

# Digital Talent Education Models of "1+X" Certification System Based on National Educational Credit Bank

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**Abstract.** The construction of a national education credit bank (ECBS) and the "1+X" certification (XCERT) are both key ways to build a modern vocational education system in China. The XCERT has laid the practical foundation for the construction of ECBS. The ECBS has created an excellent institutional environment for implementing the XCERT. Therefore, from the perspective of the ECBS, the current situation of digital talent cultivation and the implementation cases of the XCERT are sorted out. Using the case study method, we analyzed the problems of lack of cooperation among organizations, lack of professional digital talent training and evaluation system, and lack of experience in organizing vocational skills certificate examinations in the implementation process of XCERT. In response to these problems, countermeasures for the construction of the XCERT are proposed, for example, strengthening the cooperation mechanism among organizations, improving the digital talent education model, improving the quantity and quality of education and evaluation organizations, optimizing the digital talent education program, and improving the application-oriented curriculum system.

**Keywords.** "1+X" certification system; Digital talent education; Application-oriented digital talents

## 1. Introduction

The difference between applied undergraduate and academic colleges and universities is that they are locally oriented and focus more on cultivating practical digital talents. Hundreds of local undergraduate colleges and universities nationwide have achieved specific results in cultivating applied digital talents after several years of pilot transformation. However, according to the analysis of the implementation status of some schools, more problems still exist. To improve the supply of demand-oriented high-quality technical and skilled digital talents. To address these issues, this paper proposes targeted measures that need to explore new ways of cultivating digital talents and continuously deepen the reform of boosting applied digital skills. In 2019, the State Council released the National Implementation Plan for Vocational Education Reform, which specifies the main tasks and initiatives for future vocational education reform,

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among which the higher vocational colleges and applied higher vocational colleges carry out the pilot of "academic degree + several professional and technical qualifications" ("1+ X"). It attempts to solve the real problems in the process of cultivating talents in vocational education, such as the disconnect between learners' ability and social needs and the low degree of cooperation between schools and enterprises, and to cultivate "complex talents" that are compatible with intelligent production [1]. The "1+X" certification (XCERT) can improve the quality of digital talent education and smooth the career growth channel of technical and skilled talents, thus alleviating the pressure of employment.

## **2. The XCERT in the context of the ECBS**

Promoting the construction of a national credit bank and launching a pilot 1+X certificate system are important initiatives of the National Implementation Plan for Vocational Education Reform. Here's an introduction to the credit bank and the 1+X certificate system.

### *2.1 The ECBS*

As the concept of "lifelong education" becomes more and more popular, the ECBS issue is receiving more attention worldwide. The ECBS introduced by the Ministry of Education combines skills and academic education. It is a management model that simulates or draws on the functional characteristics of a bank, enabling students to choose the content, time and place of study freely. Similar to the savings method of commercial banks, learners can get credits for sporadic learning, which can be stored in institutions authorized by the relevant state departments like money. When they reach certain standards, they can be exchanged for corresponding academic and non-academic certificates. By establishing a sound learning incentive mechanism and education management system, various learning outcomes at different levels can be stored and transformed.

This paper theoretically discusses the construction of the ECBS and the technical approach of "framework + specification" from the situation in foreign countries and the actual situation in China. In July 2012, the first provincial and municipal credit bank was established in Shanghai, followed by Yunnan, Jiangsu, Beijing and other provinces. The ECBS of vocational education won the first prize for national teaching achievements in vocational education in 2018, which is based on the framework of the existing school credit system, combined with the reform and development needs of the XCERT of higher vocational institutions. It formulated corresponding work plans, work procedures and other related regulations to provide institutional guarantee for the implementation of the ECBS from a holistic perspective [2].

