

# Technology in the Cultivation of Composite Talents in the Context of the Free Trade Port

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**Abstract:** As an important strategic fulcrum for China's new round of opening-up, the Hainan Free Trade Port provides broad space for achieving high-quality development with its unique policy advantages and financial resources. In this context, integrating blockchain technology into the construction of the free trade port can not only help enhance the innovation and competitiveness of the talent cultivation system but also promote the coordinated development of the real economy and the industrial system. Based on the core characteristics of blockchain technology, such as "decentralization, traceability, and high credibility", this paper focuses on the common problems in the cultivation of composite talents in current vocational colleges, including an imperfect school-enterprise cooperation guarantee mechanism, a lack of teaching resources, weak teaching staff, and insufficient practical conditions. It proposes a new idea of introducing blockchain technology into the vocational education system. Through the research on the cultivation model of composite-skilled talents in vocational colleges in the context of "blockchain +", this paper aims to promote the in-depth integration of vocational education in vertical and horizontal aspects, and further promote the systematic, standardized, and high-quality development of composite talent cultivation.

**Keywords:** Free trade port; Blockchain; Composite talents

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## 1. Introduction

With the in-depth implementation of the China (Hainan) Free Trade Port strategy, vocational education in Hainan Province is facing development challenges and opportunities at a higher level and in a broader field. In the process of constructing a modern vocational education system, how to meet the actual needs of the free trade port construction for high-quality technical and skilled talents has become an important topic in current education reform<sup>[1]</sup>. Based on the actual development of vocational colleges, this paper explores the in-depth application value of blockchain technology in the cultivation of composite talents, aiming to provide new ideas for education and teaching reform, promote the in-depth integration of industry and education, optimize the professional

structure and talent cultivation system, enhance the practicality and adaptability of education, strengthen the fit between vocational education and regional industrial development, to better meet the diversified needs of enterprises for high-quality technical and skilled talents, build a high-level vocational education brand with Hainan regional characteristics, and provide theoretical support and practical reference for the high-quality development of vocational education.

At the same time, the rapid development of information technology, especially the new-generation digital technologies represented by cloud computing, big data, artificial intelligence, and blockchain, is profoundly reconstructing the social and economic structure and industrial ecology. As an important technical pillar in the digital economy era, since blockchain was listed as a cutting-edge technology for priority development by the State Council in 2016, it has continuously received policy support and market attention. In recent years, the number of blockchain-related enterprises has grown rapidly, the industrial scale has been expanding, and the demand for professional and technical talents has also shown a rapid upward trend. In this context, vocational colleges urgently need to seize the opportunity of digital transformation, face the forefront of industrial development, actively adjust and optimize the talent cultivation model, strengthen technical and skill training, and focus on cultivating high-quality technical and skilled talents who meet the development needs of blockchain and related digital industries. This is not only of great significance for supporting the sustainable and healthy development of the blockchain industry but also provides a new breakthrough for the connotative and innovative high-quality development of vocational education<sup>[2]</sup>.

## **2. Overview of blockchain technology**

Blockchain technology is an innovative information infrastructure that integrates a number of cutting-edge computer technologies, such as distributed data storage, peer-to-peer transmission, consensus mechanisms, and encryption algorithms. It is particularly suitable for data management and value transfer scenarios in the Internet era. Its core features include a distributed architecture, decentralization, anti-tampering, high transparency, and traceability<sup>[3]</sup>. These features significantly enhance the security of system operation and the credibility of data, showing unique advantages in reducing transaction costs, improving operation efficiency, optimizing the social credit system, and demonstrating broad application potential.

At present, blockchain technology has been applied in many specific scenarios in the financial field, such as transaction clearing, trade finance, supply chain financing, insurance, leasing, and securities management. It has gradually expanded to the real-economy fields such as audit supervision, precision marketing, electronic evidence storage, intelligent manufacturing, supply chain management, product traceability, intellectual property protection, medical and health care, public welfare and charity, and e-government<sup>[4]</sup>. The wide penetration of blockchain not only accelerates the digital transformation of traditional industries but also provides solid technical support and innovative impetus for promoting the development of the digital economy and building a trustworthy social infrastructure.

