

Applicability of Blockchain Techniques in Education System

Sony Kumari¹, Dr. Manoj Eknath Patil²

Research Scholar¹, Research Guide²

^{1,2}Department of Computer Science & Engineering, Dr.A.P.J.Abdul Kalam University,

Indore(M.P)

sony.nayan@gmail.com¹, mepatil@gmail.com²

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Abstract

When compared to the current eras of Net Neutrality and Big Data, Blockchain is perhaps the next technologically-mediated socioeconomic megatrend. There is a sea change happening in the education sector right before our eyes. Education is now done through online peer-to-peer interactions amongst people from all over the world, rather than only in a classroom setting. There is a significant challenge for educational institutions, especially those working in higher education, to effectively use digital technology for transformational purposes. This study provides a literature review on the topic of using Block chain in the classroom. The major topics covered include educational applications built using Block chain technology, the benefits of implementing Blockchain technology in schools, and the difficulties and security concerns associated with doing so. It has been found via this analysis that education serves several purposes.

Keywords: Educational institutions, Crypto currency, Digital technology, Blockchain

I. INTRODUCTION

In the field of education, the adoption of block chain technology may have positive effects on individuals, organizations, communities, nations, and the entire world. It is useful for any level of schooling, from elementary school to college. People are increasingly putting their faith in technology rather than in established hierarchies. The phrase for this type of technology is "disintermediation."

Institutions may be unable to read or authenticate digital documents supplied to customers by vendors in proprietary formats unless they have the necessary software. Even if the appropriate resources are made accessible, the verification process may still be lengthy and muddled in many situations. There is a wide variety of digital signature forms and security levels, and not all of them are accepted as legal proof even in areas where they are required by law.

Email, the most frequent method of transferring data, is not always secure, hence dedicated transmission infrastructures for sensitive data, such as medical records, must be developed. While this greatly improves the safety of letters sent through the mail, it does raise some new interoperability concerns.

II. Blockchain Technology

In 1991, the initial purpose of blockchain technology was to verify the "who," "what," and "when" of digital records. After sitting dormant for some time, an anonymous individual using the name Satoshi Nakamoto put it to use in 2009 by creating the first digital crypto money, Bitcoin. Block chain has already shown itself as a system that permits to protect digital data controlled solely by its users after barely a decade of practical use with crypto currencies, which currently number in the thousands.

Because to blockchain technology, we can now build a decentralised system wherein all transactions and data are independently and cryptographically verified and not subject to the authority of any central authority. Completed transactions are stored in an immutable ledger that can be verified for their authenticity, security, transparency, and longevity.

When nodes "collect new transactions into a block, hash them into a hash tree," and "when they solve the proof-of-work, they broadcast the block to everyone and the block is added to the block chain," the term "blockchain" (originally block chain) was first used in 2009 by (the then-unknown) Satoshi Nakamoto in the Bitcoin source code.

In March 2018, the Merriam-Webster Dictionary added the terms Block chain, crypto currency (currency that only exists digitally, using a decentralized system to record transactions), and initial coin offering (the first sale of a crypto currency to the public, conducted raising funds to support a start-up).

III. Blockchain Technology in Educational Institution

Some of the applications of Blockchain technology in educational institution:

- **Student's records and certificates**

All of a student's transcripts, diplomas, and other credentials will be stored permanently on the Block chain, where they will be accessible to and verifiable by any authorized user. Because the records or certificates are saved on a distributed ledger under Block chain technology, they may be validated long after the closing of the educational institution where they were originally issued.

- **Alternative to paper document**

In the future, Block chain will be used in place of paper records, transcripts, degree mark sheets, diploma mark sheets, certificates, and any other paperwork. We won't need to worry about misplacing anything or losing track of anything. All parties involved (employers, schools, students, etc.) can request to view certain documents, and their trustworthiness is enhanced due to the records' incorruptibility. Having everything authenticated and unified in Blockchain format eliminates the need for true-copy certification.

- **Credentials**

Blockchain will be the repository for all of our unchangeable certificates and credentials,

making them easily accessible via digital wallets. An employer may quickly and simply check the Block chain to see whether we genuinely have the credentials we claim to have.

