Research on Regional Vocational Education Resource Platform Based on Artificial Intelligence

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Abstract

With the continuous advancement of artificial intelligence, the digital transformation of education has entered a new stage. Vocational education, as a key force supporting regional economic development and industrial upgrading, has long faced problems such as scattered resources, insufficient school-enterprise cooperation, and limited sharing of high-quality courses and training resources. Building a regional vocational education resource platform empowered by AI can help integrate resources across schools, promote industry-education integration, and enhance the relevance and adaptability of talent training. Based on a review of domestic and international research, this paper analyzes the current needs of vocational education in platform construction, proposes AI-enabled functions such as resource integration, intelligent recommendation, and industry-education collaboration, and discusses its potential value for improving education quality and supporting regional development. The study shows that the platform will not only enhance the informatization level of vocational education but also contribute to educational equity and talent strategies for regional industrial upgrading.

Keywords

Artificial Intelligence, Vocational Education, Resource Platform, Industry-Education Integration, Regional Sharing

1. Introduction

In recent years, the application of artificial intelligence (AI) in education has been progressively deepening, evolving from early intelligent Q&A and recommendation systems to current learning behavior analysis and virtual simulation training. Its role has gradually transitioned from being an auxiliary tool to becoming a key force driving the transformation of educational models. This is especially true for fields such as Computer Network Technology, where rapid updates and high demands for experimental environments are common. AI demonstrates great potential in these fields. For example, AI algorithms can automatically identify configuration errors in network setups, build large-scale network topologies through virtualization platforms, and use intelligent analysis tools to model student experiment behaviors. These applications have proven to be feasible and valuable in practice.

At the same time, vocational education is undergoing a critical period of digital transformation. The "14th Five-Year Plan" and the "Vocational Education Quality Improvement and Excellence Action Plan (2020–2023)" both emphasize the integration of vocational education with new technologies such as AI and big data, aiming to build an open, shared, and intelligent educational resource system. However, vocational education is currently facing numerous challenges, including scattered resources, outdated curriculum content, and insufficient collaboration between schools and industries. Taking Computer Network Technology as an example, there is a significant disparity in course structures between different institutions, and experimental conditions often rely on costly physical equipment [1]. Many ordinary vocational colleges lack access to advanced teaching resources, making it difficult for students to gain adequate hands-on training. Similar issues exist in other fields such as Nursing and Automotive Repair, leading to low resource utilization and suboptimal learning experiences. Therefore, exploring the construction of a regional vocational education resource platform empowered by artificial intelligence is not only a necessary measure for the development of these disciplines but also a crucial step in promoting educational equity and regional economic upgrading.

First, the uneven distribution of vocational education resources is one of the major issues currently faced. In many regions, high-quality teaching materials and experimental setups are concentrated in a few key vocational universities, while most ordinary institutions lack access to updated resources and advanced equipment. This unequal resource distribution significantly impacts the quality of education and hinders students' practical skills development. For example, in the field of Computer Network Technology, many schools face shortages in network equipment and experimental cases, which limits the opportunities for students to practice and improve their hands-on capabilities. At the same time, due to rapidly changing industry demands, there is often a disconnect between the course content and the needs of enterprises. Students typically possess solid theoretical knowledge but lack the practical experience aligned with industry standards, making it difficult for them to adapt quickly to real-world environments.

Second, the outdated curriculum content is another pressing problem. As technology advances rapidly, especially in fields like computer network technology, new technologies and equipment emerge constantly. However, many schools

are unable to keep their course content up to date. Teachers are expected to regularly update their teaching resources, but the high cost of maintaining and upgrading hardware and software makes it difficult for many schools to provide cutting-edge experimental conditions. Many schools still rely on traditional textbooks and static teaching methods, limiting students' exposure to the latest technologies and industry trends. As a result, students are often unable to gain the hands-on experience necessary for applying their knowledge in real-world situations.

Additionally, the lack of deep collaboration between schools and industries is an important issue. Although many schools attempt to establish partnerships with enterprises, most collaborations remain superficial, with limited sharing of resources and integration of industry practices into the curriculum [2]. Enterprises, despite having large amounts of real-world cases and practical problems, are rarely involved in course design or teaching processes. Consequently, students may learn the theoretical aspects of their field but lack practical skills that are directly aligned with industry requirements, leading to a gap between the skills students acquire in school and those demanded by employers.

