

Research on Blockchain Assisting the Construction of Digital Education Resources in Communities

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Abstract: With the rapid development of modern information technology, significant achievements have been made in the construction of community education resources in China. However, there are also problems such as diverse resource construction entities, inconsistent resource construction standards, and lack of resource sharing mechanisms. As a new type of decentralized technology, blockchain can achieve resource co construction, sharing, and secure traceability. Starting from the concept and application value of blockchain, this article explores the current situation of community education resource construction in China, and then proposes the application methods of this technology in community digital education resource construction, and introduces the application scenarios of community digital education resource construction.

1. Introduction

With the development of information technology, China's lifelong education system is gradually improving, the concept of lifelong education is constantly popularized, and the construction of community education resources is also receiving more and more attention from people. However, due to the diversity of community education resource construction entities, inconsistent resource construction standards, and lack of a unified resource sharing mechanism, problems such as insufficient resource co construction and sharing, and information security risks have arisen. How to solve these problems is a major challenge facing community education at present. In recent years, blockchain technology has developed rapidly and has been widely applied in various fields such as finance, healthcare, and government affairs. Combining blockchain technology with the construction of digital educational resources in communities can improve resource sharing and management efficiency, promote high-quality and balanced development of community education, and meet the diverse learning needs of the people. Therefore, it is necessary to conduct relevant research[1-2].

2. The concept and application value of blockchain

2.1. Concept of blockchain

Blockchain is a decentralized distributed ledger technology that has natural advantages in resource co construction and sharing. This technology has high application value in community digital

education resource construction. It can not only effectively solve the problems of diverse management entities, inconsistent standards, duplicate content, and difficult maintenance in traditional community education resource construction, but also provide new ideas for the co construction and sharing of educational resources[3].

2.2. The Application Value of Blockchain in Community Digital Education Resources

In the future, with the continuous enrichment and improvement of community digital education resources, how to use blockchain technology to achieve the co construction and sharing of community digital education resources will be a long-term and challenging task. During the construction process, attention should be paid to the application of blockchain technology, which should be embedded in various aspects of community digital education resource construction to build a learning environment centered on community residents, learners, and education and teaching. At the same time, a comprehensive evaluation system and incentive mechanism should be established to stimulate the enthusiasm of learners to participate in learning. In the future development, blockchain technology can be combined with the "blockchain+" model to establish an efficient, secure, traceable, transparent, and trustworthy digital education resource sharing platform[4].

In addition, with the advent of the information age, more and more people are starting to improve their knowledge and skills through online learning. Meanwhile, with the continuous acceleration of urbanization in China, more and more rural populations are flocking to cities in search of better development opportunities. Therefore, in the field of community education, it is necessary to work together from the government, schools, and community residents to improve the quality and efficiency of education. The specific situation is shown in Table 1.

Table 1: Participation of Government, Schools, and Community Residents in Community Education

Project	Concrete content
At the government level	Encourage social forces such as schools and enterprises to participate in the construction of community education resources through policy guidance and financial support
At the school level	Providing better educational resources and services for students through information-based teaching methods
At the level of community residents	It is possible to learn relevant knowledge through digital learning platforms to enhance one's own abilities and establish awareness and ability for lifelong learning

The core idea of blockchain technology is to achieve security, traceability, immutability, transparency, and transparency by creating a decentralized database. Therefore, in future development, blockchain technology can be combined with community education resource construction, which can achieve resource co construction, sharing, and secure traceability, providing a better and more convenient learning experience for community education[5-6].

3. Current situation of community education resource construction in China

At present, there are mainly the following problems in the construction of community education resources in China:

Firstly, there is a diversity of resource construction entities and insufficient government leadership. Although the government's leading position has been clearly defined at the policy level, there is still inequality in the participation of education administrative departments, social organizations, enterprises, and community residents in the actual construction of educational resources, which makes it difficult to form a mechanism for resource co construction and sharing[7].

Secondly, there are inconsistent standards for resource construction, resulting in repeated waste. Due to the lack of unified standards and norms among different regions and units, there has been a serious problem of homogenization and repeated waste in the construction of community education resources.

Finally, the lack of resource sharing mechanisms has led to a serious phenomenon of "information silos". Due to the lack of effective sharing mechanisms and incentive measures, the awareness of resource co construction and sharing among regions and units is not strong, resulting in a weak awareness of resource co construction and sharing.

