

# *The Development and Value of Blockchain Technology + Higher Education under the Background of China's Higher Education Reform and Innovation*

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**Keywords:** Blockchain+higher education, Higher education, Reform and innovation, “youth education chain “

**Abstract:** With the popularization of higher education in China, promoting the development of higher education informatization is an important subject to realize the connotative development of higher education. In May 2018, dozens of colleges and universities across the country jointly established the blockchain alliance, named “Youth Education Chain”, initiated by x-lab of tsinghua university and announced the launch of “Youth Education Chain”. This is the first blockchain-based public education chain jointly built by universities in the world. By taking the establishment of “ Youth Education Chain “platform as the entry point, this paper holds that the university enrollment based on “ Youth Education Chain “ will be of great value to the reform and innovation of China's higher education in the aspects of constructing the Shared education ecology, changing the traditional teaching mode and improving the efficiency of school management.

## 1. Introduction

The report of the 19th National Congress of the Communist Party of China made a major judgment on the entry of socialism with Chinese characteristics into a new era, regarded innovation and education as an important and key part of the new journey of building a modern socialist country in all respects, and emphasized that building a strong country in education is a fundamental project for the great revival of the Chinese nation, and that education should be given priority to promote higher education into a new stage of connotative development. The so-called connotative development of higher education “refers to the development mode driven by the essential attribute requirements of higher education and the effective development of various internal elements of higher education, rather than simply taking the expansion of scale and the increase of quantity as the development elements. It has such remarkable characteristics as moderate scale, structural coordination, quality improvement and quality improvement.”<sup>[1]</sup> As early as in 2012, the Ministry of education has reflected the requirements of “connotative development” in “several opinions on comprehensively improving the quality of higher education”, that is, “firmly establish the central position of talent cultivating, set up scientific development concept of higher education, adhere to optimizing the structure, pay attention to innovation, stabilize the scale, strengthen characteristics,

and take the development idea of quality improvement as the core” .<sup>[2]</sup> Under the background of the continuous development of Internet technology, the promotion of educational informatization is an important part of the realization of the connotative development of higher education.

On April 13, 2018, the Ministry of Education issued “the action plan of educational informatization 2.0”. The paper pointed out that the new era has given a new mission to educational informatization, and will inevitably lead educational informatization from the 1.0 era to the 2.0 era. The rapid development of blockchain and other technologies will profoundly change the demand for talents and the form of education.<sup>[3]</sup> This shows that the impact of blockchain technology on education has begun to receive national attention. In May 2018, Tsinghua University X-lab launched dozens of universities across the country to jointly establish the blockchain alliance, namely “Youth Education chain alliance”, and announced the launch of Youth Education chain. This is the world's first public education chain jointly built by universities. Therefore, through the development of blockchain technology in the field of higher education, such as the emergence and development of “Chain”, taking the creation of “Youth Education chain” platform as an analysis case, this paper will consider the value and significance of blockchain technology to the reform and innovation of higher education in China.

## **2. Blockchain + Higher Education: the Background of “Youth Education Chain”**

### **2.1 What is Blockchain?**

In recent years, with the rapid development of bitcoin, blockchain has attracted people's attention with its unique advantages. The research and application of blockchain has also been in a blowout for a while. It is even considered to be another dramatically-changed innovation after the development of large-scale computers, personal computers, the Internet, and mobile social platforms, which will completely reshape the form of human social activities, bring profound changes to the fields of finance, science and technology, culture, politics, education, etc., and realize mutual information from the present The transformation from Internet to value Internet.<sup>[4]</sup>

The so-called block chain refers to “a decentralized distributed database, which is made up of a series of data blocks generated by using cryptography method, and contains data record information that cannot be tampered with in a certain period of time.” The most successful and mature application case of blockchain technology up to now is bitcoin. In 2008, bencong published a paper entitled “bitcoin: a point-to-point e-cash system”, which first proposed the concept of bitcoin. In this paper, Nakamoto “takes the blockchain technology as the basic technology to build the bitcoin data structure and transaction system, builds bitcoin as a digital currency and online payment system, and uses encryption technology to realize fund transfer instead of relying on the central bank.” This kind of electronic currency shows the following subversive innovations: first, decentralization; second, open source; third, anonymity; fourth, irreversibility; fifth, security; sixth, free and convenient global circulation.