To address these challenges, the introduction of artificial intelligence offers a promising solution. AI technologies can support the development of integrated virtual platforms that allow students to conduct practical training in cloud-based environments, reducing the reliance on expensive physical equipment. Furthermore, AI can monitor the experimental process in real-time, identify errors automatically, and provide targeted feedback, helping students correct mistakes promptly. Additionally, AI can recommend personalized learning resources based on students' behavior and performance, enhancing learning efficiency and engagement. Through these capabilities, AI can not only address the resource shortages and practical training limitations in traditional vocational education but also promote educational equity by enabling cross-regional and cross-institutional resource sharing and optimized resource distribution.

2. Research Background and Significance

Currently, regional vocational education faces several pressing challenges. Taking Computer Network Technology as an example, the first issue is the scattered and unequal distribution of resources. High-quality teaching materials and experimental cases are primarily concentrated in a few key vocational universities, while teachers in many ordinary colleges lack up-to-date resources and experimental setups. This imbalance in resources results in uneven educational outcomes, particularly in the development of practical skills [3]. Many schools rely on traditional textbooks and hardware equipment, which cannot keep pace with the rapid advancements in the industry, thereby limiting students' practical abilities and innovative potential.

The second issue is the disconnect between course content and industry needs. As information technology rapidly advances, enterprises are increasingly in need of professionals proficient in network operations and information security. However, many students, despite having strong theoretical knowledge, show a significant gap in their practical skills, especially in areas such as router configuration and network security protection. Enterprises hope to hire professionals who can immediately contribute, but due to the lag in vocational education's curriculum and teaching methods, students often struggle to adapt quickly to the demands of the workplace, requiring companies to invest substantial time and resources in retraining.

The third issue is the lack of effective cross-school resource-sharing mechanisms. Although some schools have developed high-quality experimental scripts or virtual simulation cases, other institutions face challenges in accessing and utilizing these resources, leading to redundancy and waste. The lack of resource sharing between vocational institutions prevents high-quality educational resources from being fully utilized, further exacerbating educational inequality.

The introduction of AI can provide breakthroughs in these areas. First, AI-driven personalized recommendation mechanisms can intelligently push learning resources, such as network protocol configurations or network security cases, based on students' learning behaviors and experimental performance, thus achieving precise and differentiated learning [4]. Through this method, students can access tailored learning content, enhancing learning efficiency. Second, AI can enable real-time data collection and analysis during experiments. For instance, if a student makes an error in static routing configuration, the system can automatically detect and provide targeted feedback. During network security attack and defense experiments, AI can record attack paths and defense strategies, offering a reference for later review and learning. With such real-time feedback mechanisms, students can promptly identify and correct mistakes, mastering skills more effectively.

In terms of resource management, AI can automatically classify and semantically tag course materials, enabling cross-school and cross-region resource sharing. AI can intelligently organize and manage vast amounts of teaching resources, avoiding redundant development and improving resource utilization efficiency. At the same time, AI’s automatic classification and tagging functions allow resources from different schools to be more efficiently integrated, providing students with a richer and more efficient learning experience.

From the perspective of research significance, constructing a regional vocational education platform based on artificial intelligence will not only address the resource shortages and teaching inefficiencies in Computer Network Technology but can also be extended to other disciplines such as Nursing, Automotive Repair, and more. This will contribute to the overall enhancement of vocational education quality. In terms of education, AI will drive the informatization and intelligent transformation of vocational education, offering more flexible and personalized learning methods. In terms of

industry, AI will promote deeper collaboration between schools and enterprises, reducing the time it takes for students to adapt to job requirements and improving their professional competitiveness. In terms of regional development, AI platforms will support educational equity, promote regional economic upgrading, and facilitate the implementation of local talent strategies.

3. Research Status at Home and Abroad

Internationally, artificial intelligence has been applied in vocational education to varying extents. In computer-related majors, platforms like Coursera and edX in the US use AI algorithms to provide personalized learning paths for students in network technology courses. This allows students to receive instant feedback and resource recommendations. In Germany, the Dual Education System has incorporated intelligent simulation systems that allow students to design complex network topologies and troubleshoot issues in virtual environments, reducing dependence on expensive physical equipment. These cases demonstrate that AI can significantly enhance the learning experience and skill alignment in fields like Computer Network Technology, where practical experiments are critical.

