

# The Modern Apprenticeship Model under the "1+X" Certificate System: an Innovative Path to Cultivate Highly Skilled Talents

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**Abstract:** The paper introduces the background, implementation path, and core elements of the "1+X" certificate system and the modern apprenticeship policy. Based on the exploration, it summarizes their common goals. Both the "1+X" certificate system and the modern apprenticeship policy are important measures to cultivate high-quality and high-skilled talents, ultimately achieving the same goal through different paths. Furthermore, the limitations of the modern apprenticeship policy are pointed out, and the "1+X" certificate system is an important supplement to it. Finally, a proposal is put forward for the deep integration of the two systems to jointly promote the improvement of talent quality.

## 1. Introduction

The emergence of modern apprenticeship policy and the "1+X" certificate system stems from China's reform and innovation of talent training models. They are important measures to address the structural mismatch between talent demand and existing talent supply<sup>[1,2]</sup>.

With the application of modern information technology, knowledge is growing exponentially, science and technology are advancing rapidly, and skills are constantly being updated and iterated. Traditional vocational education cannot meet the needs of enterprises for talent in terms of knowledge or skills, which has led to certain employment difficulties for many graduates in the job market. In 2018, China began to implement the modern apprenticeship policy to promote the connection between vocational education and practical work experience, in 2019, the "1+X" certificate system was introduced to address the integration of vocational education and general higher education. The goal is to achieve the integration of schools and industries, majors and positions, and courses and advanced technologies, in order to deepen the "integration of production and education" and cultivate high-quality and high-skilled talents that are more in line with market demands.<sup>[3][4]</sup>

### 1.1. Background Introduction

1) The talent demand: China is currently in a crucial period of industrial upgrading, with an urgent need for skilled talents. A group of highly skilled vocational and technical talents with certain scientific and cultural literacy, good humanistic quality, professional ethics, and innovative consciousness are urgently needed. However, traditional education models and vocational training mechanisms can no longer meet these demands, leading to an exacerbation of the talent supply-demand contradiction.

2) The intense international competition pressure: China is undergoing a transformation from a manufacturing power to a manufacturing powerhouse, facing foreign technological blockades and market exclusions. The international competition it faces is exceptionally fierce. To establish an unbeatable position in the global market, China urgently needs batches of highly qualified and skilled talents. The modern apprenticeship system and the 1+X certificate system are strategies introduced to better cultivate talent to meet market demands.

3) The Policy support: The country attaches great importance to talent development and has introduced a series of policy documents over the years. For example, in 2019, the "Opinions of the

State Council on Accelerating the Development of Modern Vocational Education" was issued, proposing the implementation of the "prioritizing vocational education development" strategy. The "Several Opinions of the Ministry of Education on Deepening the Reform and Innovation of Vocational Education" aimed to promote the development and enhance the quality of vocational education. The "National Plan for Reform and Implementation of Vocational Education" outlined specific measures such as strengthening the construction of vocational education teaching staff and promoting international cooperation in vocational education. In 2020, the "Opinions of the CPC Central Committee and the State Council on Comprehensively Deepening the New Era Education and Teaching Reform and Enhancing the Quality of Education" was introduced, which included specific measures to strengthen the integration of vocational education with industry and promote actions to enhance vocational skills. These policies aim to further improve the quality and level of talent development in vocational education and encourage enterprises to enhance vocational skills training, thereby raising the skill levels of their employees. The implementation of modern apprenticeship systems and the 1+X certificate system have better implemented these policies<sup>[5]</sup>.

## **1.2. Research Objectives and Significance**

The research paper aims to investigate how to establish an efficient modern apprenticeship model under the "1+X" certificate system to cultivate high-quality, highly skilled talents, providing an innovative path for achieving the strategy of building a strong talent-driven nation.

The significance of this study is reflected in several aspects:

1) Providing Insights and Practical Experience for Higher Vocational Education Reform: The establishment of the modern apprenticeship system can effectively bridge the gap between higher vocational education and industry demands, offering a more practical teaching model for higher vocational education. This helps students achieve better employment and career development outcomes, providing new insights and practical experiences for the reform of higher vocational education.

2) Offering a More Effective Path for High-Skilled Talent Development: The implementation of the modern apprenticeship model can better nurture high-skilled talents with both practical skills and specialized knowledge, offering a more efficient pathway to meet society's demand for high-skilled talents.

