Using Blockchain Technology for Credentialing Educational Certificates in Bangladesh

Nafisa Muhammad, Abhijit Saha, Abir Chowdhury, Ehsanur Rahman Rhythm,
Md Humaion Kabir Mehedi and Annajiat Alim Rasel
Department of Computer Science and Engineering (CSE)
School of Data and Sciences (SDS)
Brac University
66 Mohakhali, Dhaka - 1212, Bangladesh
{nafisa.muhammad, abhijit.saha, abir.chowdhury1, ehsanur.rahman.rhythm, humaion.kabir.mehedi}@g.bracu.ac.bd,
annajiat@gmail.com

***Abstract*—The opportunities and the obstacles of using blockchain technology in case of the academic sector are explored in this research.While looking for jobs, students must provide evidence of their academic credentials and extracurricular achievements, which are essentially in the form of certificates .It is a persistent problem in Bangladesh for people to create and submit false academic credentials, which makes it more challenging for genuinely trained people to get work in a field for which they are qualified.Checking the authenticity of academic documents is absolutely necessary before any recruiting process. While the current procedure is unable to ensure the authenticity of certificates,utilizing blockchain technology to establish an electronic certificate creates a record that cannot be altered in any way and is tamper-proof at the same time. This makes it far more difficult for students to forge their academic credentials thus eliminating fraudulent activities.**

***Index Terms*—blockchain; certificate credentials; IPFS; fake certificates; tamper-proof; decentralized**

I. Introduction

In the conventional educational model, students are awarded a number of certificates at various points of their educational journey that prove their academic achievements.There is currently no centralized system in place for digitizing all these certificates or verifying their authenticity, also increasing the risk that they may be lost or damaged.It is extremely difficult to maintain or authenticate such a huge number of records, which might lead to an inconvenient situation where certificates might be forged [1]. Fake certificate producers and students who use them to advance in their careers have been growing in recent years in Bangladesh.For a small fee, one can skip the trouble of attending school completely and get a certificate that is almost indistinguishable from the authentic one obtained from an educational institution.It's hard to say how many people with fake certificates are actively seeking jobs, but it's likely a large number given that few companies bother to verify applicants credentials .Anyone caught using a forged signature or seal on a legal document in Bangladesh is subject to a fine of up to BDT 20,000 or two years in prison, or both, per Section 470 of the Bangladesh Penal Code, 1860.While police regularly conduct operations against certificate forgeries, they occasionally have trouble distinguishing between real and fake certificates because students frequently make photocopies of original certificates at the same shops [2]. So, to prevent this we need a system that eliminates any chances of tampering with the data. Blockchain technology would be the most effective and efficient way of implementing this proposal. Part of the proposed algorithm is implemented using the public Blockchain technique, while part of it is applied with the private Blockchain method for restricted approval behavior. When a university or other institution uses Blockchain, that adds a block automatically to the other members of the network due to the network's decentralized nature [3].

II. Literature Review

Blockchain technology is a decentralized system serving as one of its primary advantages. In addition, blockchain technology can completely eliminate third party involvement and a central administrator [4]. According to [4], as each transaction is recorded and data is available to all participants, this results in Blockchain being immutable, traceable and trustworthy. Initially, Blockchain had been used solely as a peer-to-peer transaction system of electronic cash, where transactions between two parties, the sending and receiving, occur without any involvement of a third party financial organization [5]. However, as more time passes, Blockchain technology is evolving, thus, newer applications of the technology are being explored. As a growing field of interest, with its highly modern nature, Blockchain is suitable for application in many fields and one of the fields it can be of relevance to is education. This section reviews the usage of Blockchain in the education sector and educational certificate credentials using Blockchain Technology. Blockchain is a domain which is being explored constantly, thus the research regarding Blockchain's usability and application in the education sector is still fragmented and incomplete [6]. As a technology which has gained popularity due to its exceptional cyber security capabilities [7], its potential has been increasing gradually and has benefited the academic sector as well. According to Alammary et.al [8], Blockchain's application in education can be grouped into twelve categories which essentially are the following :Man-

