

The Application, Motivations, and Effects of Blockchain Technology in University Online Learning Platforms

Xin Zhan*

Department of Foreign Languages, South China Agricultural University, Guangzhou, Guangdong, 510642, China

* Corresponding author Email: zhanxinzhaid@gmail.com

Abstract: Blockchain technology has characteristics such as distributed, decentralized, de-trusted and invisible, and this technology has received widespread attention from researchers. While there has been considerable advancement in the study of blockchain technology's usage in China's educational system, further research must be done before it can be applied effectively in any given use case. To that purpose, this study, based on literature research methodologies, begins with the key characteristics of blockchain technology and the usage of contemporary online education platforms, uses the MOOCs online learning platform as an example, analyzes the platform's drawbacks, looks at the potential applications of blockchain technology in such platforms and its influence, and concludes by summarizing the findings.

Keywords: Blockchain; Higher Education; Learning Records; Credit Certification.

1. The principles of blockchain technology

1.1. The origin of blockchain

The theoretical basis for the security of blockchain technology was established by two cryptographers, Diffie and Hellman, in their 1976 work, "New Directions in Cryptography," which examined the idea of a mutually distributed ledger. The term "blockchain" was first used by Satoshi Nakamoto in his 2008 book "The New Metal System: A Peer-to-Peer," where he noted that blockchain is the fundamental technology for organizing the data of the New Metal and encrypting transaction data.

1.2. The meaning of blockchain

The blockchain is a basic technology for data organization and transaction data encryption. Satoshi Nakamoto developed a blockchain technology based on the blockchain to address the issues of a lack of peer-to-peer trust and high-cost restrictions in conventional transaction systems. The "Bitcoin" is a digital currency built on blockchain technology that can be exchanged directly without going through a third-party institution in response to the constraints of existing trading systems, such as their high costs and lack of peer-to-peer trust and allows for direct trade[1].

Without Bitcoin, blockchain technology would not have been possible, and as of now, the Bitcoin system is the most significant and well-known application of blockchain technology. In general, blockchain technology is a new distributed infrastructure and computing paradigm that makes use of blockchain data structures for data validation and storage, distributed node consensus algorithms for data generation and updating, cryptography for safe data transmission and access, and smart contracts made up of automated scripting code for data programming and manipulation[3].

1.3. Characteristics of Blockchain

Blockchain is fundamentally a distributed database that is maintained by all users in an untrusted, decentralized manner.

Data storage and recording techniques are both examples of how it is "distributed" in nature. A blockchain is a data structure made up of connected and stacked blocks of data that are ordered chronologically and are certified by cryptographic techniques to be unforgeable. Each block is a tamper-proof record, and each record has a distinctive timestamp as a watermark. A completely new set of technological methods for storing, retrieving, and expressing data are made possible by this natural integration of many technologies. It is an organic integration of multiple technologies that allows for a whole new set of technical solutions for recording, accessing, and expressing data.

The whole blockchain design is decentralized, with peer-to-peer nodes acting as the nodes and no central hardware or administration. Additionally, the system's operating principles are open and transparent, meaning nodes may share data without having to put their faith in one another and cannot and will not deceive one another. As the rules of the system are open and transparent, they must be made accessible to the community as open source. Additionally, there is no need to reveal the identities of the nodes to one another, enabling users to maintain their anonymity.

2. Reasons for the use in online education platforms for universities

The use of blockchain technology and corporate innovation in the educational space are still being thoroughly investigated. Experts in the field of educational technology have also talked about and anticipated this.

2.1. The limitations of higher education resources

The quality of the whole population has improved somewhat since the country's recent modernization, and the nine-year obligatory education program is essentially in effect. Despite these improvements, there are still certain issues with education in China. There are still many students with acceptable cultural qualities who are unable to attend university and engage in offline instruction because of financial issues, and people in some of the country's poorest

communities still have extremely limited access to educational resources.

2.2. The need to change the traditional teaching model

According to the conventional higher education paradigm, students take part in and finish lessons that were planned by university professors, and they also take examinations and get feedback from them. According to this method, the higher education institution has full control over quality assurance, instructional activity control, learning certification, and certificate granting. Although the conventional teaching model has its justifications and needs, it is more suited to achieving the goals of education and human development if it considers the distinctions between various teaching audiences, as well as the variety and flexibility of teaching time and space, teaching formats, learning materials, and academic evaluation[1].

Additionally, while if the university's certificate serves as a major indicator of the learner's accomplishments throughout their time at the university, the learner is still solely accountable for all the materials and information relevant to their studies, including group projects and final exams. Learners must also keep track of and process comments on their progress to apply for scholarships, as well as for jobs or further education after graduation. It takes a lot of time and work to organize, store, and use these things. On the other hand, the recipients of these materials lack the tools and resources needed to confirm their veracity and applicability[2].

