates have successfully entered institutions such as HopeRun Software and the CETC 14th Research Institute, contributing to the national information technology innovation and defense industries, thus achieving excellent educational outcomes.

Finally, the innovative teaching methods and scientific evaluation system employed in this course provide valuable insights for other professional courses and offer a reference for how vocational talent education can better serve national strategic needs in the new era.

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