3) Promoting the Integration of Industry and Education: The establishment of the modern apprenticeship model can effectively combine higher education with industry demands, fostering the integration of industry and education. This creates a mutually beneficial development pattern, driving sustainable economic and social progress.

## **2. Overview of the Modern Apprenticeship System and the "1+X" Certificate System**

### **2.1. Definition and Characteristics of the Modern Apprenticeship System**

"Modern apprenticeship" is a new form of vocational education or training that distinguishes itself from traditional apprenticeship. It is a vocational training model jointly implemented by enterprises and vocational colleges. Examples include Germany's "dual system," the UK's "Modern Apprenticeship Program" launched in 1993, Australia's "New Apprenticeship Program" introduced in 1996, and China's "Modern Apprenticeship Pilot Program" launched in 2014. The common goal is to cultivate high-quality, highly skilled professionals who can meet market demands by combining theoretical knowledge with practical skills<sup>[6]</sup>.

In the modern apprenticeship system, enterprises and vocational colleges play different roles. Enterprises, as the core of apprenticeships, provide practical experience, job opportunities, vocational skill training, and career development guidance to apprentices. They take on more real-world projects and responsibilities to help students gain authentic vocational skills and experience, thereby better preparing them for the job market.

Vocational colleges, on the other hand, are responsible for providing apprentices with relevant vocational knowledge and developing their comprehensive qualities. They also conduct theoretical

training, curriculum development, and standard setting. The school's role is to offer academic knowledge and other forms of support, encourage enterprises to provide apprentices with more targeted practical environments, and enable apprentices to quickly acquire vocational skills and knowledge.

Therefore, in the modern apprenticeship system, enterprises and schools each have their own roles and cooperate with each other to enhance apprentices' overall vocational qualities and practical capabilities. Enterprises focus on practical skills training, while schools emphasize theoretical knowledge, comprehensive qualities, and career development planning. Together, they build the training system of modern apprenticeship.

## **2.2. Basic Principles and Implementation of the "1+X" Certificate System**

The "1+X" certificate system is a new system in China that promotes the deep integration of vocational education with economic and social development while diversifying talent development. According to the "National Plan for Vocational Education Reform," the primary purpose of conducting pilot projects for the "1+X" certificate system is to deepen the reform of the composite technical and skill talent training mode.

The core concept of the "1+X" certificate system is that "1" represents a degree certificate (typically an academic diploma), while "X" represents various other types of certificates. This certificate system aims to promote the universalization and enhancement of vocational skills, align vocational education with actual job requirements, and better meet the demand for highly skilled professionals in the economy and society. Additionally, the "1+X" certificate system offers students more diversified learning and development opportunities, helping them realize their own value and enhancing their employability<sup>[7]</sup>.

The implementation of the "1+X" certificate system primarily includes the following aspects:

1) Establishment of the "1+X" certificate system: Higher vocational institutions can establish corresponding vocational skill levels or occupational qualification certification examinations based on their characteristics, national occupational skill standards, students' professional backgrounds, subject knowledge, and career development needs.

2) Establishment of a linkage mechanism between vocational skill certificates and academic degree certificates: Higher vocational institutions should combine vocational skill certificates with academic degree certificates to break the traditional mindset that prioritizes academic degrees, allowing students to acquire vocational skills and enhance their employability.

3) Integration of vocational skill certification courses into the teaching system: Higher vocational institutions should incorporate vocational skill certification courses into the teaching system, providing relevant training and guidance to students.

4) Promotion and support for vocational skill examinations: Higher vocational institutions should support and assist students in participating actively in vocational skill examinations through methods such as promotion, guidance, and advocacy.

The implementation of the "1+X" certificate system can better meet the market demand for various types of skilled professionals, enhance the quality of higher vocational education, and improve students' competitiveness in the job market.

## **3. Analysis of Elements in the Modern Apprenticeship Model**

### **3.1. Learning Environment: Facilitating the Deep Integration of Theoretical Learning and Practical Training**

The modern apprenticeship model is an educational approach based on cooperation between educational institutions and enterprises, where skills are taught and learned through mentorship. Building the foundation for modern apprenticeship pilots involves actively promoting the integration of student recruitment and employment to control enrollment scale, optimizing resource allocation for middle and higher vocational education, reforming assessment methods, content, and admission procedures, and achieving collaborative training between schools and enterprises to strengthen the

