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# IMPLEMENTATION OF BLOCKCHAIN IN EDUCATION SYSTEM: LITERATURE REVIEW

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***Abstract:-*** Blockchain technology can help students to place their educational documents at secure locations.By providing a safe forum for exchanging student data, boosting confidence, bringing down costs and raising accountability, it helps the education sector. Blockchain technologies have improved the credentialing process, saving company's time when confirming employee academic performance. With the use of blockchain technology, the entire record of the course is stored in data blocks that are chronologically sorted by timestamps. The cryptographic algorithm prevents the deletion of both old and new data blocks, preventing computer manipulation and fraud. It builds a virtual system for paper storage and records students' credentials and successes over the course of their lifetimes.

***Index Terms*: Blockchain, Education sector, Employee academic performance**

## I.INTRODUCTION

A smart and robust database system called blockchain technology enables transparent information sharing inside a network (Soto, 2002). Data is kept in blocks that are connected together in a chain and stored in a blockchain database. Transactions must be monitored and verified by a dependable service provider to prevent potential legal problems (Bauwens &Pazaitis, 2020). The existence of this centralised authority not only makes the transaction more difficult, but it also establishes a weak spot. Both parties may be harmed if the main database is compromised. Because blockchain networks offer trust and transparency, the increasing growth of business operations has necessitated the migration of security activities to them(Kassab et al., 2019). Today, blockchain is becoming more agile as it integrates into a variety of domains, including finance, remittance, and online payments. (Bauwens et al., 2019)Blockchain is also widely employed as an emerging technology in IoT smart contracts, healthcare, voting, and educational document verification. In addition, blockchain can be used to track tangible luxury objects, intellectual property rights, and a variety of other things(Gatteschi et al., 2020).

Pazaitis (2020)Data management and data authentication are two benefits of blockchain technology in education that don't compromise validity. The blockchain data is fully accountable, accessible and verifiable every single day of the week. Employers from all over the world can verify educational credentials, including degrees, transcripts, and students' competences, qualifications and technological skills using blockchain technology(Bauwens et al., 2019).In general, students are the focus of the laborious work performed by educational institutions like universities and schools in areas like: (1) recording student accomplishments; (2) authorising public papers & (3) student achievement evaluation. Certificates are particularly regarded as a sign of human capital. Human capital in this context refers to the skills and knowledge that someone has acquired via their education. (Singhal et al, 2018).

## II.LITERATURE REVIEW

As a common ledger that contains all of the data on all Bitcoin transactions, the Blockchain may also be thought of as such (Nakamoto, 2008). The educational landscape is evolving into the current era. Technology and education do go well together, and this combination has been more and more common in recent years Melanie Swan (2015). The conclusion is that instructional technology is now a global phenomenon. But it's impossible to talk about technology use without also talking about security. Matthew et al.(2017)Financial and human resources will be used more frequently if sufficient protective procedures are not followed. In order to aid in the decision-making process about the security measures to be taken after the early adoption of technology in education, practitioners and researchers have put forth a variety of proposals, techniques, and strategies. One strategy that has lately gained favour is blockchain technology, which offers strong encryption features. To investigate the current state of blockchain technology used in education, a bibliographical search was undertaken. Both a formal taxonomy of current procedures and a synthesis summary are objectives of this study.

Blockchain innovation was first implemented by University of Nicosia to deal with understudies' certifications got from MOOC stages (Sharples et.al. 2016). Sony Global Education likewise utilized the Blockchain innovation to make a worldwide appraisal stage to give administrations to putting away and overseeing degree data (Hoy 2017). Massachusetts Institute of Technology (MIT) and the Learning Machine organization collaborated to plan an advanced identification for web based learning dependent on Blockchain

innovation. The Blockchain record can coordinate a wide range of instructive data with the student's extraordinary ID. It incorporates learning conduct in class, smaller scale scholastic venture understanding, and full scale instructive foundation, and so forth.

Yumna et al. (2019) stated that Blockchain innovation adds to decreasing degree of misuse of documents. Beforehand, there were different examples of misuse. In any case, it will in general be kept up a key good ways from by using square chain in surrendering and managing understudy's capability now. The data that is supported by customer ID and stored in square chain is verified, approved, and maintained by the excavators from everywhere in the world. A blockchain-based appropriated record is dependable and long-lasting. As a result, the pro and steadiness are both guaranteed, which will essentially reduce degree distortion.