In China, the informatization of vocational education began earlier, but the overall level remains uneven. For example, in Computer Network Technology, some leading universities have attempted to build virtual lab platforms, such as "cloud labs," which allow students to remotely configure network devices. However, most platforms are still in the stage of digital resource sharing, lacking deep AI-driven analysis and intelligent services. Similar issues exist in other fields like Nursing and Automotive Repair, where resources are primarily presented in static forms like videos and textbooks, with a lack of intelligent analysis and personalized feedback functions.

In general, both domestic and international explorations indicate that AI can play a central role not only as an auxiliary teaching tool but also in resource integration, personalized learning, and practical assessment [5]. For Computer Network Technology, where the demand for practical experimentation is high and content evolves rapidly, AI-based resource platforms are especially crucial. Therefore, building a regional vocational education resource platform based on AI for Computer Network Technology is not only a matter of urgent need but also serves as a model for extending to other majors.

4. Needs Analysis

In the construction of a regional vocational education resource platform, the needs of different stakeholders are distinct and vary. Taking the Computer Network Technology major as an example, the most urgent need from the perspective of school teachers is how to quickly update teaching resources to keep pace with the rapid evolution of network technologies. Currently, the update speed of network course content is slow, and the cost of setting up experimental environments is high. Many schools lack advanced experimental equipment, limiting the practical training conditions for students. Therefore, teachers hope that the platform can provide shared virtualized experimental environments, such as cloud-based network topology simulation systems, allowing students to complete tasks like router configuration and switch debugging without the need for expensive physical devices. At the same time, teachers expect the platform to automate the process of recording and analyzing student experiments, helping to identify common errors and provide personalized improvement suggestions.

For students, learning Computer Network Technology often involves complex command-line operations and logical configurations. They expect to gain more intuitive learning experiences through the platform. For example, when studying OSPF or BGP routing protocols, the system should be able to automatically detect configuration errors and offer correction suggestions. Additionally, when students conduct network security attack and defense experiments, the platform could generate learning portfolios, tracking their defense strategies and attack paths, thus helping students gradually build a comprehensive knowledge structure. Such AI-based personalized feedback mechanisms could significantly enhance students' learning efficiency and engagement.

From the perspective of enterprises, employers in the information and communication technology (ICT) sector often report that graduates have strong theoretical knowledge but weak practical skills, particularly in network equipment operation and information security. As a result, companies are required to provide extensive retraining after hiring. Enterprises hope to be able to intervene early in the development of curricula and laboratory setups, transforming their job skill requirements into teaching cases. For instance, companies could upload real-world network operation logs, from which AI can extract typical fault cases and convert them into training tasks for students [6]. This would allow students to familiarize themselves with the actual working environment of enterprises while still in the learning phase.

Besides Computer Network Technology, similar needs are observed across other professions. For example, in the Nursing major, students hope that the platform can provide AI-based image recognition systems to monitor procedural compliance. In the Automotive Maintenance major, students expect the platform to simulate engine assembly and fault diagnosis. These demands indicate that a regional vocational education platform must be adaptable across various disciplines while achieving a breakthrough in key fields as a starting point.

5. Platform Construction Concept

Based on the needs outlined above, the construction of a regional vocational education resource platform can initially focus on the Computer Network Technology major and gradually expand to other disciplines.

In the first stage of resource integration, the platform should prioritize building a comprehensive resource repository for Computer Network Technology. By integrating AI-based semantic analysis and automatic tagging functions, the platform can standardize and manage resources such as network configuration cases, experimental scripts, and teaching videos [7]. For example, the system can automatically recognize keywords like VLAN configuration or static routing setup, categorizing resources from different schools into a searchable database, thus avoiding redundant resource development.

The second stage involves intelligent services. Taking network experiments as an example, the platform can deploy a cloud-based virtual lab, where students can log in and conduct device configuration experiments. AI will monitor the experiment process in real-time, automatically detecting errors in command-line syntax or logic, and providing personalized feedback. For instance, when a student forgets to announce a network in OSPF, the system will automatically flag the issue and recommend related learning resources [8]. Teachers will have access to AI-generated student progress reports, which will provide a clear overview of the overall class performance and individual learning gaps. This approach not only improves teaching efficiency but also helps students develop self-correction habits in their learning process.

