Research and market survey of a campus knowledge payment platform based on distributed ledger technology

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Abstract. Based on the distributed ledger technology, this paper designs a kind of campus knowledge payment platform, and fully investigates the market of campus knowledge payment. First, this article analyzes the existence environment of the campus knowledge payment platform, and does a certain survey of the consumption potential of the college student consumer group, then elaborates the basic principles and technical advantages of the distributed ledger technology, and then conducts the operation process of the knowledge payment platform It is expounded and finally concluded that the campus knowledge payment platform project is worthy of promotion, and has prospects and research value.

1. Market environment analysis and market survey of campus knowledge payment platform

1.1. Market environment analysis of campus knowledge payment platform
Since 2016, the knowledge payment industry has developed rapidly, and the state has issued relevant policies to strengthen rectification. The 2016 13th Five-Year Plan implements a strict intellectual property protection system, improves the intellectual property ownership system that encourages innovation, builds an intellectual property operation and transaction and service platform, and builds an intellectual property power. In 2017, the “Opinions on Improving the Property Rights Protection System to Protect Property Rights in accordance with the Law” strengthened the governance of online infringement and piracy. Provide policy and legal protection for network intellectual property rights.

Mature network technology has contributed to the development of major live broadcast platforms and the popularization of mobile payments. Good online teaching and online payment have further contributed to the rise of knowledge payment. The emergence and application of distributed ledgers have created a foundation for user information security and fair evaluation mechanisms, and further strengthened the ability to control product quality. The mature development of technologies such as AI big data analysis has created convenience for one-to-one accurate recommendation, making customized service experience deep into each customer.

1.2. Market survey of campus knowledge payment platform
With the in-depth development of the reform and opening policy, the people's living standards have continued to improve, and the spending power of college students has also continued to rise. It varies from region to region. In developed regions such as Beijing, Shenzhen, and Shanghai, the per capita monthly expenditure of college students is about 2,000 to 3,000 yuan. In inland provinces, per capita
monthly consumption has also reached the level of 1,000-2,000. Good spending power makes it possible for contemporary college students to pay for more knowledge.

![Graph of 2010-2019 Chinese college students' consumption amount and growth rate]

Figure 1. 2010-2019 Chinese college students' consumption amount and growth rate

The target audience of this platform is a large number of college students. It includes two parts: "Professor" and "Learner". The college students themselves have passed the college entrance examination and special education in the university. Excellent personal qualities and skills are the basis for their knowledge teaching. At the same time, as a young student, life pressure is small, and the learning demand for certain skills and interests is also greater, and they are more willing to pay for knowledge and skills. According to the questionnaire survey, 87% of college students are willing to accept payment for knowledge, and the market potential is endless.

As far as "professors" are concerned, although college students have more free time than primary and secondary schools, the dispersion and long-term nature of academic tasks make it difficult for them to carry out long-term work. Therefore, a part-time job with a relatively free schedule has become the primary choice for college students. It is understood that the current part-time direction of college students is mainly physical or low-level mental work such as tutors, waiters, etc., and cannot use their own professional advantages or expertise to realize their own development.

As far as "learners" are concerned, the survey shows that 58% of college students said that the current payment for knowledge platforms still cannot meet their learning needs. Some off-campus tutoring organizations and most payment platforms for knowledge are mostly professional knowledge with limited coverage. The teaching content is affected by factors such as region and ability, and it is difficult to effectively meet the learning needs. In addition, some skills are not suitable for online teaching. Purely online recording and broadcasting courses or live broadcasting courses have insufficient communication skills and cannot meet the learning needs of college students for special skills such as dancing, basketball, and skateboarding. The high fees of some platforms also discouraged many college students with limited funds.

Therefore, a safe and efficient payment platform for knowledge that is in line with the characteristics of college students' study and life is what everyone expects.

2. Principles of Distributed Ledger Technology

2.1. Decentralization

Distributed ledger technology, compared with traditional bookkeeping technology, it is decentralized, that is, there is no center that provides ledger or information, ledger is open, and all participating nodes have the right to bookkeeping, every accounting will be time stamped, so that every accounting can be
checked. Each node keeps the latest account book and all historical records, which improves the transparency of information between the mutual trust subjects, realizes the whole process of keeping track of the account data, and then multi-party information sharing and collaborative operation. The conceptual diagram of decentralization in distributed ledger technology is shown in Figure 2.

