Article

Vocational Education Reform and Innovation: Implementation Path and Challenges of the 1+X Certificate System

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Abstract: Against the backdrop of rapid globalization and continuous technological innovation, the comprehensive reform of vocational education has become crucial to significantly enhancing national competitiveness. The 1+X certificate system, serving as a major strategic initiative in China's vocational education, fundamentally strengthens its typological characteristics. It creates a new type of vocational skill level certificate, actively promotes the deep integration of industry and education, and substantially deepens teaching methodologies. At present, the pilot work of the 1+X certificate system has advanced comprehensively across various institutions. However, during this pilot implementation phase, several critical problems still exist. These include the insufficient practical value and social recognition of the certificates, the urgent need for further strengthening the cultivation and strict supervision of social training organizations, and the necessity for deepening the "three-education" reform in pilot colleges. In subsequent work, concerted efforts should be intensified to pool advantageous resources, enhance the intrinsic value of the "X" certificate, standardize the operational behavior of evaluation organizations, and deepen institutional reforms. This will ultimately improve the overall quality of China's vocational education. The 1+X certificate system aims to cultivate high-quality technical talents with comprehensive professional skills by seamlessly integrating academic education with vocational certification. This paper deeply explores the implementation path of the 1+X certificate system, analyzes the multifaceted challenges it faces, and proposes corresponding countermeasures, providing useful references for future vocational education reform.

Keywords: vocational education; skill certification; educational reform; policy implementation; educational challenges

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1. Introduction

In 2019, the National Vocational Education Reform Implementation Plan was introduced, outlining the establishment of a system combining academic certificates with multiple vocational skill level certificates, commonly referred to as the '1+X certificate' system. In this framework, "1" signifies the academic certificate, while "X" represents various vocational skill level certificates. This initiative encourages vocational college students to actively pursue diverse vocational skill certifications alongside their academic qualifications. The plan also emphasized the importance of accelerating the development of modern vocational education and fostering the interconnection and mutual recognition of academic and vocational certifications. The Ministry of Education defined the scope of the "1+X certificates" to encompass professional knowledge, vocational literacy, and practical skill operations. As a crucial pathway for cultivating technical and skilled talents, the reform and innovation of vocational education have become integral to the national strategy. The "1+X certificate" system represents a novel model of vocational education, garnering significant attention for its potential to enhance workforce readiness. This paper aims to delve into the implementation strategies of the "1+X certificate" system, examine the challenges it encounters, and propose effective countermeasures to address these

issues, thereby contributing to the broader discourse on vocational education reform and its role in national development.

2. The Connotation and Value of the 1+X Certificate System

2.1. The "1+X Certificate System" Promotes Deep Integration of Schools and Enterprises and School-Enterprise "Dual" Talent Cultivation

Against the backdrop of the digital economy and technological innovation, industrial transformation and upgrading have generated an increasing demand for technical and skilled talents, presenting significant challenges for vocational education to meet these demands. The 1+X certificate system emerged as a response to these challenges. By encouraging vocational colleges to actively engage in the development of socialization mechanisms and fostering a seamless connection between vocational qualification certificates and skill certificates, this system effectively bridges the gap between vocational education and industry requirements. Specifically, the 1+X certificate system mandates that students acquire multiple vocational skill level certificates alongside their academic education [1–3]. This dual-certificate model not only enhances students' competitiveness in the job market but also aligns school education more closely with market needs. Through comprehensive collaboration with enterprises, schools can promptly update their course content, integrating the latest technological standards and industry trends into their curricula. This approach cultivates versatile technical and skilled talents who are well-prepared to meet societal demands. Moreover, the 1+X certificate system significantly enhances the practical orientation of vocational education. Schools can refine their teaching content based on real-time industry needs, enabling students to acquire critical market-relevant skills more effectively. This system provides students with increased practical training opportunities, fostering a "dual" talent cultivation model that integrates schools and enterprises. Such integration breaks down barriers between education and industry, facilitating mutual enhancement of the educational framework and economic development [4, 5]. By promoting this deep collaboration, the 1+X certificate system underscores the practical value of vocational education, ensuring that it remains a vital contributor to societal and economic progress.