combination of theoretical education and practical skills development. Additionally, it involves deepening the reform of the model of combining learning with work, selecting suitable majors for modern apprenticeship training, jointly developing talent training programs, designing courses and materials, implementing teaching, conducting assessments, and engaging in pedagogical research, among other activities<sup>[8]</sup>. Enhancing the construction of a dual-mentor teaching staff, promoting close cooperation between schools and enterprises, and breaking free from the constraints of existing teacher staffing and employment systems are important aspects of this approach. It also involves exploring the establishment of a flexible teacher staffing system or appointing teachers under a contract system, increasing efforts for personnel exchange and sharing between educational institutions and businesses, engaging in mutual secondment and training, as well as collaborative technology research and professional development. This process leads to the formation of a teaching management and operational mechanism that aligns with the modern apprenticeship system. Collaborative institutions establish teaching evaluation and quality control systems, guide partner enterprises in formulating specific apprentice management methods, safeguard the basic rights of apprentices, reasonably allocate apprentice positions and work tasks based on educational needs, implement flexible academic or credit systems, innovate and improve teaching management and operational mechanisms, and explore various forms of full-time degree education. Pilot institutions and cooperating enterprises jointly conduct assessment and evaluation, including the completion of apprentice work tasks, to create an efficient, scientific, and comprehensive modern apprenticeship work environment.

### **3.2. Training Plans: Emphasis on Personalized and Specialized Skills Training**

The training plans in the modern apprenticeship model focus on the individualized and specialized needs of learners to meet their career aspirations. Tailored training plans are designed based on the unique characteristics and career needs of learners, aiming to address their specific requirements and help them maximize their potential. Furthermore, these training plans are adaptable and can be adjusted based on the progress of individual learners to ensure optimal learning outcomes<sup>[9]</sup>.

This training model places equal emphasis on theoretical knowledge and practical skills, allowing learners to benefit from hands-on experience. Practical work not only aids learners in better comprehending foundational knowledge but also enables them to accumulate experience and skills in real-world scenarios, ultimately enhancing their job proficiency. This training approach not only elevates learners' theoretical knowledge but also cultivates their practical capabilities, enabling them to effectively tackle challenges in real work environments<sup>[10]</sup>.

### **3.3. Mentorship System: Facilitating the Guidance of Professional Talent, Experience Transfer, and Tacit Knowledge Transmission**

The modern apprenticeship model emphasizes the guidance and experience transfer by seasoned professionals who serve as mentors to learners. These mentors possess rich practical experience and leadership skills to provide vocational training to apprentices. Mentorship not only involves the transmission of explicit skills and knowledge but also the transfer of tacit knowledge. The transmission of tacit knowledge primarily occurs through the following pathways<sup>[11]</sup>:

1) Observation and Imitation: Learners observe and imitate the skills, behaviors, habits, and cultural values of their mentors, then mimic these skills to learn. While this method does not rely on verbal instruction, it accelerates the learning progress of learners.

2) Practical Experience: Learners accumulate experience gradually as they engage in actual work, mastering skills, and continuously improving. These experiences may involve handling specific situations, addressing technical details, and problem-solving techniques, enabling learners to better handle complex environments and challenges<sup>[12]</sup>. Learners can also analyze and summarize their experiences to enhance their skills and problem-solving abilities.

3) Guided Demonstration and Feedback: Mentors guide apprentices by demonstrating tasks and providing real-time feedback during practical operations. They correct errors and offer timely guidance and advice, providing effective learning support<sup>[13]</sup>. Additionally, mentors can analyze apprentices' performance, identify learning deficiencies, and provide personalized guidance to help them achieve their learning objectives.

4) Sharing Implicit Cognition: Mentors share their implicit knowledge and insights with apprentices, including difficult-to-express skills, tricks, or intuitive understandings. This assists learners in better understanding and applying the acquired skills<sup>[14]</sup>.

5) Communication and Interaction between Mentors and Learners: Learners can gain insights into the work environment, professional ethics, and industry-specific tacit knowledge through daily communication and interaction with their mentors. Such knowledge is often unavailable in textbooks or classroom settings<sup>[15]</sup>.

By employing these learning methods comprehensively, learners can progressively acquire and master tacit knowledge, becoming experienced and skilled industry practitioners. The key to the apprenticeship system lies in providing ample opportunities and an environment conducive to the transmission and learning of tacit knowledge, allowing apprentices to comprehensively acquire skills and professional knowledge through practice.

The essential elements of the modern apprenticeship model include the learning environment, training plans, and mentorship system. Implementing this educational model can elevate learners' professional competence and skill levels while promoting technical innovation and sustainable development within enterprises.

