Construction and Practice of Internationalized Vocational Education Innovation Platform in the Internet Plus Era

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Abstract. In the face of new requirements for the development of vocational and technical disciplines in the Internet Plus era, this paper proposes the promotion of teaching reform through the construction of an internationalized professional innovation practice platform. The paper first analyzes the new challenges posed by the Internet Plus to vocational and technical disciplines, as well as the current lack of internationalization. Then, based on industry development trends, it proposes the positioning of applied and composite talent cultivation. On this basis, innovative approaches are designed for curriculum content, teaching methods, and faculty. Simultaneously, a practice platform integrating virtual simulation and school-enterprise cooperation is established. Through investigation, analysis, and optimization strategies, the platform's performance is further improved. The study shows that the construction of a professional innovation platform can drive reform in vocational and technical disciplines and cultivate high-quality technical talent. This paper provides reference for the development of vocational and technical education in China, enhancing the employability of graduates in technical and engineering fields.

Keywords: Internet Plus; vocational education; innovation practice platform; internationalization

1. Introduction

In the era of "Internet+", vocational education in China, especially in STEM (Science, Technology, Engineering, and Mathematics) fields, faces the dual challenges of outdated teaching content and low internationalization. This research aims to establish an internationalized platform for innovative practices in vocational STEM education, with the goal of fundamentally reforming program development and teaching methods to keep pace with the times. By conducting a thorough analysis of the development needs of STEM disciplines in the new era, this study will formulate multidimensional reform measures that align with the "Internet+" trend, including curriculum systems, teaching methods, and faculty development. Additionally, it will explore the construction of virtual simulation platforms in collaboration with industry partners to promote the integration of education and industry. This initiative aims to cultivate applied and versatile talents who can meet the future demands of society and provide a strategic framework for vocational STEM education reform in China.

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2. Analysis of the Development of Technical and Engineering Disciplines in the Internet Plus Era

2.1 Analysis of the Impact of Internet Plus on Technical and Engineering Disciplines

The "Internet+" era demands that vocational STEM programs keep pace with the rapid development of information technology, update teaching content, and strengthen practical applications of technology. New educational tools such as virtual simulations and remote laboratories have become crucial, introducing new dimensions to education. These tools not only enhance the learning experience but also provide convenience for educational practices, enabling students to engage in practical operations in virtual environments. Consequently, new talent development requirements emerge: students must possess interdisciplinary technical skills such as data analysis, automation control, and system integration to meet the needs of digital transformation industries [1].

2.2 The Need for Internationalization in Vocational and Technical Discipline Development

Despite the irreversible trend of globalization, the internationalization level of vocational STEM education in China has not yet reached the desired standard. This situation highlights the urgent need for internationalization, including improving the compatibility and advancement of curriculum systems and teaching content. Specifically, there is a need to increase the proportion of English-taught courses, strengthen the construction of an international faculty team, and support international exchanges and internships for students to prepare graduates for cross-cultural work environments and provide them with international perspectives [2].

2.3 Positioning the Training of Technical and Engineering Talents for the Future

Based on the demands of industry upgrading and technological progress for talent, vocational STEM programs should focus on cultivating applied and versatile skill-based talents. This entails keeping program offerings up to date, such as incorporating emerging fields like information technology and artificial intelligence, designing interdisciplinary curricula that include data analysis and systems design, innovating teaching methods using project-driven and case-based approaches, and developing faculty with "dual-qualified" backgrounds in both industry and teaching to ensure graduates can adapt to rapidly changing social and economic environments [3].

2.4 Data Analysis and Model Development

In this study, to gain insight into the future development trends and talent demands of engineering and technical specialties in higher vocational education over the next five years, researchers collected and analyzed data from the past five years. Initially, data preprocessing and descriptive statistical analysis were conducted to understand the current state of the number of engineering specialties and the employment industries of their graduates. Then, researchers used a linear regression model to predict future development trends. The linear regression model is a predictive model that assumes a linear relationship between the independent variable (in this case, the year) and the dependent variable (the number of engineering specialties). It estimates future values by constructing a linear equation. The form of this model is typically:

$$y = ax + b \tag{1}$$

where a is the slope, representing the annual growth rate of the number of specialties, and b is the intercept, representing the predicted number of specialties when the year is zero. During the model fitting process, the coefficient of determination $R^2$is used to measure the effectiveness of the model's predictions. The closer this value is to 1, the more the model can explain the variation between variables. In this study, the coefficient of determination is 0.896, indicating that the model predicts well. According to this model, it is predicted that by 2025, the number of higher vocational engineering specialties in China will reach 360. Such predictions provide data support for professional construction and talent training and offer a basis for predictive decision-making for policymakers[4-5].

3. Innovation Practice Platform Construction Goals and Strategies

3.1 Construction Goals

The overall goal of establishing an internationalized vocational STEM (Science, Technology, Engineering, and Mathematics) innovation practice platform is to create an open and collaborative ecosystem for practical teaching, closely integrating academia and industry. This will be achieved by promoting industry-academic collaboration, fostering partnerships between educational institutions and enterprises, and establishing a dynamically updated teaching resource repository. The objectives also include creating an online virtual simulation training environment, advancing project-based teaching reforms, and making this the core of talent development to meet the demands of industrial upgrading and cultivate high-quality skill-based talents[6].