## **3. Practical explorations of blockchain talent cultivation in domestic universities**

With the rapid development of blockchain technology and its wide application in multiple fields, global higher education institutions have successively set up relevant courses and research directions, striving to gain an edge in talent cultivation. According to the “2018 China Blockchain Talent Status White Paper” released by LinkTower

Think Tank and Lagou.com, 29 universities around the world have offered blockchain courses, including Stanford University, the Massachusetts Institute of Technology, the University of Cambridge, and the University of Oxford. The number of Chinese universities reached 10, ranking first in the world<sup>[5]</sup>.

Well-known domestic universities such as Tsinghua University, Fudan University, and Shanghai University of Finance and Economics have systematically offered blockchain-related courses for undergraduates and postgraduates<sup>[6]</sup>. For example, Central University of Finance and Economics has built the first school-enterprise joint laboratory based on blockchain in China; Tongji University participated in the research of the digital currency of the People's Bank of China and established the "Blockchain Intelligence Laboratory"; in 2023, Tsinghua University initiated the establishment of the National Blockchain Education Alliance for Universities, the "Ivy Chain Alliance", to promote resource sharing and collaborative development.

In contrast, vocational colleges started relatively late in blockchain talent cultivation, and related explorations are still limited. For example, Guangdong Lingnan Institute of Technology, in line with the local blockchain industry's needs, has opened courses in the blockchain application direction. The first batch of students were pre-booked by many enterprises before graduation, reflecting the urgent market demand for technical and skilled talents.

From the perspective of educational technology innovation, the application of blockchain in higher education mainly focuses on three aspects: academic degree certification, teaching reform, and educational model reconstruction. In terms of academic degree certification, universities such as Holberton School and MIT have used blockchain to ensure the authenticity and security of academic degree information<sup>[7]</sup>. In terms of teaching reform, 27 universities around the world, including Tsinghua University, Zhejiang University, MIT, and the University of Oxford, have opened blockchain courses to promote the cultivation of technical talents. In terms of the educational model, scholars from the University of Oxford founded Woolf University, an online university based on blockchain, which supports students in independent course selection, online payment, and credit certification, realizing the decentralization of education.

In China, the application of blockchain in higher education is still in the theoretical exploration stage. Scholars such as Chen believe that the introduction of blockchain technology will break down the information barriers between educational institutions, promote multi-party cooperation among schools, enterprises, and between schools, and jointly build an educational innovation ecosystem across schools, regions, and industries. Li *et al.* believe that blockchain provides a decentralized learning method, which can authenticate various learning achievements and provide technical support for the construction of a credit bank. Li tried to integrate the blockchain incentive mechanism into online education platforms to enhance learners' continuous learning motivation. Li *et al.* proposed that the introduction of blockchain technology will break the inherent centralized space-time organizational structure in vocational education, which is helpful to improve the allocation efficiency of educational resources and promote the in-depth transformation of the educational model<sup>[8]</sup>.

Although the above-mentioned research has widely explored the application of blockchain in the education field, most of it remains at the theoretical level, especially in the practical application of cultivating composite talents in vocational colleges. Therefore, this paper will be based on the core characteristics of blockchain technology-decentralization, data authenticity, self-trust mechanism, consensus maintenance, openness, and a certain degree of anonymity, and explore its specific application paths in the cultivation model of composite talents in vocational colleges. By using blockchain technology to build a vertically connected and horizontally interoperable vocational education system, it can effectively solve the problems existing in current vocational

education in resource allocation, process supervision, talent evaluation, etc., and promote the development of vocational education towards a more systematic and information-based direction<sup>[9]</sup>.

## **4. Research on the cultivation model of composite-skilled talents in vocational colleges in the context of “Blockchain +”**

### **4.1. Exploring the integrated practical teaching model of “courses + projects”**

To improve students’ practical operation ability and project combat experience, some universities have explored and constructed a trinity practical integrated teaching model of “course teaching + project training + competition-driven”. By introducing real-world blockchain projects into the classroom, students are guided to participate in tasks such as smart contract development, on-chain data evidence storage system design, and blockchain prototype application construction, realizing the transformation of “learning by doing and doing by learning”. Some universities and enterprises jointly build blockchain training bases, establish technical laboratories, and organize students to participate in competitions such as the National Blockchain Technology Innovation Competition for Universities, the “Internet +” College Student Innovation and Entrepreneurship Competition, and the China Software Cup, to promote learning and training through competitions and strengthen students’ comprehensive practical ability and technical innovation awareness<sup>[10]</sup>.