2.2. Consensus mechanism
In distributed ledger technology, the permissions of different nodes are equal. Since each node has its own latest ledger and has the authority to query and proofread, it is impossible to tamper with the ledger data privately, ensuring the authenticity of the data. At the same time, in the entire blockchain constructed by distributed ledger technology, the index of the previous block is connected to the next block. Therefore, if you want to modify the byte of a block, you need to crack each node after the byte. The packaging key. As the length of the blockchain increases, the difficulty of tampering will increase. Generally, the longer the length of the blockchain, the more trusted. Figure 2 shows the data structure of data in distributed ledger technology.

![Figure 2. Conceptual diagram of decentralization in distributed ledger technology](image)

![Figure 3. Data structure in distributed ledger technology](image)
2.3. **Smart contract**

Based on the establishment of a consensus mechanism, a smart contract written in computer language can be embedded in a computer program. It is human beings who give computers or other smart devices the autonomy to interact with the real world according to specific procedures and rules. When the contract execution conditions are triggered, the distributed consensus mechanism is used to make the program irreversibly executed automatically. Since the program is based on a consensus mechanism, it cannot be changed after it is embedded, nor can its operating results be changed. On the basis of smart contracts, richer data is also included in the consensus mechanism. In the consensus mechanism, different nodes trust each other, which improves the transparency of information.

2.4. **Technical characteristics**

In the distributed ledger technology, the ledger is fault-tolerant. Even if the account holder makes a mistake or falsifies the data, when the data is recorded next time, every node participates in the bookkeeping, so that the real record is retained. At the same time, since the majority of people with good faith bookkeeping rights make it more difficult to forge data, and at the same time, an error correction is performed every time an account is booked, making the possibility of long-term erroneous data extremely low. Therefore, the data of distributed ledger technology is quite credible.

3. **The operating mechanism of the knowledge payment platform**

3.1. **Establishment of trust mechanism**

In the knowledge payment platform, there are two types of users: "student" and "teacher". For teachers, they need to introduce their course content, class format, class time and other course information, and upload personal information that can be verified to ensure that Certain authenticity of course information. For students, it is also necessary to upload personal information to ensure the basic quality of students. When a student chooses a course and completes the course, the teacher and the student can conduct a two-way rating and make an evaluation, and based on the distributed ledger technology, the rating can be guaranteed, the evaluation is trustworthy and traceable, and there is no "watering" phenomenon. After the platform runs for a period of time, the courses will become more transparent, students' choices will be clearer, and the students' virtual images on the platform will be more three-dimensional, allowing teachers to choose more suitable methods for teaching, teaching students in accordance with their aptitude, and improving teaching efficiency.

3.2. **The process of paying for knowledge**

First, students search for relevant courses on the platform according to their own needs, and then browse the teacher’s evaluation and rating information to select the teacher that suits them. Then the teacher and the student have a preliminary exchange, finalize the teaching method, time, and format, and establish the teacher and the student Trust relationship. After the course is completed, the students and the teacher evaluate each other, the evaluation materials enter the database, and broadcast to make all nodes update the ledger to ensure that the data is accurate and non-tamperable, and the entire process is completed. The flowchart of knowledge payment is shown in Figure 4.
4. Conclusion
Distributed ledger technology is based on a decentralized multi-node network with the same rights. Through the use of cryptography principles, consensus mechanisms and smart contracts, information can be verified instantaneously, traceable, non-tamperable, and difficult to forge, thereby ensuring the authenticity of information, the problem of mutual trust between nodes is solved, creating an efficient and secure data system. The knowledge payment platform based on distributed ledger technology makes the payment of knowledge more reasonable, users have more trust in the platform, and the students and teachers can be more transparent. Through objective and fair mutual evaluation, the teacher’s teaching process is more comfortable and the students gain the teaching results are more brilliant, dispelling users' doubts from many aspects, and improving users' experience.

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