2.2. The "1+X Certificate System" Creates a Unique Talent Training Model for Vocational Education in China

The 1+X certificate system integrates successful international frameworks, such as the German "dual system" and the Australian TAFE, with China's specific conditions to create an innovative parallel model that combines academic certificates with vocational skill level certifications. This approach significantly enhances the integration of industry and education, fostering school-enterprise cooperation and revitalizing vocational education in China. By blending academic education with vocational skill certifications, students gain both high academic recognition and market-relevant qualifications, equipping them with practical skills and comprehensive abilities that improve their employability and adaptability to market demands [6, 7]. This model addresses the limitations of traditional vocational education, which often prioritizes academic qualifications over practical skills, by emphasizing hands-on operational capabilities and holistic development. Furthermore, the 1+X certificate system strengthens the collaboration between vocational colleges and industries, ensuring a deeper integration of educational and industrial resources. This alignment makes vocational education more responsive to societal needs and facilitates a seamless connection between educational outcomes and economic development. The system ultimately bridges the gap between education and the workforce, ensuring that students are better prepared to meet the evolving demands of the labor market while contributing to sustainable economic growth.

2.3. The "1+X Certificate System" Promotes an Industry-Education-Research Vertically Integrated Education Ecosystem Chain

The 1+X certificate system serves as a pivotal mechanism for fostering deeper integration between education and industry, while simultaneously advancing the vertical integration of the education ecosystem chain. This system encourages closer collaboration among educational institutions, industries, enterprises, and other societal forces, thereby creating a synergistic environment for vocational education. By actively involving social forces, the system drives comprehensive reforms in teaching personnel, instructional materials, and pedagogical approaches, ultimately enhancing the overall structure and efficiency of the education ecosystem. Higher vocational colleges implementing this system can partner with enterprises to co-develop curriculum content that aligns with industry standards. This collaboration ensures that teaching methodologies and directions are continuously refined to meet the evolving demands of industrial development, thereby maintaining synchronization between educational content and industrial advancements. Enterprises, under this model, transcend their traditional role as mere employers of graduates to become active contributors to educational content and standard-setting processes [8, 9]. This dual role significantly elevates the quality of education provided by higher vocational colleges. Furthermore, the system facilitates resource sharing and leverages complementary strengths, effectively integrating industry, education, and research. This integration not only guarantees the quality of vocational education but also cultivates a substantial pool of highly skilled talents tailored to meet the dynamic needs of the market and society.

3. Implementation Path of the 1+X Certificate System

3.1. The Talent Training Model of "Five Subjects, Four Links, and Six Tasks"

In the implementation path of the 1+X certificate system, the talent training model of "five subjects, four links, and six tasks" is utilized to establish a robust connection between educational practices and industry requirements, thereby fostering sustainable improvements in talent cultivation quality. The five subjects encompass the government, schools, enterprises, industry associations, and society, each playing a pivotal role in the system's success. The government provides essential policy frameworks and regulatory support, ensuring the system's alignment with national development goals. Schools focus on curriculum design and the execution of teaching methodologies, while enterprises contribute practical platforms and insights into industry-specific demands. Industry associations and social organizations offer directional guidance, ensuring the system remains relevant and adaptable to evolving market conditions. The four links—education and teaching, practical operation, evaluation and feedback, and continuous improvement—serve as critical stages in the talent cultivation process. These links ensure that students not only acquire theoretical knowledge but also develop practical skills, adaptability to market dynamics, and employability, creating a continuous cycle of enhancement. The six tasks, which include aligning industry demands with educational programs, integrating vocational standards into curricula, and merging teaching with production processes, drive innovation in educational models and course content. These tasks aim to cultivate students' comprehensive qualities, ensuring that the talent produced aligns closely with market needs. By systematically addressing these aspects, the 1+X certificate system achieves a high degree of synchronization between education and industry, fostering a workforce equipped to meet contemporary challenges [10, 11].

3.2. Implementing the Concepts of Industry-Education Integration and "Three-All Education"

During the implementation of the 1+X certificate system, the principles of industry-education integration and "Three-All Education" are thoroughly applied to enhance vocational education. By fostering close collaboration with industry enterprises, vocational colleges can swiftly incorporate industrial technical requirements into their curricula, ensuring that both course content and teaching methodologies align with the evolving demands of the industrial sector. Enterprises not only serve as internship bases for students but also provide practical case studies and insights into industry development trends, enabling students to acquire skills that remain relevant in a dynamic

professional landscape. Additionally, the 1+X certificate system fully integrates the "Three-All Education" framework, which encompasses all-member education, whole-process education, and all-round education. All-member education highlights the active involvement of both teachers and students in cultivating highly skilled technical professionals. Whole-process education ensures that ideological and political education, skill development, and practical ability training are seamlessly embedded throughout the educational journey. All-round education emphasizes the holistic enhancement of students' moral, intellectual, physical, aesthetic, and labor qualities. By harmonizing these three dimensions, the 1+X certificate system not only strengthens students' vocational competencies but also prioritizes their comprehensive personal development, ultimately boosting their competitiveness in the job market and preparing them for multifaceted career challenges.