- **Accessibility of records**

Digital wallets are essentially an app on our smart phones that may store and display credentials and data for the viewing and use of any party, including teachers, students, and the general public.

- **Payment of Course**

Today, crypto currency is being accepted by more and more schools as a means of paying tuition. Consider paying using crypto currency you have already mined or that you have in your wallet.

- **Scrutiny and validation of information**

More than a hundred MIT alumni had their digital degrees issued on the Bit coin block chain in 2018 thanks to a partnership between MIT and the block chain firm Learning Machine. We may rest assured that no degrees or certificates will be issued in violation of the law. When you graduate, your academic accomplishments will be recorded on an immutable block chain that you can then use in your CV and online profiles to show prospective employers.

- **Inspiration and motivation for students**

As a type of incentive, tokens might be given to pupils. Earning additional tokens depended on how well they did in that particular class. Block chain technology allows for the creation of these digital tokens. Earned tokens may be used as payment for more courses, tuition, or transferred to a crypto currency wallet for future use. Motivating pupils to learn is easy when they know they can make money while they do it.

- **Recruitments and Connection between students and employers**

Tokens are digital assets that will be included in a block chain and might be used to rank pupils in some fashion, such as making them more marketable to prospective employers. Candidates' competence may be gauged, at least in part, by checking the number of tokens they earned in their courses.

- **Rewarding high quality content**

Teachers, course developers, and content providers might all benefit from this approach in the same way that students do from the token system. Students will award extra tokens for high-quality content and instruction. This token supply will then be transformed back into crypto currency that may be spent or saved by teachers.



Figure 1: Blockchain application in education

IV. BLOCKCHAIN AND CHALLENGES OF TODAY'S EDUCATION SYSTEM

Block chain is a digital, distributed, and decentralized ledger that facilitates the safe and transparent recording, storage, and dissemination of data within a community. Data is validated and then sealed in a block before it is added to the block chain. When a new block is created, it is broadcast quickly and automatically to every other node in the network. The block will be added to the existing chain when it has been verified by all nodes. In a decentralized network of nodes, this may guarantee that all users are viewing the most recent information. Block chain technology has the potential to enhance the immutability and resilience of any process with a high degree of predictability and repetition that involves the transmission, storage, access, and verification of sensitive data. An inherent challenge in a decentralized setting like block chain is ensuring data integrity and authenticity in the face of many flawed or corrupted procedures, given the absence of a centralized authority. To do this, a block chain enforces a set of "crypto economic rules" to preserve distributed consensus throughout the block chain's peer-to-peer network. In order to guarantee that such rules are obeyed, monetary incentives are used in the form of Learning Tokens. The token is seen as the lowest common denominator for bringing parties together in a distributed ledger system. Sub-currencies representing assets like USD or gold, firm stocks, individual tokens representing smart property, secure unforgeable coupons, and even token systems with no links to traditional value at all, employed as point systems for incentivisation, can all be implemented using tokens.

Smart contracts, or computer-written instructions that transfer digital assets according to predetermined conditions such as "if home sale recorded as completed, transfer tokens from buyer to seller," are another exciting field of study. It's true that the "successful" implementation of the block chain concept is novel, but smart contracts themselves are not. As "a computerized transaction protocol that performs the conditions of a contract," it made its debut in 1996. The overarching goal is to ensure that standard contractual provisions are met (including those pertaining to payment, liens, secrecy, and enforcement) with as few intentional and unintentional variations as possible and as few trusted third parties as is practical. Reduce fraud loss, arbitration and enforcement fees, and other transaction expenses are all related economic goals.

To put it another way, if smart contracts are implemented on the block chain, anyone will be able to create decentralized and immutable contracts between two or more parties that can then be used as the basis for their own projects and apps. This has the potential to do away with the requirement for a third party to offer some form of external enforcement or trust. The deployment of such systems would result in increased reliability, security, transparency, user-friendliness, cost-effectiveness, precision via record-keeping, and confidence.