3.2 Construction Strategies

Regarding specific design considerations, the following modifications can enhance the content's comprehensiveness:

(1) Optimization of Program Offerings: Adjust the program structure to include emerging fields such as data science, artificial intelligence, and robotics. Introduce comprehensive applied programs that incorporate information technology to enhance students' interdisciplinary skills.

(2) Innovation in Course Content: Strengthen practical applications such as case analysis and project development, aligning course content closely with industry practices. Integrate engineering training, emphasizing practical application to enhance students' hands-on skills.

(3) Reformation of Teaching Methods: Promote project-based teaching methods, situational simulation, etc., teaching theoretical knowledge directly through practical projects to ensure students can learn in real or simulated work environments. Adopt a blended learning approach, combining online and offline resources to provide personalized learning paths.

(4) Construction of Online Virtual Simulation Platforms: Develop a digital training platform that integrates virtual simulation, remote control, and process replication capabilities. Expand students' practical teaching channels by simulating real work environments, enhancing the interactivity and effectiveness of remote learning.

(5) Faculty Development: Optimize the faculty team structure by introducing dual-qualified teachers with industry experience. Emphasize continuous professional development for teachers and training in teaching methods to ensure teaching quality aligns with industry demands.

Through these specific construction paths and design considerations, the aim is to comprehensively improve teaching quality and cultivate highly skilled technical talents better suited to meet industry demands[7]. As shown in Figure 1.

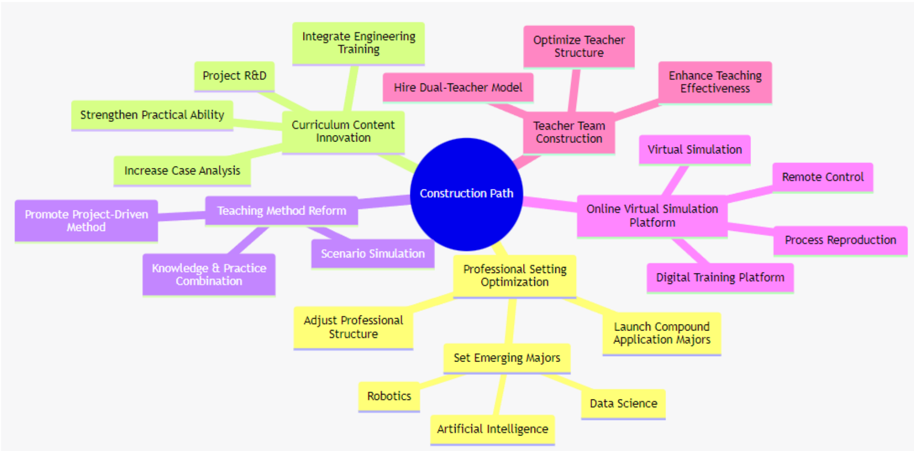

Figure 1: Construction Pathway

4. Issues and Countermeasures

4.1 User Experience Feedback Analysis

In the construction of a virtual simulation training platform based on industry-academic collaboration, we prioritize students' practical operational experience. Regarding user experience feedback on the platform, data was collected from 100 students, focusing on key indicators such as user-friendly interface, smooth operation, and simulation realism. Feedback indicated that although the platform provided students with an advanced technical environment, the realism of the simulations received a relatively low score, averaging 72 points, suggesting that students perceived a gap between virtual and real-world operations. Additionally, there was feedback on inconvenience in platform interface operation[8].

4.2 Countermeasures and Recommendations

To address these issues and enhance the effectiveness of the training platform, we propose the following countermeasures: (1) Hardware and Software Upgrades: Collaborate with enterprises to update our simulation equipment, utilizing advanced physics engines and rendering technologies to enhance the realism and immersive experience of simulations. (2) Interface Optimization: Improve interface design by analyzing user operation habits data and applying principles of human-computer interaction design to align with engineering practical operation habits. (3) Strengthening Technical Means: Broadly apply virtual simulation and remote control technologies, building on industry-academic collaboration, to further enhance students' practical operational skills and engineering thinking through technical means. (4) Real-time Feedback Mechanism: Establish a responsive online feedback system, utilizing big data analysis to promptly collect user feedback and iteratively optimize, continuously improving platform performance and teaching effectiveness. Through these strategies, we aim to continuously optimize the training platform, ensuring its teaching effectiveness meets the needs of STEM students and remains aligned with actual job requirements[9]. As shown in Table 1.

Table 1. Analysis of User Feedback and Countermeasures

Countermeasures and suggestions	Concrete measures
Upgrade virtual simulation software and hardware	More advanced physical rendering techniques are used to improve the fidelity and immersion of the simulation.
Collect user operation habits data	Adopt human-computer interaction optimization algorithm to continuously iterate and optimize the interface operation process to improve user experience.
Establish an online feedback channel	Use big data analysis tools to proactively collect user experience and respond to optimization needs in a timely manner.

5. Conclusion

This research, guided by the development needs of STEM disciplines, demonstrates the effectiveness of constructing an internationalized vocational STEM innovation practice platform. Through optimization of program offerings, practical course content, innovative teaching methods, and strengthening of the faculty team, the platform has effectively promoted educational reform, accelerated the cultivation of applied skill-based talents, and significantly enhanced students' practical skills and competitiveness in the job market. The implementation of digital internships, such as virtual simulations, has further solidified students' professional skills and problem-solving abilities. As a result, this platform plays a critical role in improving educational quality and meeting the talent demands of industrial upgrading[10].

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