4. Blockchain application methods and scenarios

The purpose of constructing digital education resources in communities is to integrate community education resources and improve the quality of education. In practical operation, there are two main forms of sharing community education resources: resource sharing platforms and resource sharing mechanisms. The former can be achieved by establishing a unified community digital education resource sharing platform, while the latter can be achieved by establishing a blockchain resource sharing mechanism. If the blockchain resource sharing mechanism is viewed as an organic whole, then the blockchain resource sharing mechanism is carried out within this whole. In this system, educational resource co construction, sharing, and security traceability can be achieved through mutual cooperation among platform providers, community members, resource providers, and community managers[8].

4.1. Mechanism for co construction and sharing of educational resources

The education resource co construction and sharing mechanism of blockchain refers to the community digital education resource sharing platform, where each participant (mainly individuals and institutions) independently selects the education resources to be shared based on their own resource needs, and publishes their own resource information on the sharing platform. At the same time as publishing resources, all participants can see the resource information posted by other participants. In this way, all participants can have equal access to resource information and independently choose whether to accept and utilize this information according to their own needs. In this way, every community member can fully utilize their own educational resources and achieve the co construction and sharing of educational resources. Specifically, the functions of the resource co construction and sharing mechanism include the following three aspects: first, the resource publishing function; The second is the resource reception function; The third is the resource feedback function. Each participant can achieve their role and contribution in the co construction and sharing of educational resources through these three aspects[9].

4.2. Security traceability mechanism

Due to its openness and sharing characteristics, network security has always been a major challenge in the construction of community digital education resources in resource sharing. In the traditional resource sharing model, resource providers usually only provide basic information and do not provide copyright information when uploading educational resources to the sharing platform. This

has led to the problem of intellectual property infringement in the use of educational resources, and also affected the trust of community members in the resources. If blockchain technology is used to build a community digital education resource sharing system, the personal information and copyright information of all participants can be stored on the blockchain, forming a complete digital archive. During the sharing process, all participants can access digital archives on the blockchain and monitor the handling of copyright issues while understanding the content of the digital archives.

4.3. Application scenario analysis of blockchain

Blockchain can achieve distributed storage, immutability, and traceability of data. In the construction of community education resources, due to the diversity of resource construction subjects, inconsistent resource construction standards, and lack of resource sharing mechanisms, there are problems such as duplicate construction, waste of resources, and information asymmetry in community education resources. By utilizing blockchain technology, a traceable learning data storage system can be established to record community member learning data on the blockchain network, providing a reliable basis for the co construction and sharing of educational resources. The so-called blockchain data mainly refers to a database formed by connecting all the blocks that store data, and the connection method is to use hash values. The most important component is the block header data (see Table 2 for details), and the block body data that stores transaction information[10].

Table 2: Block header database

Field	Code	Data type	Primary keys	Foreign Keys
Block hash value	Block_hash	string	Yes	No
Version	Version	string	No	No
Previous block hash value	Per_block_hash	string	No	Yes
Time stamp	Timestamp	number	No	No
Random number	Nonce	number	No	No
Business data hash value	Merkle_root	string	No	No
Block hash value	Block_hash	string	Yes	No

Effective recording of resource construction entities, resource usage entities, and resource usage can be achieved in learning data storage systems. Community residents can access the required learning courses through various terminals such as smartphone apps and computer web pages to access the system. Community members can easily and quickly access the learning content they need by accessing the system. In addition, through smart contracts and digital signature technology, the system can authenticate the identity of each member, ensuring that the use of educational resources will not result in personal privacy leakage and other issues.

In a learning data storage system, each member is a node and has its own copy of data. If a member fails to participate in learning activities or performs poorly during a certain period of time and is discovered and recorded by other members, the member will be recorded as a "malicious node" of that node and will be cleared by other members. The "malicious node" can interact with the system through an intelligent contract and be cleared.

5. Conclusion

In summary, blockchain technology has broad application prospects in the construction of community education resources. By analyzing the characteristics and advantages of blockchain technology, it can be concluded that blockchain technology can be applied to the construction of digital educational resources in communities. Specifically, combining blockchain technology with

community education resource construction can solve the problems of insufficient trust and resource co construction and sharing in current community education resource construction. It can achieve intelligent co construction, sharing, and use of community education resources, effectively solving the digital divide problem. The application of blockchain technology in the construction of digital education resources in communities requires government leadership, active participation of residents, full play of the advantages of all parties, and joint promotion of high-quality development of community education.

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