Among the predicted sectors to be disrupted—including finance, government, insurance, transportation, and health—education is one in which block chain seems ready to play a big role in addressing some of its difficulties. Education today needs reform to make it more accessible to low-income and working-class students, to provide them with the high-quality training they need to compete in the modern economy, to incorporate alternative learning methods, to respect each student's right to pursue their own educational path, and, most importantly, to inspire and motivate students to study.

- **Agile education system and Distributed Universities**

Today's system of higher education is extremely inflexible and based on an outdated model. It assumes that kids of varying intelligence and interest would all benefit from the same highly regimented curriculum. There is little room for identifying diverse, creative, and innovative talents due to the exam-oriented and score-based approach to evaluating students' capability, the standardization of curricula, and the difficulty in meeting the need for new skills and for continuous learning of emerging technologies. Students in today's dynamic world need to learn how to develop market-driven skills, identify their unique strengths, and showcase their mastery in a variety of disciplines. Education as it is now limits students to the confines of their classroom, but more and more learning is taking place in non-traditional settings. The report by Universities UK shows that enrolling in a university and spending several years on a statically defined subject is becoming less appealing to students, while at the same time there is a growing interest in online-learning, distance-learning, like-minded individual communities, and the concept of badges and micro-accreditation rather than macro-ones.

- **Lifelong digital learning identity and Educational Ledger**

Challenges that Europe currently faces include the following: the need for CPD and reskilling of its workforce; the facilitation of the recognition of non-formal learning based on individuals' portfolios; this is especially relevant for open learners and migrants; and the standardization and scaling up of the process of credentialing, issuing, recognition, and access by interested parties. The capacity to maintain track of a person's learning experience and make it accessible to all relevant parties while also providing proof of a claim's veracity is crucial to overcoming these obstacles. Existing options for keeping track of one's accomplishments and education throughout one's life are limited. What none of them have, however, is a way to check people's claims of expertise and credentials without requiring human participation.

- **Student motivation and Gamification**

Declining academic motivation is one of the problems plaguing the modern education system.

Gamification of the educational process is one solution to this issue. Interactive games, in whatever shape they take, are a great way to get people excited about a task at hand. A number of factors, including but not limited to boredom or disinterest, a pattern of escalating absenteeism in which each absence decreases the individual's willingness to return to university, and most importantly, being distracted by technology such as smartphones and the Internet, contribute to students' inability to focus on their studies or their overall performance in school. With the help of modest rewards, users are more likely to engage in activities, remain loyal to the service, and even compete with one another.

- **Student expectations and Employability**

Keeping up with rising student expectations is one of the main problems plaguing modern education. As a result of the rise in the tuition price maximum, students have larger expectations than ever before for the financial benefits that repaying their substantial student loans can bring.

The skills gap may be narrowed by the widespread use of block chain technology and its token-based incentives. One way to accomplish this is to facilitate the trading of tokens of value between those who issue incentives and those who receive them. Students, for example, may accept tokens from potential employers or other authorities in exchange for committing to learn more about a subject that is in high demand in the labour market. The combination of AI and blockchain data enables businesses to get adequate "knowledge" from data and find the best candidates for open positions by tracking their history of success in relevant coursework. Authorities, another stakeholder of such a platform, are able to identify skill shortages and take corrective measures with this information in hand.

V. Conclusion

Using Block chain technologies, this study presents a rigorous evaluation of their potential educational uses. In addition to eliminating the requirement for educational institutions to do credential validation, block chain technology has the potential to hasten the demise of the paper-based system for certificates. The adoption of Block chain technology by educational institutions permits a shift in the verifiability of academic records, authenticity, validity of certificates, and grades of degree programs at institutions like colleges and universities. Block chain technology will soon allow educational institutions to automate, standardize, and safeguard many of their tasks through a decentralized autonomous network.

The field of education is ripe for a block chain-powered overhaul. Top minds need to dive into this technology as soon as possible, both independently and in collaborative settings. Although few institutions are prepared to make significant investments in block chain technology at this time, beginning the conversation internally and with colleagues across the academic community will allow them to be ready once opportunities emerge with the scale and significance to deliver both game-changing business value and learning experiences.

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