### **4.2. Deepening school-enterprise joint construction and promoting the collaborative education of “industry, teaching, research, and innovation”**

With the in-depth promotion of the integration of industry and education policy, the cooperation between universities and leading blockchain enterprises in talent cultivation, curriculum construction, and scientific research has been continuously deepened<sup>[11]</sup>. For example, some universities cooperate with enterprises such as Alibaba, Tencent, Ant Chain, and Baidu Super Chain to develop joint courses, build training platforms, implement the “dual-tutor” system, and jointly declare scientific research projects, creating a collaborative development mechanism for industry, teaching, research, and innovation. This mechanism not only realizes the real-time connection between curriculum content and industrial technology but also provides students with a learning scenario close to reality, enhancing the vocational adaptability and job competence of talent cultivation.

### **4.3. Promoting interdisciplinary integration and expanding the cultivation path of composite talents**

Blockchain technology has significant interdisciplinary characteristics, and its wide application determines that talent cultivation cannot be limited to the fields of computer or information technology<sup>[12]</sup>. Some universities have carried out the construction of interdisciplinary integrated curriculum systems such as “blockchain + finance”, “blockchain + law”, and “blockchain + management”. For example, law-based universities add courses such as “Blockchain Compliance and Digital Asset Law”, and finance-based universities offer professional modules such as “Blockchain and Digital Finance” and “Blockchain-Empowered Supply Chain Finance”. Such interdisciplinary integration cultivation paths help to cultivate composite talents with both technical capabilities and industry knowledge, and enhance the comprehensive competitiveness and innovation ability of graduates in actual positions<sup>[13]</sup>.

#### **4.4. Building a blockchain-based open education platform to promote resource sharing and lifelong learning**

In response to the common problems of uneven resource allocation and insufficient teaching staff in current vocational education, some universities, jointly with scientific research institutions and technology enterprises, have developed blockchain-based online education platforms for the public, such as “MOOCs”, “micro-majors”, and university education resource sharing platforms. These platforms not only serve students on campus but also are open to social learners, supporting the goals of continuing education and lifelong learning and promoting the popularization of blockchain technology and educational equity<sup>[14]</sup>. At the same time, relying on the collection and analysis of learning behavior data on the platform, universities can realize the digitalization and precision of teaching management, providing technical support for personalized teaching and the construction of a smart education ecosystem.

#### **4.5. Constructing an authoritative assessment and evaluation system based on blockchain**

With its anti-tampering and traceability characteristics, blockchain technology makes it possible to establish a more scientific and fair education evaluation system. In the assessment and management links, vocational colleges can build a blockchain-based intelligent management platform, design an assessment system combined with enterprise skill standards, and realize the whole-process data recording from the learning process to the output of results. The system can automatically capture students’ learning duration, participation frequency, practical operation tracks, etc., and teachers can give accurate scores based on this, promoting the construction of a differential and multi-dimensional evaluation mechanism<sup>[15]</sup>. In addition, blockchain can also be used to store and authenticate students’ academic qualifications, skill certificates, and other information, improving the credibility of graduates’ information, enhancing enterprises’ recognition of vocational college talents, and building a trust bridge between schools and enterprises.

### **5. Conclusion**

At present, vocational colleges in China face practical challenges such as large differences in the foundation of students and unbalanced student ability structures, and there is an urgent need to improve the quality of talent cultivation. Based on the actual development of vocational education, this paper explores the internal needs and realization paths of cultivating composite-skilled talents in vocational colleges in the context of “blockchain +”, and proposes to deeply integrate blockchain technology into the whole process of talent cultivation.

By constructing an open-shared, intelligent-managed, and trustworthy evaluation education system based on blockchain, it not only helps to optimize the allocation and wide sharing of educational resources but also promotes the transparency of the teaching process and the scientificization of the evaluation mechanism, thus promoting the transformation and upgrading of vocational education from “knowledge transfer” to “ability cultivation”. At the same time, with the technical advantages of blockchain in identity authentication, learning record tracking, and result traceability, it can effectively enhance enterprises’ trust in the abilities and qualities of graduates and strengthen the collaborative cooperation between schools and enterprises in joint talent cultivation and delivery.

In the future, vocational colleges should continue to actively explore in the integrated development of “technology + education”, build a more open, trustworthy, and intelligent education ecosystem with the help of blockchain technology, promote the high-quality and connotative development of vocational education, and

provide solid talent support for the construction of national strategic emerging industries and the digital economy.

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## Disclosure statement

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