In the third stage, industry-education collaboration becomes central. The platform should directly integrate the network operation and security requirements of enterprises into curriculum design. For example, a telecommunications operator may provide real-world network operation cases, which can be transformed into virtual training tasks on the platform. Students will complete tasks such as fault identification and resolution within a simulated environment. AI will record the steps taken by students and score them based on enterprise standards. This not only reduces the time cost for enterprise retraining but also enhances students' employability. A similar approach can be applied to other fields such as Nursing or Automotive Repair, where enterprises can upload relevant workflows and fault cases, and AI can convert them into learning tasks, ensuring the alignment of educational content with industry needs.

Regarding operational mechanisms, it is recommended that governments establish standards for data security and resource management, with joint participation from schools and enterprises in platform content development. Schools and enterprises that actively upload high-quality resources can be incentivized through a points-based system or recognition mechanisms. For example, enterprises that upload high-quality network security case studies could be granted priority recruitment rights or preferential treatment in industry-school cooperation.

6. Potential Value and Expected Outcomes

Using Computer Network Technology as the entry point, the platform's construction can initially address several critical challenges in vocational education, such as "outdated course content, limited experimental facilities, and inefficient practical assessments." By leveraging AI-powered intelligent experimental environments, the platform can provide students with opportunities to complete complex network topology configurations and device setups without the need for expensive physical equipment. For example, students can build and test real-world network environments in virtual labs, simulating scenarios that would otherwise require costly and space-consuming hardware. This transition to virtual environments not only reduces the financial burden on institutions but also allows for greater scalability, as more students can access the resources simultaneously.Moreover, AI can monitor the experimental process in real-time, detecting errors and offering instant feedback to students. This personalized feedback mechanism enables students to correct their mistakes immediately, enhancing their learning experience and ensuring that they master skills in a timely manner. Teachers will benefit from AI-driven data analytics, which will provide insights into student performance, identify areas of weakness, and optimize teaching methods accordingly. This shift towards data-driven decision-making will enhance the precision and effectiveness of instruction, ultimately improving overall teaching quality.

Beyond the technical aspects, a key strength of this platform is its alignment with real-world enterprise environments. By integrating industry-relevant scenarios and challenges into the curriculum, students can gain exposure to the operational standards, security protocols, and best practices used in businesses today. For example, in network security courses, students could work on real-life cybersecurity attack simulations and defense strategies. This hands-on approach ensures that students are well-prepared for the workforce and are familiar with the tools and processes they will encounter in their future jobs. Such alignment with industry needs eliminates the "transition period" that many graduates experience after entering the job market, as students already have the necessary practical experience before they graduate.

The successful application of this model can be extended to a wide range of fields beyond Computer Network Technology. For instance, in Nursing, AI can be used to simulate medical procedures and ensure that students perform tasks such as patient care, medication administration, and emergency response protocols correctly. By using AI-driven simulations, nursing students can practice skills without the need for live patients, providing a safe environment to refine their techniques before applying them in clinical settings. Similarly, in Automotive Maintenance, students can use AI to diagnose engine faults in a virtual environment, simulating real-world repair scenarios. Through AI-enhanced simulations, students can troubleshoot complex issues, perform diagnostics, and test various repair solutions, all within a risk-free virtual space. Furthermore, in Mechatronics, AI can be used to model and control automated machinery, allowing students to design and optimize systems that integrate mechanical, electrical, and computer engineering principles.These examples highlight the broader impact of the regional vocational education platform. The value of the

platform extends beyond a single discipline, offering the potential to transform multiple fields of vocational education, including healthcare, automotive, and engineering. By incorporating AI into these disciplines, the platform addresses the diverse needs of students, teachers, and industries, making it an invaluable resource for the entire educational ecosystem.

From an educational perspective, the platform will significantly enhance the digitalization and informatization of vocational education. It will bridge the resource gap between institutions of varying sizes and financial capabilities, allowing schools with fewer resources to provide high-quality education through shared virtual platforms. This democratization of education will help reduce disparities in learning outcomes between schools, ensuring that all students, regardless of their geographical location or institutional affiliation, have access to the same high-quality learning experiences [9]. Additionally, the platform will promote personalized learning, tailoring educational content to individual students' needs and learning paces, which will improve student engagement and retention rates.