3.3. Typical Case Analysis and Effect Evaluation

In the process of promoting the 1+X certificate system, the analysis of typical cases and effect evaluation play a significant role. By conducting in-depth analyses of cases where the 1+X certificate system has been implemented across various colleges and regions, both successful experiences and challenges encountered during implementation can be identified. For instance, some schools have achieved notable success by strengthening school-enterprise cooperation, effectively aligning industry demands with educational content. This alignment has led to updated course materials and improved student employment rates. Conversely, other schools have faced challenges due to insufficient alignment with industry needs, resulting in a mismatch between the skills students acquire and the demands of the job market. To address these issues, establishing a comprehensive effect evaluation system is essential. Such a system enables the timely identification of problems, allowing for the adjustment of educational strategies to ensure that the technical and skilled talents cultivated meet industry requirements [9, 12]. This process not only enhances the value and social recognition of the certificates but also provides critical feedback for schools to refine their teaching content and methodologies. Ultimately, this continuous improvement contributes to higher educational quality and better employment competitiveness for students, thereby facilitating the nationwide promotion and optimization of the 1+X certificate system.

4. Challenges Facing the 1+X Certificate System

4.1. Inconsistent Training Quality and Standards

One of the primary challenges facing the 1+X certificate system during implementation is the inconsistency of training quality and standards. Vocational skill training spans a diverse range of industries, and significant disparities exist among regions and institutions in terms of course content, teaching methodologies, faculty expertise, infrastructure, and practical training opportunities. These variations result in uneven training quality, which subsequently impacts the perceived value and social acceptance of the certificates. In certain regions and institutions, the absence of unified training standards and robust regulatory mechanisms has led to some training organizations failing to adhere to standardized teaching requirements. This inconsistency creates a notable gap between the skill levels of students and the actual demands of industries, thereby hindering graduates' career prospects. Particularly in industries with stringent technical requirements, the lack of standardized and systematic training can place students at a competitive disadvantage in the job market. Addressing these issues necessitates the establishment of comprehensive and unified training standards, a rigorous evaluation framework, and an effective regulatory mechanism. These measures are essential to ensure that the quality of education and training provided by institutions aligns with the evolving needs of industries and enterprises [13]. By achieving this alignment, the 1+X certificate system can better support students' career development and enhance its overall credibility and effectiveness.

4.2. Insufficient Depth and Breadth of School-Enterprise Cooperation

The central role of school-enterprise cooperation within the 1+X certificate system is undeniable, yet its current implementation often lacks sufficient depth and breadth. While some schools have formed partnerships with enterprises to provide internships and employment recommendations, these collaborations are predominantly limited to the employment phase. This narrow focus results in minimal enterprise involvement in critical areas such as curriculum design, textbook development, and teaching plan formulation. Consequently, a significant disconnect arises between the educational content delivered by schools and the evolving technological advancements and industrial requirements. Furthermore, as industries continuously update their technologies and standards, schools that fail to revise their teaching materials and practical training projects in a timely manner risk exacerbating the skills gap between graduates and industry needs. To address these challenges and enhance the effectiveness of the 1+X certificate system, it is imperative to deepen school-enterprise cooperation. This involves not only sharing resources but also fostering joint efforts in curriculum reform, innovative teaching methodologies, and the establishment of advanced practice bases. Such comprehensive collaboration would ensure that educational programs are closely aligned with industrial demands, thereby equipping students with the skills and knowledge necessary to thrive in a rapidly changing professional landscape.

4.3. Students' Employment Competitiveness Needs Improvement

Although the 1+X certificate system equips students with multiple vocational skill certifications, many graduates still encounter significant employment challenges [14, 15]. This issue primarily stems from the misalignment between vocational college training programs and the evolving demands of the job market. The skills imparted to students often fail to match the specific requirements of enterprises, particularly in emerging industries and advanced technological sectors. In these fields, the curriculum content frequently lags behind industry advancements, resulting in a gap between academic training and cutting-edge practices. Additionally, students often lack adequate practical experience. While theoretical courses provide foundational knowledge, insufficient hands-on training leaves many graduates unprepared to adapt quickly to workplace environments, limiting their operational proficiency. Consequently, despite holding 1+X certificates, their employment competitiveness remains constrained. To address these challenges, vocational colleges must prioritize stronger collaboration with industries, refine curriculum design to reflect current market trends, and integrate more practical components into their programs. Ensuring students gain substantial hands-on experience before graduation is essential for enhancing their adaptability and readiness for the workforce. Furthermore, institutions should offer comprehensive employment guidance and expand internship opportunities to help students better understand industry expectations and improve their competitiveness in the job market. These measures are critical for bridging the gap between education and employment demands.