### *2.2 The XCERT*

Based on the ECBS, the National Implementation Plan for Vocational Education Reform was released in 2019. The XCERT was proposed to be introduced in vocational institutions. The XCERT introduced by the Ministry of Education combines academic and skill certificates. The "1" refers to the academic certificate, which reflects the quality

of talent cultivation in school education. The "X" refers to several vocational skill level certificates, which reflect the comprehensive ability required for vocational activities and personal career development, and are the credentials of vocational skills of graduates and members of society. The XCERT is a merit-based system that allows for the mutual exchange of academic qualifications and skills training in vocational education through credit recognition, accumulation and conversion. The XCERT encourages students to obtain multiple vocational skill level certificates and academic certificates to expand their employment and entrepreneurial skills and alleviate structural employment conflicts [3].

In 2010, the State Council pointed out the need to build a complete lifelong education system. Further, it proposed that academic and non-academic education should be integrated and developed, pre-vocational and post-vocational education should be effectively connected, different learning outcomes should be mutually recognized, and the ECBS should be established. In the context of the ECBS, the XCERT leads students to obtain vocational certificates and form vocational competence information appropriately, which is recorded in the credit information platform. In implementing the XCERT, credit banks are needed for mutual recognition of courses and credit conversion. The credit bank provides various kinds of learning achievement certification, accumulation and conversion services for individuals, learning organizations and institutions, so the credit bank can better help the implementation of the XCERT.

### **3. The current situation of digital talent education under China's XCERT**

Education is the foundation of a nation. Therefore, if our country wants to develop better, we must pay attention to education, and pay attention to vocational education along with education. With the development of social economy, vocational education is especially important in today's society and in the new journey of our national development.

#### *3.1 The current situation of vocational education development in China*

Over 40 years of reform and opening up, vocational education has played an essential role in China's economic and social development. It initially formed a modern vocational education system, laying a solid foundation for the modernization of China. As China's economy enters a new era, the demand for highly skilled personnel from all walks of life is increasing daily, and the role of vocational education is becoming more and more prominent. The 2021 Conference on Higher Vocational Education was held, and the issue of education in higher vocational institutions is increasingly receiving greater attention from all walks of life. The Opinions on Promoting the High-Quality Development of Modern Vocational Education put forward the goal of cultivating more than 10% of higher vocational colleges and universities in 2025.

In this context, China's vocational education policy has also been introduced. The Action Plan for Quality and Excellence in Vocational Education (2020-2023) proposes to make vocational education a core element of the "Three Education Reforms" and to make the education of students' professional ability a significant task, to make it sounder. At present, the development of higher vocational education is receiving more and more attention, but it also faces many problems. For example, the orientation of the school is not clear, the depth of integration of industry and education is not deep enough, the theory

of teachers needs to be supplemented, and the social recognition of vocational education is low [4].

Since the piloting of the XCERT, the Ministry of National Education has announced three batches of 92 vocational skill level certificates in April, September 2019 and January 2020, with a total of 22,949 pilots under 92 vocational skill level certificates. From the regional distribution of the first batch of the XCERT pilot institutions, the most significant number of pilots is in Guangdong Province, with 191 pilots, followed by Shandong with 156, Jiangsu with 144, and Beijing with 52 pilots. However, many schools are not involved in only one certificate pilot. For example, the Beijing Institute of Electronic Science and Technology Vocational College conducted five certificate pilots. The first pilot of Changzhou Institute of Technology has four vocational skill level certificates. And Fujian Information Vocational Technology College has carried out three certificate pilots. In the second batch of pilot institutions, Beijing has 72 pilots, and in the third and fourth batches, Beijing does not have the most pilot institutions. However, the number of certificates and education and evaluation organizations far exceeds that of other provinces, with 201 certificates declared in 2021, as well as education and evaluation organizations distributed in 24 provinces, with an average of about 13 in each province, while Beijing has 162, far exceeding other provinces.

### *3.2 The development status of the vocational education personnel education system*

The targets of digital talent development in vocational education include students of applied undergraduate majors, students of specialized education, and a wide range of students and practitioners who need to receive vocational skills education. Therefore, digital talent cultivation in vocational education requires both the understanding of relevant vocational knowledge and the development of vocational ability. In addition, training human resources is conducted in the classroom, and more importantly, practical education is conducted. Suppose we intend to improve the quality of digital talents. In that case, the professional curriculum needs to keep up with the times, the quality of professional practice training of students needs to be further improved. However, there are some problems in the education of digital talents in vocational education, such as the unscientific setting of digital talent education programs and teachers' lack of time experience.