2.3. Deficiencies of online education platforms

Online learning systems for catechisms have been increasingly popular in recent years, demonstrating how society is starting to accept online education. However, the acceptance of learning outcomes and the transfer of credits in MOOCs online learning platforms has not yet kept up with the growth of their scope, which negatively impacts the promotion of online education going forward. Consequently, the incentive to learn online through a MOOCs platform is mostly driven by certificates and their potential worth. The motivation level of students will be much lower if they believe they won't obtain a learning evaluation that will show their competency from this learning platform and that they won't acquire a socially acceptable course certificate. Therefore, raising the authenticity and legitimacy of course certificates is crucial to boosting online learning's efficacy, the user experience, and the adoption of online education.

A third-party evaluation and certification procedure, which is both expensive and time-consuming, or the official certification process offered by the MOOC online learning platform are the only options available to students today. In this sense, blockchain technology is really advantageous. The effective implementation of this technology in higher education can offer a robust technological assurance for the verification of online learning results and create a reliable, affordable certification system for online education[4], further modernizing the higher education instructional model and increasing the appeal of schooling to students.

3. The impact of the use

3.1. Reducing the cost for learners

Firstly, a blockchain-based educational currency system

may be created by institutions and online learning companies. Universities might specifically make some of their free required courses available on learning platforms like MOOCs Online Learning Platform, with the progress of students being kept on the blockchain once the course series is finished. The learner's learning experience is documented in the blockchain learning ledger, and as the course moves closer to completion, all of these records may be turned into a digital currency and stored on the blockchain network based on a thorough set of criteria[3], which in turn supports the learner's learning progress after completion and necessitates payment of the digital currency. More poor university students could be able to use the educational resources of universities if a blockchain system supporting educational currency is implemented. When these currencies are included into the economic structure of a knowledge society, they may be used to keep track of a person's educational history and academic accomplishments as well as provide a benchmark for estimating their intellectual capital.

3.2. Enhancing the learners' convenience

Secondly, with such a learning management system, university instructors and students would be in charge of managing and controlling the data and resources used in instruction. This is due to the technology's distributed ledger, which enables safe and adaptable administration of educational materials and data across universities, as well as the use of data analytics to increase learners' access to education while facilitating mass learning certification. Through the blockchain technology platform, students may bundle and combine their credits or learning outcomes from other educational programs and seek for certification from universities that accept this style of learning, getting the necessary diploma or degree certifications. These statistics and certifications can be used by learners to demonstrate their academic qualifications and as legal evidence when applying for jobs. These blockchains with comprehensive student learning data will offer a permission-based, one-stop shop that students, companies, and institutions can simply access and validate.

3.3. Improving security and credibility

Blockchain-based solutions for storing educational data online offer a very high level of security and reliability. By utilizing their private key to sign the content of the certificate and the certificate itself, students may generate digital files with basic information about themselves using blockchain technology. Finally, a digital record on the blockchain is made using the private key to ensure consistency between the user's data and the information included in the certificate. Each institution may sign a different digital certificate with a comprehensive information record using its private key, and it can also deposit the hash value of the certificate in the blockchain. The smart contract performs a multiple signature check at each issue and query, depending on the generated hash to confirm that the certificate's content has not been altered[4].

3.4. "Smart contracts" help to complete educational contracts and depository

As a further development of blockchain technology, "smart contracts" may execute complicated transaction processes without human oversight or involvement, achieving the automation, intelligence, and decentralization of transactions.

This innovation streamlines transaction processes, lowers transaction costs, and significantly increases transaction security. In this type of higher online education platform, we may create an education smart contract system utilizing blockchain technology that can match the virtual economy and manage the responsibilities of buying, using, paying for, and accepting education services without manual operation. Additionally, all transaction and contract data will be saved forever and will not be altered in any way.

4. Conclusion

While the interest in blockchain technology has increased recently and its application research has been very thorough, particularly in the financial sector, where companies like securities, banks, and insurance companies have achieved tremendous breakthrough results, the theoretical research on the technology is still comparatively limited in the field of education. This paper offers a new research perspective for creating an online education platform for universities.

The modernization of higher education and the promotion of the renewal of higher education concepts are led by higher education information technology, which is an endogenous force for systemic change in education. This is crucial for higher education in China. At the moment, China is still in the early stages of thorough research about the use of blockchain technology in education, therefore more extensive study is required. More patience and focus on blockchain technology are required since it will take some time for a more mature

application to develop in the area of higher education digitization. More research should be done on the use and advancement of blockchain technology in education given the promising future.

This study conducts relevant literature research to understand the use of blockchain technology in the area of higher education. It also deepens comprehension of the features of blockchain technology to comprehend the application possibility of this technology more fully in the field of higher education. Finally, it analyzes the characteristics of blockchain technology to examine its application in online education platforms of higher education, the reasons, and methods for doing so, as well as the challenges and opportunities that may arise.

References

- [1] Ding B., Yang S., Zhao Y. (2019) The realities, problems, and suggestions of "blockchain + higher education" change. *Modern Educational Technology.*, 29(07):45-51.
- [2] Xu T. (2017) Research on the development status of "blockchain+" education and its application value. *Journal of distance education.*, 35(02):19-28.
- [3] Shi Q. (2018) The impact of blockchain technology on the future of higher education in China. *Exploration of higher education.*, No.186(10):5-13.
- [4] Li Q., Zhang X. (2017) Blockchain: Promoting openness and credibility of education with technology. *Journal of distance education.*, 35(01):36-44.