5. Countermeasures and Suggestions to Address the Challenges

5.1. Strengthening Training Quality Supervision

To address the problem of uneven training quality, the government should enhance the supervision of vocational skill training by establishing a comprehensive and robust training quality supervision system. Nationwide unified training standards and evaluation systems are essential to ensure consistency in training quality across various regions and institutions. This includes conducting rigorous qualification audits of training organizations to verify their teaching capabilities, faculty strength, and facilities. Such measures can prevent issues like arbitrary fees and the indiscriminate issuance of certificates. Additionally, it is crucial to strengthen the supervision of the training process to ensure that course content and teaching methods align closely with industry demands. This approach can help eliminate fraudulent training practices and low-quality education [10, 16]. Institutionalized quality supervision can significantly enhance the value and social recognition of certificates, thereby improving the authority and attractiveness of the

1+X certificate system. By doing so, the overall effectiveness and level of the vocational education system can be elevated, ensuring that it meets the evolving needs of the labor market and contributes to sustainable economic development.

5.2. Deepening School-Enterprise Cooperation

School-enterprise cooperation plays a pivotal role in ensuring the effective implementation of the 1+X certificate system. Schools must proactively establish enduring and robust partnerships with prominent enterprises within the industry, fostering a seamless integration between educational institutions and businesses. Enterprises, in turn, should actively contribute by offering practical platforms for experiential learning and engaging in curriculum development, teaching material creation, and the establishment of technical standards [17]. This collaboration ensures that educational content remains aligned with the evolving trends and demands of industrial development. By maintaining close ties with enterprises, schools can access cutting-edge information on technological advancements and industry requirements, enabling them to refine curriculum structures and enhance the quality of education and training. Additionally, the cooperation should emphasize resource optimization: enterprises can provide state-of-the-art equipment and realistic practical environments, while schools can nurture highly skilled professionals tailored to meet enterprise needs. This synergy ensures precise alignment between educational outcomes and industry expectations, significantly improving students' employability and adaptability to workplace environments, thereby fostering a workforce that is well-equipped to meet contemporary industrial challenges.

5.3. Enhancing Students' Employment Competitiveness

Enhancing students' employment competitiveness is a fundamental goal of the 1+X certificate system. Schools should intensify their efforts in providing comprehensive career guidance and employment services to help students gain a deeper understanding of market demands and employment trends, enabling them to define clear career development paths. Beyond theoretical learning in classrooms, schools must prioritize the cultivation of students' practical skills. By implementing initiatives such as post internships and order-based training programs, schools can offer students valuable hands-on experiences in real-world work environments. These opportunities allow students to build practical expertise and develop problem-solving abilities essential for workplace success. Furthermore, schools should actively collaborate with enterprises to conduct vocational skill training programs tailored to market needs. This ensures that students acquire the practical competencies required by employers, thereby enhancing their employability and aligning with the principle of "learning for application." Additionally, schools should provide career guidance that spans multiple industries, equipping students with insights into the skill requirements and growth prospects of various vocational fields. This approach supports students in making informed career plans [17]. Through these measures, schools can facilitate a seamless transition for students into the workforce, reduce employment pressures, expand career opportunities, and improve students' overall adaptability and competitiveness in the job market.

6. Conclusion and Outlook

As an important initiative in the reform and innovation of vocational education, the 1+X certificate system holds profound significance for improving the quality of vocational education in China and cultivating high-quality technical and skilled talents. By integrating academic certificates with multiple vocational skill level certificates, the 1+X certificate system not only enhances students' comprehensive qualities and vocational skill levels but also aligns more effectively with the industry's demand for highly skilled professionals. Despite its promising framework, the system encounters several challenges during implementation, including inconsistent training quality, insufficient depth in school-enterprise collaboration, and limited student employment competitiveness. Addressing these issues requires coordinated efforts from the government, educational institutions, enterprises, and other stakeholders. Key measures include establishing a

robust quality supervision mechanism, fostering deeper and more meaningful school-enterprise partnerships, and prioritizing the development of students' practical abilities to ensure the system's successful execution. Furthermore, as vocational education reform continues to evolve, the 1+X certificate system is expected to lay a stronger foundation for the advancement of China's vocational education landscape, contributing to the cultivation of a workforce equipped to meet diverse societal needs. Looking forward, the system must adapt to the increasingly diversified and individualized demands for technical and skilled talents driven by emerging industries. Continuous optimization and innovation of the system will be essential to ensure its relevance and effectiveness, ultimately providing a sustainable pipeline of talent to support economic growth and societal progress in the long term.

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