Undergraduate professional digital talent education can be divided explicitly into research-oriented, application-oriented, technical skill-oriented, and composite talent education [5]. The cultivation of applied talents focuses on applying professional skills in the workplace. It reflects the word "application" from the construction of the teaching system, which is oriented to the needs of the industry in the arrangement of teaching content. In the teaching process, teachers need to explain the industry's cutting-edge professional knowledge so that students can understand the industry and acquire the corresponding theoretical knowledge.

However, there are specific problems in the cultivation of applied undergraduate talents, such as the unscientific setting of digital talent education programs and the lack of practical experience of the teacher team. In order to better integrate the contents of VET certificates into the VET curriculum, many schools propose to optimize the curriculum, update the learning contents. However, there are some problems in the implementation; for example, the curriculum system of accounting majors in the vast majority of applied undergraduate colleges and universities is not well connected with the qualification examinations of social vocational education [6].

#### 4. Example of the implementation of the XCERT

The following is an analysis of the application of the XCERT at the undergraduate and specialist levels.

##### 4.1 The Case for Applied Undergraduate Education

Since the implementation of the XCERT, Beijing Materials College Business School has actively responded to the Ministry of Education's initiative of the XCERT and applied for "Human Resource Digital Management" as a pilot program for the Human Resource Management major. In addition, the school has assigned teachers to attend the seed education course for the HR Shared Services Vocational Skill Level Certificate and the teacher training for the HR Digital Pipeline Vocational Skill Level Certificate. In May and June 2021, the teachers will pass the examination for the certificate trainers and assessors.

According to the Plan of Action for the Development of the Human Resources Service Industry, by 2020, China will establish a professional and information-based HR service system, which will, in turn, realize the deep integration of HR service and network. Moreover, with the advent of the second "manpower sharing wave" in China, HR sharing is in line with the development trend of the industry. The Human Resource Sharing Service, Occupational Skill Level Certificate, is aligned with job skill requirements, market demand and technology development trends, supplementing new concepts and technologies in human resources, strengthening core professional skills, and cultivating composite talents needed by human resource services and human resource departments. Therefore, the school's human resource management program applies for these two certificates in response to the development needs of the times.

According to the basic needs of the certificate education, the university's business school has adjusted the teaching aspect by adjusting the education program and creating relevant courses. It also invited the enterprises belonging to the two certificates to discuss revising the curriculum and education program. At the same time, it collaborated with two enterprises to set up a practical education base for human resource management talents. Regarding certificate assessment, the school faculty and enterprises jointly organized and held pilot examination sites and invited the enterprises' specialized personnel to the school to guide the education and examination work. However, some problems need to be improved; for example, the curriculum and assessment are not adjusted in time according to the requirements of the certificate, there is a lack of practical part in the final assessment, and there is a lack of specific guidance for students to get the certificate, of course, these also need to be constantly improved.

After BMC applied for the HR digital management vocational skill level certificate, the course system and final assessment did not match well with the XCERT assessment requirements. Table 1 shows the final assessment criteria of Beijing Materials College.

**Table 1** Course System

Curriculum System	Class Hour
General Studies Platform Course	1332
Discipline Platform	496
Specialized Courses	496
Internship and Practical Education	160

Source: Human Resource Management Program of Beijing Materials College undergraduate professional education program

So far, the XCERT of Beijing Materials College has been established and perfected through a high level of communication with the companies to which the certificate belongs, and the program has become one of the essential features of the Human Resource Management Department of the College's Business School.

#### *4.2 Cases in vocational education institutions*

In order to respond positively to the National Vocational Education Reform Implementation Plan issued by the State Council, Shijiazhuang Vocational and Technical College was qualified for vocational skills education and accreditation in three fields in June 2019 in the first batch of the XCERT piloted by the Ministry of National Education after careful preparation and active declaration, followed by the triumphant declaration of seven certificate programs in October, including e-commerce data analysis, outlet operation and promotion, and intelligent finance and taxation. In order to promote the XCERT, the first batch of the XCERT was qualified for vocational skills education and accreditation in three fields.