Alammaryet al. (2019) stated that academic achievements are a reflection of a person's dedication, abilities and dependability in addition to their knowledge, skills and expertise. Because of the value of these credentials people frequently exaggerate their accomplishments. The current system manually examines these files and certifies them from a centralised server while also providing information.

Giechaskiel et al, (2018) explored and stated that centralised server requires a lot of work to maintain and it could not be reachable when the verification is being done. Therefore, it is impossible to guarantee accessibility and integrity for papers like certifications, flagships etc. through a single central location

Zhao et al.(2019)To build a strong, all-encompassing gateway that makes it simpler for all organizations in academic institutions to function, a variety of strategies that have been investigated can be applied. In order to reduce the amount of paperwork required in the education industry, blockchain technology may be utilised to convert procedures and activities that are performed in institutions' daily operations into reliable software. There has been some interesting research in the blockchain space in other industries like bitcoin, finance, insurance, and copyright protection. To efficiently manage student records, blockchain technology offers an immutable, handle-resistant solution. To avoid data discrepancies, this ensures that records and all of their many versions are recorded. Additionally, blockchain elevates intelligent contracts to the forefront alongside business logic.

Data is vulnerable to hacking, equipment failure, natural disasters, redundancy, etc. because of the current mixing of storage options based on paper and pen and the internet. Additionally, human negligence has made the current situation worse. The legitimacy of documents is resolved by blockchain technology. Information on who adds records and where they are added is completely available. By sharing this information with employers, blockchain certificates allow students to immediately and easily access their records. Blockchain technology forbids the online distribution of patent documents. Students can also use it to explore and share their thoughts and works (Liang et al, 2020).

Given that it contains all of the information about bitcoin transactions, the blockchain might also be thought of as a shared directory (Pop et al, 2019). Education is moving into the modern era. In actuality, over the past few years, innovation and education have come to work flawlessly together. As a result, education technology is now a worldwide phenomenon. But we can't discuss technological use without addressing the problem of protection. If proper safety precautions are not followed, resource utilisation of both human and financial resources will increase.

### 2.1 Using Blockchain to Secure Educational Data

The suggested architecture consists of a checklist, smart contracts, a custom micro-leader, and the public ledge. You can track and link authentication to blockchain outcomes by using the hash function. Finally, in the blockchain, the hash value is retrieved (Casino et al, 2019). Below is a diagram of this in figure 1.

The blockchain can help educational institutions improve their ability to support teachers, provide information to community members and parents empower learners, and develop cutting-edge teaching methods. Online education commonly referred to as open and distance learning or e - learning, uses data and internet technologies to impart knowledge. It is referred to be an online learning technique. The blockchain technology provides a practical solution to issues with authenticity and protection in online learning. Without the need for external oversight, the blockchain will also offer cutting-edge learning records to guarantee that program credits are properly recognised (Liu et al, 2020 &Averin et al, 2020).