agement of certificates, qualifications and learning outcomes management; assessment of students' professional potential; safeguarding of collaborative learning environments; transfer of fees and credits; obtaining consent from digital guardians; management of competitions; management of copyrights; enhancing student interactions in online learning; review of exams; and promotion of lifelong learning. It was also found by [8] that the vast majority of applications were devoted to managing certificates where 13 articles—or 41%—of the total—presented software tools for controlling the distribution, storage, and exchange of academic credentials for students. Tellew et.al [9] proposed a system, CertificateChain, where the training certificates for healthcare workers are to be managed using blockchain and smart contracts. In their proposed model, Ethereum was used where the certificates were stored in blocks after being split into 30KB slices due to transaction size limitations followed by their algorithm which reconstructed the file into a byte array on the chain. Another work by Reza el.at [10] suggested a system emphasizing on academic records authentication along with combining educational institutions with the intention of expanding the storage system using blockchain.

III. Conclusion

Blockchain and IPFS enhance the verification of academic degrees where blockchain saves certificate hashes for validation and IPFS digital storage decreases the chance of certificate loss. Future work could involve the Integration of several blockchain platforms and the enhancement of system capabilities. Overall, this system has the potential to alter how academic certifications are validated and made reliable .The rising use of blockchain for certification implies that accessing academic credentials will become more efficient and safe in the future.This technology is perfect for securely storing, sharing, and networking private information. This advanced tool can improve the efficiency, clarity, and quality of many existing systems. Credentialing, copyright protection, and instantaneous communication are all brought closer together by this method. Eventually, blockchain might improve these into more conventional methods.

References

[1] N. V. Gopal and V. V. Prakash, "Survey on blockchain based digital certificate system," 2018. [Online]. Available: https://api.semanticscholar.org/CorpusID:221068010

[2] D. Tribune, "The fake certificate bazars of dhaka banginews.com," 2020. [Online]. Available: http://www.banginews.com/web-news?id=1e411713e3930fde89f48aed4dfb1608193b3fa5

[3] M. D. Pierro, "What is the blockchain?" *Computing in Science &amp Engineering*, vol. 19, no. 5, pp. 92–95, 2017. [Online]. Available: https://doi.org/10.1109/mcse.2017.3421554

[4] J. Golosova and A. Romanovs, "The advantages and disadvantages of the blockchain technology," in *2018 IEEE 6th Workshop on Advances in Information, Electronic and Electrical Engineering (AIEEE)*. IEEE, Nov. 2018. [Online]. Available: https://doi.org/10.1109/aieee.2018.8592253

[5] S. Nakamoto, "Bitcoin: A peer-to-peer electronic cash system," *Decentralized business review*, 2008.

[6] M.-F. Steiu, "Blockchain in education: Opportunities, applications, and challenges," *First Monday*, Aug. 2020. [Online]. Available: https://doi.org/10.5210/fm.v25i9.10654

[7] C. Atienza-Mendez and D. G. Bayyou, "Blockchain technology applications in education," vol. Volume 6, pp. 68–74, 12 2019.

[8] A. Alammary, S. Alhazmi, M. Almasri, and S. Gillani, "Blockchain-based applications in education: A systematic review," *Applied Sciences*, vol. 9, no. 12, p. 2400, Jun. 2019. [Online]. Available: https://doi.org/10.3390/app9122400

[9] J. Tellew and T.-T. Kuo, "CertificateChain: decentralized healthcare training certificate management system using blockchain and smart contracts," *JAMIA Open*, vol. 5, no. 1, Jan. 2022. [Online]. Available: https://doi.org/10.1093/jamiaopen/ooac019

[10] "Education certification and verified documents sharing system by blockchain," *International Journal of Intelligent Engineering and Systems*, vol. 15, no. 6, pp. 682–691, Dec. 2022. [Online]. Available: https://doi.org/10.22266/ijies2022.1231.60