In order to promote the pilot work of the XCERT, Shijiazhuang Vocational Technology College and Hebei Pu'an Testing Technology Co., Ltd. have built school-enterprise cooperation and shared practice platforms; both sides actively carry out technological innovation and increase the education of teachers, there have been nine full-time teachers stationed in the base, participating in the work of the company and the development of standards. We also have several teachers with vocational qualifications and "1+X" examiners. We have established a production practice base for "school-enterprise cooperation", which reduces the burden of building "practice bases" and improves the quality of teachers' work. This has reduced the burden of funding for the construction of "internship bases" and improved the teachers' ability to serve society.

In order to better serve vocational skills education, the university's new energy vehicle technology department has set up a "dual-teacher" education base. In September 2020, the school organized "1+X" teacher training in the base, including vehicle use and maintenance. More than 60 teachers from more than 30 secondary, higher vocational and undergraduate institutions in Hebei Province were trained.

The teaching team of the construction engineering technology major combines school culture and enterprise culture, explores new talent cultivation modes suitable for higher vocational education, and forms the professional characteristics of "curriculum serves jobs and projects are integrated into teaching". However, only "Construction Engineering Technology" and "Tourism and Hotel Management" have been effective in building professional teaching teams, and the teaching teams of other majors still need continuous improvement compared with the requirements of the XCERT. Thus, it can be seen that the implementation of the XCERT still needs to be progressed in exploration.

### **5. Problems of implementing the XCERT in the context of the ECBS**

Through the analysis of the above case implementation, it is easy to see that in the process of implementing the XCERT in China, different educational institutions have other problems with varying education targets.

### *5.1 Insufficient inter-organizational collaboration*

Implementing the XCERT requires the cooperation of education authorities, industry, enterprises, education and evaluation organizations, universities and other education. In 2019, the "Notice on Continuous Recruitment of Vocational Education Training Evaluation Organizations" required that education evaluation organizations should put social interests in the first place, but this does not change its social attributes. It is unrealistic to emphasize the public interest and how to solve the contradiction between the public interest and the profitability of enterprises so that education evaluation organizations can continue to enthusiastically participate in the XCERT.

In addition, universities lack adequate policy support for implementing the XCERT, which does not play a positive guiding role. For example, many applied undergraduate institutions have strict requirements for theoretical courses in implementing human resource professional education programs. The credits, class hours and assessment forms are strict to the requirements. However, many practical courses are not implemented in place. According to our understanding, the proportion of practical courses in most applied undergraduate colleges and universities is about 30%, which is still far from 50% in senior vocational colleges.

### *5.2 Lack of professional digital talent education evaluation system*

The implementation of digital talent cultivation under the XCERT needs the digital talent evaluation system as a basis. However, there are still many problems in constructing the digital talent evaluation system under the XCERT, such as evaluating professional ability, enterprise adaptability and comprehensive ability of students in applied undergraduate institutions. By investigating the distribution of provinces where education and evaluation organizations are located, 301 evaluation organizations in four batches are distributed in 24 provinces, with about 13 organizations in each province on average, but 162 organizations in Beijing and less than 10 organizations in most provinces. The reason is that the number of education and evaluation organizations is too small, which leads to the insufficient participation of enterprises in the digital talent education evaluation system, and the relevant standards of the national XCERT are not fully aligned; the academic evaluation system of students still has many imperfections.

### *5.3 Unscientific digital talent education program setting*

A digital talent education program is the essential requirement of each content and primary quality education determined by the professional education specification. At present, the applied talent education program of many institutions of higher education is not scientific enough; first of all, it shows that the curriculum module setting is unreasonable, for example, in e-commerce majors of applied undergraduate institutions, although the education objectives are more precise, the curriculum system is not supported, and the curriculum system setting of e-commerce in many colleges and universities does not realize its education objectives[7]. The practical teaching link is seriously weakened, so students do not have enough mastery of the basic skills.