From an industry perspective, the platform will enable faster and more efficient connections between enterprises and educational institutions. By aligning the training content with real-world industry standards, the platform will ensure that students acquire the skills that employers are actively seeking, reducing the need for post-graduation retraining. This alignment will also allow businesses to directly influence the curriculum, ensuring that the training programs reflect the latest trends and innovations in the industry. Such collaboration will lead to a more skilled workforce, capable of meeting the ever-evolving demands of the job market.

From a social perspective, the widespread adoption of the platform will contribute to greater educational equity by providing high-quality learning opportunities to underserved regions and institutions. It will also support regional economic development by creating a skilled workforce that meets the needs of local industries. As industries adopt more advanced technologies, such as AI and automation, the platform will enable students to stay ahead of technological trends, contributing to the overall economic growth and modernization of industries within the region. Moreover, the integration of AI-driven education will support industrial upgrading by ensuring that workers are equipped with the skills needed to thrive in an increasingly digital economy.

Ultimately, the platform will not only serve as an educational tool but will also act as a strategic support system for regional talent ecosystems. By facilitating collaboration between educational institutions, industries, and government entities, the platform will contribute to sustainable development in both education and industry. It will create a continuous loop of innovation and skill development, enabling regions to adapt to changing economic conditions and technological advancements. In this way, the platform will play a critical role in shaping the future of vocational education, ensuring that it remains relevant, accessible, and aligned with the needs of both students and industries.

7. Conclusion and Prospect

In conclusion, constructing an AI-based regional vocational education resource platform is not only a necessary step toward high-quality vocational education but also a strategic initiative to align education with rapidly evolving industry demands. The introduction of artificial intelligence offers significant advantages in resource integration, personalized learning, and industry-education collaboration. AI can bridge the gaps created by fragmented educational resources, enabling cross-institution and cross-regional sharing of high-quality teaching materials, training modules, and real-world case studies. Furthermore, AI-powered intelligent recommendation systems ensure that learning is tailored to individual student needs, enhancing both engagement and learning outcomes.This paper presents a conceptual framework for the development of such a platform, based on initial research and analysis of existing challenges in vocational education. However, the detailed implementation of the platform requires further pilot projects to validate the feasibility of the proposed approach. These pilot projects should focus on refining the AI algorithms for resource categorization, improving the accuracy of personalized recommendations, and testing the effectiveness of virtual labs in providing realistic hands-on experiences. The collaborative nature of this platform — involving close partnerships between academic institutions, industries, and technology providers — will also need continuous feedback loops to ensure that the platform meets both educational and industry needs.

Looking ahead, the expansion of the platform should not be limited to a single major or region. The success of the Computer Network Technology major can serve as a foundation for broader application across various vocational fields, such as Nursing, Automotive Maintenance, and Mechatronics. Each industry sector will bring its unique requirements to the platform, allowing AI to adapt to the specific needs of different fields. For example, in Nursing, AI could be used to simulate patient interactions or monitor procedural accuracy; in Automotive Maintenance, it could assist in diagnosing complex vehicle issues through AI-driven diagnostics.

The long-term vision for this platform is to create a scalable and adaptable solution that can be replicated in different regions and applied across various industries. As technological advancements in AI continue, the platform's capabilities will expand, integrating new AI technologies such as machine learning, natural language processing, and computer vision to provide even more accurate feedback and more immersive learning experiences. Additionally, the platform could integrate emerging technologies like Augmented Reality (AR) and Virtual Reality (VR), offering a truly immersive training environment where students can interact with simulated real-world scenarios.

Ultimately, this AI-powered vocational education platform will play a critical role in shaping the future of education and

workforce development. It will not only enhance the quality of vocational education by providing students with highly relevant, industry-aligned training but also help enterprises address the growing demand for skilled workers in a rapidly changing economy. By fostering collaboration between educational institutions, industry partners, and technology developers, this platform has the potential to become a model for education reform, setting the foundation for future digital learning ecosystems that are responsive, adaptive, and sustainable.

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