As the underlying core technology of electronic currency, blockchain technology has opened the era of value interconnection through its application. Its core is to establish a safe and reliable mechanism without third-party guarantee by relying on technical means, so that everyone can participate in it<sup>[5]</sup> (P260) its core principle is to build blocks that are related before and after and can be verified by each other, sort the blocks by time stamp, and then use cryptography technology to form a distributed, trusted and mutually verifiable mesh value transmission system. Compared with the traditional accounting method, blockchain. It has the characteristics of decentralization, openness, autonomy, information tamperability, anonymity, intelligence and so on.

### **2.2 Blockchain + the Development of Higher Education At Home and Abroad**

The development of foreign blockchain technology in the field of higher education mainly focuses on the application of blockchain technology in the field of education and the promotion of blockchain technology in higher education<sup>[6]</sup>.

Domestic blockchain technology has gradually risen to the level of national science and technology strategy.

In December 2016, the notice of the State Council on printing and distributing the 13th five year plan for national informatization first mentioned blockchain, and took it as a key cutting-edge technology together with quantum communication, artificial intelligence, virtual reality, big data cognitive analysis, driverless vehicles and other technologies, clearly proposed that the innovation, test and application of new technologies such as blockchain should be strengthened to achieve preemption The new generation of it dominance. In the field of higher education, the attention and application of blockchain technology are mainly focused on the dissemination of blockchain technology knowledge and the cultivation of blockchain technology talents, as shown in the table below:

To sum up, compared with the rapid development of blockchain technology in China's finance and other fields, the blockchain technology in the field of education lags far behind the development of blockchain technology in other fields. In the face of the urgent need of talent shortage in blockchain, colleges and universities gradually carry out blockchain courses in order to solve the problem from the source. Generally speaking, it is still in the preliminary stage of exploration.

### **3. The Emergence and Development of “Youth Education Chain”**

#### **3.1 The Initiate of “Youth Education Chain”**

The main initiator of Youth Education League is Tsinghua University x-lab. This is a training platform for creative innovation and entrepreneurship talents of Tsinghua University. It was jointly launched by the school of economics and management of Tsinghua University and 14 departments of Tsinghua University in 2013. Over the past five years, more than 30000 people have received innovation training, incubated 1300 innovation projects, and raised a total of 3.4 billion yuan. In May 2018, X-lab of Tsinghua University, together with other educational institutions such as Peking University and Zhejiang University, prepared and launched a decentralized organization driven by blockchain. This organization project is known as the “YEC alliance”. On May 27, 2018, Tsinghua X-lab hosted the “Tsinghua University blockchain education innovation, Industry Innovation Summit and the founding conference of sinomeni League”, which was successfully held in Tsinghua University. On the same day of the conference, Zhong Hong, President of Sinology Research Institute, Zhao Ming, Professor of Information Technology Research Institute of Tsinghua University and Dr. Wei Hongxin, founder of chain block college, as the co sponsor of Sinology, jointly announced the launch of Sinology. The “youth education chain” is the world's first public higher education chain. It is based on the blockchain technology, the distributed education public chain jointly built by colleges and universities, and the blockchain innovation test platform. It aims to cultivate blockchain technical talents, provide open services for blockchain industrial innovation, and explore new directions and modes of future education and scientific research system.