In addition, due to the unbalanced development of education, the curriculum system of local colleges and universities in China has not been updated in time, which is not compatible with the current level of scientific and technological development and

cannot be synchronized with the undergraduate applied talent education mode, which makes it difficult for students to learn the cutting-edge professional knowledge.

#### *5.4 Insufficient practical experience of the faculty*

Practical teaching is an indispensable way to cultivate skilled talents. However, in some applied colleges and universities, the cultivation of applied talents needs teachers who have the practical experience and master cutting-edge theoretical knowledge. The teacher strength of many colleges and universities needs to be improved. There is a shortage of "double-teacher" teachers. Many teachers in colleges and universities are engaged in teaching work directly after graduation. Although they have rich theoretical knowledge, they lack special education in practical teaching, so they cannot give more valuable suggestions to students in the process of practical teaching[8], which affects the cultivation of students' practical skills. These have affected the cultivation of students' practical skills. For example, at present, the scale of the finance faculty in China's applied undergraduate colleges and universities cannot match the enrollment scale after expansion, and the knowledge structure of the faculty is unreasonable, which is manifested by the low proportion of teachers from finance-related majors[9].

### **6. Promoting the XCERT countermeasure suggestions**

Implementing the XCERT requires the cooperation of multiple organizations to achieve a win-win situation, thus promoting the innovation of the digital talent cultivation model. Combining the actual teaching experience at home and abroad, we analyze the current higher vocational institutions and connects the education objectives, course contents, professional competence and graduation requirements of universities with the vocational qualification standards of enterprises, and integrates the job objectives, tasks and job requirements with the vocational skills qualification certificates, and incorporates them into the actual teaching process.

#### *6.1 Strengthen inter-organizational cooperation*

Education and evaluation organizations are mainly responsible for building vocational skill level certificates and standards; universities carry out the implementation. At the same time, enterprises are employers, and a win-win cooperation mechanism needs to be established between different organizations. The education department should strictly select education evaluation organizations, preferably enterprises with more significant influence, and establish a supervision and evaluation mechanism. Education and evaluation organizations should cooperate with colleges and universities to provide education and guidance related to vocational skill-level certificate examinations. In order to keep their enthusiasm to participate in "1+X", they need better feedback.

At the same time, colleges and universities should actively cooperate with enterprises to combine the practical guidance of enterprises with the counselling of colleges and universities to ensure that students get certificates with strong practicality and realize the "post-certificate docking" besides, schools should also start from the basics, such as teaching materials and assessments, and should also increase the role of certificates so that they can offset part of the courses to improve students' motivation.



And the school should establish a quality assurance mechanism for the certificates incorporated into the curriculum and resolutely eliminate the indiscriminate education and issuance of certificates.

### *6.2 Improving the quantity and quality of education evaluation organizations*

As the number of education and evaluation organizations is too small, the degree of participation of enterprises in the talent education evaluation system is not enough, and the relevant standards of the national XCERT are not fully aligned; the academic evaluation system of students still has many imperfections, which requires a social mechanism to recruit a part of education and evaluation organizations, in the already mature In the absence of evaluation certificates, we plan to prepare a group of them, and in this process, we should ensure quality while maintaining quantity. They should be recognized by the backbone enterprises and authoritative experts of industry enterprises, and the certificates to be added to the schools must also go through more rigorous screening; the education department will conduct random checks and assessments on the quality of education and evaluation organizations and schools from time to time.

### *6.3 Strengthen faculty and improve course assessment arrangements*

In order to better implement the XCERT in applied undergraduate schools, it is necessary to improve the supporting infrastructure and strengthen the "dual-teacher" faculty, which is a new requirement of teaching reform in higher education institutions and requires "dual-teacher" teachers with specific professional theory and practical work experience. Schools can set up on-campus teacher development centers to provide teachers with the necessary education to improve their practical and professional skills [10].

In addition, the curriculum should combine professional theoretical knowledge and practical education, accounting for more than half of the total credit hours and more credits for practical courses than theoretical courses.

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