#### **4. Common Goals of the "1+X" Certificate System and the Modern Apprenticeship Model**

The "1+X" certificate system is an important measure in China's vocational education reform aimed at strengthening students' foundation in professional knowledge while nurturing technically skilled individuals with entrepreneurial capabilities. The modern apprenticeship model, as a dual-education talent development approach involving both academic and on-the-job vocational training, combines the advantages of academic and occupational education, integrating teaching with workplace experience. The Ministry of Education has explicitly outlined the initiation of 1+X certificate system pilot programs within modern apprenticeship majors at vocational colleges to better promote vocational education, enhance students' practical skills, and overall quality<sup>[16]</sup>.

##### **4.1. Both Emphasize the Requirement for Industry-Education Integration**

Industry-education integration is a core characteristic of vocational education and a crucial aspect of establishing a modern vocational education system in China. The modern apprenticeship model is a collaborative approach to talent development between educational institutions and enterprises, enabling students to gradually master practical skills through a combination of learning and work experience. The "1+X" certificate system is a design for talent development and evaluation that involves the development of X certificates and standards with the participation of various stakeholders such as relevant industries, enterprises, and vocational colleges. These certificates reflect the latest industry technologies, norms, and practices. Both of these models deeply integrate industry with vocational education, promote industry-academic cooperation, and facilitate a collaborative approach to talent development across diverse entities<sup>[17]</sup>.

##### **4.2. Both Promote the Cultivation of Multiskilled Technical Talent**

Current industrial development demands individuals with diverse technical skills, and vocational colleges aim to cultivate such individuals. The objectives of the modern apprenticeship model and the 1+X certificate system are aligned in the cultivation of multiskilled technical talent. The modern apprenticeship model achieves this by combining school-based education and workplace training to develop professionals with both specialized knowledge and practical skills. In contrast, the 1+X certificate system allows students to acquire not only academic degrees but also various vocational skill certificates through effective credit transfers, enhancing their employability and entrepreneurial capabilities<sup>[18]</sup>. These models share the goal of promoting the development of multiskilled technical talent.

##### **4.3. Both Deepen Reforms in Teaching (Teachers, Materials and Methods)**

The modern apprenticeship model implements a dual-mentor system where vocational college

teachers and industry mentors jointly undertake educational and instructional tasks. Together, they explore the development of teaching materials and methods aligned with vocational education requirements<sup>[19]</sup>. Teaching methods primarily include project-based learning, modular learning, and work-process-oriented instruction, with the aim of helping students better grasp vocational skills and work experience during their studies. The 1+X certificate system implementation requires the establishment of a teaching staff that combines expertise from both educational institutions and enterprises, synchronization with vocational skill level standards, and the exploration of team-based modular teaching methods. Through these teaching models, students' vocational skills are enhanced, and their overall competence is cultivated. The modern apprenticeship model and the 1+X certificate system mutually reinforce each other in deepening teaching reforms. Efforts in areas such as industry-education collaboration, teaching staff development, and curriculum development inject new energy and vitality into vocational education, better meeting society's demand for highly qualified vocational professionals. The "1+X" certificate system effectively complements the "modern apprenticeship model"<sup>[20]</sup>.

## **5. Limitations of the Modern Apprenticeship Model**

The modern apprenticeship model has limitations in terms of the scope of knowledge and skills, which may have certain implications for the motivation of students. These limitations are primarily manifested in the following aspects:

1) The apprenticeship system may restrict the diversity of career choices for students. If the apprenticeship system focuses solely on specific fields of knowledge and skills, students may feel limited in their career choices<sup>[21]</sup>. This can lead to feelings of suppression and lack of motivation, especially when students have interests or potential opportunities in other fields.

2) The limited scope of learning content may result in limited job opportunities in the employment market. If the apprenticeship system emphasizes training in a specific skill or industry, students may have weaker competitiveness in other industries or positions. This can lead to frustration and disappointment, reducing their motivation during the learning process.

3) The limited scope of learning content may result in insufficient comprehensive knowledge in related fields. Apprenticeship systems often prioritize the development of specific skills and operational methods but may neglect theoretical knowledge and background relevant to the field. This can limit students' flexibility and creativity in practical work, leaving them feeling inadequate and perplexed when facing complex problems.

4) The limited scope of learning content may also prevent students from accessing the latest cutting-edge and innovative knowledge. As technology and industries evolve rapidly, students need to continuously update their knowledge and skills to adapt to changes. However, if the learning content does not keep up with the latest trends, students may feel outdated and frustrated, affecting their motivation and enthusiasm for learning.