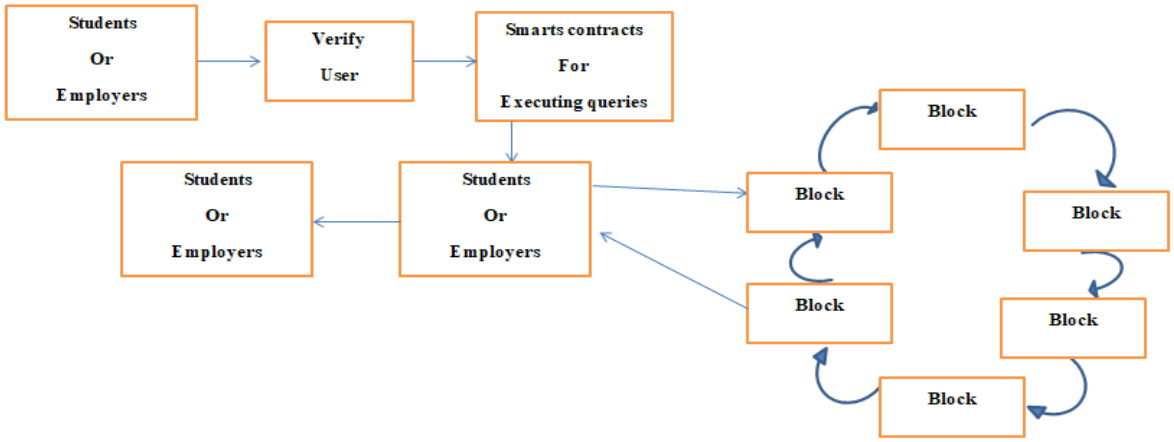


**Figure 1 Block chain based framework to secure student educational data**

Blockchain is an online repository that compiles data. Each node has a duplicate of the blockchain ledger. A third party is not required to manage the blockchain. The intelligent contract is carried out on the Ethereum blockchain. A contract is executable code that operates independently on the blockchain. If the requirement is met, the actions are carried out automatically. The intelligent programme is the one that decides how users will interact with one another (Bhasker et al, 2020 & Mishra et al, 2021).

The use of smart contracts has the advantages of being impervious to change and minimising the costs associated with delivery, verification, and fraud detection. Dispersed books' flawless and impenetrable operation is another benefit. Each transaction may be tracked, and it is irreversible. The smart contract's bytecode was deployed to the blockchain, and the operation happened under

specific circumstances. In comparison to a standard contract, the smart contract offers greater stability. Additionally, processing costs are decreased (Mahankali and Chaudhary, 2020; Caldarelli and Ellul, 2021).

Blockchain offers a novel way of storing data, carrying out transactions, managing tasks, and establishing trust. With applications spanning from bitcoin to healthcare, smart contracts, the Internet of Things, smart grid governance, supply-chain, etc., some consider Blockchain as a revolutionary tool for cryptography and cybersecurity. A thorough investigation of blockchain security, privacy, and trust would be provided by this research project. It examines issues and further analyses blockchain technology's applicability in the field of education. Lastly, it suggests a blockchain-based system for trustworthy student record management (Fraga and Fernández-Caramés, 2019).

Blockchain, the underlying technology of the Bitcoin money, is a decentralised shared ledger that keeps track of information from the numerous parties involved in transactions on the Bitcoin network. The Blockchain is specifically used by the Bitcoin network to store transaction history as well as other relevant data, including the time the address of the sender (or spender), the recipient, and the transaction were completed. It will help the spenders keep from overspending. All data on the Blockchain is encrypted to protect user privacy.

The goal of this project is to identify existing blockchain applications in various industries as well as potential blockchain uses in the field of education. It centres on three main topics: (1) blockchain-based educational technologies; (2) educational opportunities; and (3) challenges of applying blockchain technology in education. The process of document authentication can be difficult and time-consuming, and it is an important topic. Various reports are additionally provided, including banking notes, official records, transaction records, and diplomas (Imam et al, 2021).The most significant documents that institutions provide to students are their educational certificates. Since the issuance procedure is not clear-cut and verifiable, fake certificates are simple to produce. It can be difficult to recognise a well-made fake certificate and it may be taken for the real deal (Alammary et al, 2019). This research aims to explore the practical uses of blockchain technology and further examine its particular application in the educational sector. We recommend examining the various privacy and protection aspects of blockchain technology, as well as how it affects the educational process.We also support setting up a blockchain-based system to track student academic progress. Immutable student documents would be part of this effort, and they may be independently verified at some point. The proposed method would protect student data, enabling students to check on their diplomas even after a certain amount of time has elapsed. It is impossible to construct a fraudulent degree, and it may be independently verified.

## III.CONCLUSION

This study examines the benefits and drawbacks of blockchain technology in education. Finally, a blockchain-based architecture for student record keeping that is secure and reliable is shown.The benefit of using a smart contract is that it cannot be modified, and it reduces the expenses associated with delivery, authentication, and fraud detection. The seamless and impenetrable operation of dispersed books is another benefit. Each transaction may be tracked, and it has a lasting effect. The smart contract's bytecode was used in the blockchain, and specific requirements were met for the activity to occur. Compared to a standard contract, the smart contract provides more stability. Additionally, processing expenses are reduced. By doing this, contributors can avoid redundancy. To ensure the anonymity of the blockchain, every information is encrypted.

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