#### **3.2 The Development of “Youth Education Chain”**

According to the introduction of Dr. Wei Hongxin, founder and block chain technology expert of chain block college, as a public chain of distributed education and scientific research, Youth Education chain has established nodes in more than 30 colleges and universities in China, such as Tsinghua University. Through the cooperative consensus mechanism of picture name, it will be built

into a block chain of education and scientific research jointly built by global universities. Relying on the science and technology innovation resources of Tsinghua University, it is a blockchain education and industry innovation alliance jointly initiated by Tsinghua University X-lab and hundreds of universities, scientific research institutions and industry organizations. The first group launched six sub alliances, including sinomeni Innovation Education Alliance, sinomeni blockchain technology alliance, sinomeni blockchain enthusiast alliance, sinomeni blockchain industry alliance, sinomeni blockchain investment alliance and sinomeni blockchain media alliance. On June 14, 2018, Youth Education League Research Institute and Business School of China University of political science and law jointly launched the launching ceremony of blockchain financial rule of law research center. At the same time, sinomeni league's "National University travel activity" was successfully held in China University of political science and law, aiming to promote the popularization of blockchain knowledge, cultivate blockchain industry talents, and promote the construction of sinomeni chain nodes at the same time, gather high-quality courses and teachers in the chain University, and serve the mission of talent cultivation in Colleges and universities. In June 2018, Tsinghua blockchain online experiment course was launched to popularize blockchain knowledge for blockchain enthusiasts in China and universities. 10 minutes a day, online video learning combines the new mode of online experiment to learn digital currency, digital transaction, DAPP and smart contract development. The course is jointly designed by Zhong Hong, President of sinomeni League Research Institute, and experts from well-known institutions of blockchain based on sinomeni chain. The first 7-day course is jointly developed and produced by Tsinghua X-lab blockchain laboratory, blockchain college, Brock finance, etc.

#### **4. The Value of "University on Chain" to the Reform and Innovation of Higher Education**

In 1970s Martin Trow roughly divided the development of higher education into three stages. The first stage is the elite stage, that is, the gross enrollment rate of higher education is less than 15%; the second stage is the popularization stage, that is, the proportion of receiving higher education is between 15% and 50%; the third stage is the popularization stage, that is, the proportion of receiving higher education is more than 50%. Higher education in China has developed rapidly since the reform and opening up. The proportion of higher education has jumped to 40% in 2016 from only 1.56% of the gross enrollment rate of college entrance examination in the late 1970s. In 2016, there were 7.486 million students enrolled in general colleges and universities, an increase of 27.73 times over 1977; 26.958 million students, an increase of 30.33 times over 1977; 7.042 million graduates, an increase of 41.57 times over 1977. <sup>[7]</sup> China's higher education has entered the post popular stage from the original elite education. <sup>[8]</sup> This also means that China's higher education will face many new problems, new challenges and even more arduous tasks.

##### **4.1 Build a Shared Education Ecosystem**

In the field of higher education, the cooperation and exchange of higher education can effectively promote the complementary advantages and resource sharing of higher education, effectively break through the bottleneck of the shortage of human resources, so as to achieve sustained, rapid and healthy economic and social development. However, from the current situation of the construction and development of colleges and universities in China, the lack of sharing mechanism is very prominent. <sup>[9]</sup> From the perspective of resource sharing consciousness, each of them is divided into several parts, with serious departmentalism, weak sense of sharing and competition, and a large number of valuable higher education resources idle and wasted. Many colleges and universities are worried about the sharing of high-quality resources and the loss of their own school running characteristics and core competitiveness. Li Dongyang pointed out in his

article that under the background of the popularization of higher education, there are the following problems in the sharing of higher education resources in China: firstly, there is a vicious competition relationship, ignoring the establishment of the awareness of promoting competition through cooperation; secondly, the government has not played an important role in the sharing of higher education resources; thirdly, the sharing of education resources lacks the guarantee of property right system.<sup>[10]</sup>

Zhong Hong, President of Qinghua X-lab Youth Education League Research Institute, pointed out in the 2018 blockchain Industry Summit “how to push down the university wall” speech: “China faces high resistance in the field of education and scientific research to fight against the super technology power. Innovation education can be based on the public chain to build a University on the chain without walls, and use multi center to build a community of education and share the education ecology, Bring about change in the field of education in an innovative way.”<sup>[11]</sup> He believes that blockchain education will have a subversive impact on the whole university system. The University on the chain is the sharing education ecology based on the distributed application of blockchain technology. The unequal role in the original system will change. Everyone in the education system of blockchain can be both the provider of education content and the receiver of education content. The traditional knowledge production is centralized. The University on the chain aims to build a large-scale platform for collaborative knowledge creation and knowledge dissemination. Then the university will cultivate more innovative talents for the society. The blockchain can break the restrictions between the school and the school, so that students can learn across schools, fields and countries, and provide students with more comprehensive knowledge. This is also the case It can provide more innovative talents for the society. In this sense, the University on the chain means the arrival of the era of shared education, and also means the reconstruction of shared education ecology.