In summary, the modern apprenticeship model needs to be more open and diversified in terms of the scope of knowledge and skills to enhance students' motivation and opportunities for success.

## **6. The "1+X Certificate System" as a Complement to the Limitations of the Modern Apprenticeship**

The "1+X Certificate System" serves as a supplementary measure to address the limitations of learning content, aiming to broaden students' skill and knowledge base, enhancing their motivation and employability<sup>[22]</sup>. The "1+X Certificate System" effectively complements the limitations of learning content in the following ways:

1) Choices of Diverse Certificate: The "1+X Certificate System" allows students to choose additional certificate courses beyond their primary field of study. These certificates can cover various industries, skills, and domains, providing students with a wider range of learning content. By obtaining multiple certificates, students can possess a more comprehensive and diverse set of skills, increasing their employment opportunities and flexibility.

2) Cultivation of Interdisciplinary Skills: The "1+X Certificate System" encourages students to select certificates from different disciplines or fields. This helps cultivate students' interdisciplinary skills, enabling them to bridge the gap between multiple domains. Through interdisciplinary learning, students can better understand the interconnections between different fields and address complex problems and challenges, enhancing their overall competence and competitiveness. Practical Vocational Skill Development: The "1+X Certificate System" not only emphasizes the development of practical vocational skills but also awards corresponding certificates to learners, validating their skill acquisition and making them transferable to other work scenarios. This is crucial for boosting students' confidence and employability<sup>[23]</sup>.

3) Adaptability to Industry Demands: The "1+X Certificate System" can better adapt to evolving industry demands. Students can choose relevant certificate courses based on industry trends and emerging technologies to update their knowledge and skills<sup>[24]</sup>. This enables students to keep pace with industry developments, enhancing their attractiveness and competitiveness in the job market.

In summary, the "1+X Certificate System" supplements the limitations of the apprenticeship system regarding learning content. Through diverse certificate choices, the cultivation of interdisciplinary skills, the development of practical vocational skills, and adaptability to industry demands, this system helps students expand their skill and knowledge base, thereby increasing their motivation to participate actively in their education.

## **7. Envisaged Path for the Deep Integration of the "1+X" Certificate System and the Modern Apprenticeship**

In the practical context of modern apprenticeships within enterprises, it is envisioned to introduce relevant vocational skill certificate assessments based on the specific characteristics of the enterprise's job content. This approach allows students to simultaneously undergo vocational skill assessments during their apprenticeship. It not only enables students to gain more practical experience but also enhances their vocational competence, making them more competitive in their future careers. Moreover, fostering a deeper understanding of enterprises and their operations among more students, who are the future industry professionals, can enhance the reputation of these enterprises. This, in turn, can attract more talent and create additional value for the companies, leading to a mutually beneficial relationship between the enterprise and the apprentices.

For example, in the field of mechatronics within higher vocational education, during the apprenticeship period in an enterprise, specific vocational skill certificates such as AUTOCAD Engineer Certificate, PRO/E Designer Certificate, Maintenance Electrician, CNC Machinist, Assembly Fitter, or any relevant vocational level certificate could be introduced based on the actual work content within the enterprise. The theoretical teaching for vocational level assessments can be conducted by specialized teachers dispatched from vocational schools, while the skills training can be organized by enterprise mentors. Ultimately, a third-party organization would be responsible for assessing the students' skill levels, which would serve as a measure of their skill proficiency and result in the awarding of vocational level qualification certificates to the students.

## **8. Research Findings and Discussion**

The integration of the "1+X" certificate system with the modern apprenticeship system has deepened industry-education cooperation and represents an effective approach to cultivating high-quality, highly skilled professionals. To a certain extent, it has addressed the current mismatch between vocational education and workforce demands. This integration has also helped resolve issues such as labor shortages for enterprises, alleviated the strain on the enrollment of vocational schools, tackled the problem of the mismatch between the knowledge and skills taught in vocational schools and those required by enterprises in fields like mechatronics, and addressed the challenge of keeping training equipment up to date. However, during the implementation, several issues that require urgent attention and resolution have emerged. These include incomplete legal regulations, low levels of collaboration between schools and enterprises, inappropriate funding mechanisms, limited enthusiasm from

enterprises to participate, challenges in ensuring the quality of education, issues related to apprentices' interests and the guarantee of theoretical study time, and discrepancies between apprenticeship training and labor contracts. All of these issues warrant further in-depth research and consideration.

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