## 4.2 Change the Traditional Teaching Mode

Higher education under the stage of popularization and popularization, the most direct demand is that more people accept higher education and join in the study of higher education in various ways. “Higher education and institutions of higher learning are bound to have closer contact with the society. The society will put forward higher requirements for institutions of higher learning, and institutions of higher learning will also take greater responsibility for the society. The impact of institutions of higher learning on the society should be synchronized with the progress of the times or appropriately advanced.”<sup>[12]</sup> From the perspective of the development process of higher education in China, although remarkable achievements have been made since the reform and opening up, there is still a certain gap between the educational teaching mode, teaching content and teaching methods and the requirements of the era of educational modernization. For example, Zhong Hong, President of Qinghua X-lab Youth Education League Research Institute, pointed out that the traditional education mode is seriously lagging behind the development of technology industry. In the research of blockchain field, including education, the university is also worse than the blockchain industry in at least ten years. Therefore, “as an important means to achieve education equity and improve education quality, education informatization plays an increasingly important role in promoting reform and innovation”<sup>[13]</sup>.

The development of blockchain technology may lead to new changes in the future education mode, that is, students no longer pay for school, and even may receive token rewards in the process of school. Mao Donghui, director of Tsinghua X-lab, thinks that traditional universities are actually mass recommended courses, but the students are different, and each student's acceptance of knowledge is different. If you study in a chain University, you will undoubtedly reduce some



restrictions, make students more free in the learning process, and actively promote students to improve the spontaneity and positivity of learning. In the traditional teaching mode, higher education is the process of knowledge transfer through teaching between teachers and students on campus. However, this situation will completely change through the chain of universities. Students may not study on campus or in school. The teaching based on block chain technology will make all the previous achievements of students appear on the chain, and promote teachers to grasp students' learning and background information timely and accurately, so as to better carry out personalized teaching.

### 4.3 Improve School Management Efficiency

“The expansion of scale depends on the guidance of education macro policies, but the improvement of quality needs colleges and universities to achieve through efforts to improve the efficiency of school management.”<sup>[14]</sup> From the current situation of higher education management efficiency, the traditional higher education management mode calls for new development, and some typical problems can not be ignored.<sup>[15]</sup> First of all, the concept of educational management is old. Higher education management focuses on administrative management, neglects the needs of teachers and students, lacks communication with teachers and students, and pays less attention to the educational function of management. Second, the education management system is rigid. The degree of autonomy and socialization of colleges and universities is not high, the goal of running a school focuses on elite education thinking, and the management system is too rigid. Third, the management method is single and backward. Machinery relies on the implementation of system management, neglects the main position of people, and pays less attention to the important role of experts and teachers in school management.

For the initiators of Universities on the chain, they believe that the blockchain network based on value transmission will slowly push down the walls of universities and make it really form a new form of educational organization. In the face of the problems existing in the current situation of higher education management, University Based on the blockchain, first of all, the management is placed on the blockchain, which reduces the tedious business work of school management, so as to pay more attention to the educational function of management. Secondly, through the trusted consensus mechanism of blockchain, we can reduce the opportunities of false information and create an atmosphere of honesty and credibility, so as to improve the efficiency of school management. Third, give some initiative back to teachers and students, realize personalized management, so as to promote the deep participation of teachers and students.

### Acknowledgement

The study was founded by the Philosophy and Social Science research project in Jiangsu Province[2017SJB1072],and the postdoctoral research funding program [1721210035] .

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