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A Survey on Blockchain in Educational Institutions

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ABSTRACT: Blockchain being a decentralized unit gained extensive attention these days. It gains considerable identification due to the factors such as decentralization, security and reliability. Although blockchain is spreading its influence beyond the limit, little is known about blockchain technology's usage in the educational sector. The key application of blockchain in institutions is digitalization, decentralization of educational activities which enhances the impediments of scalability challenges that arise slow-speed transactions and trilemma. It also assists educational institutions to maintain accurate records (degrees, certificates and diplomas) and payments of each student with their report. This paper is a review of research about blockchain based technology's application which is used in educational institutions such as benefits gained using the technology and the challenges faced on adopting the technology. A comprehensive analysis has been conducted on the findings. This paper also provides perspective on various educational areas that avails advantage from using blockchain technology.

KEYWORDS: Blockchain Technology, Educational institutions, Decentralization.

I. INTRODUCTION

In 1982, David Chaum, a cryptographer, used blockchain like protocol for maintaining records and in 1992, Stuart Haber and W Scott Stornetta secured the chain of blocks cryptographically but failed to implement the document according to timestamp. Later, Haber, Stornetta and his friend Dave Bayer incorporated a hash tree to group documents and certificates as a block. Blockchain is originally derived from the term block chain termed by Satoshi Nakamoto. He modified the design using a hash tree method, timestamp blocks in which the blocks are being added and connected through a chain. In his original paper, he mentioned block and chain as separate words and later the term was merged and coined as blockchain in 2016

What is Blockchain?

Blockchain is a system of recording and storing information that makes it difficult to change the details or hack the system after saving. Blockchain is a kind of database in which the input data enters the block and chains with the previous block and forms a chain of blocks. It is a digital record of transactions in which blocks are linked in a list called chain.

Blockchain has its applications in many streams but is extensively applied as a ledger for transactions. The decentralization of blockchain makes the transactions immutable which helps in the confidentiality and consistency of the data. Also, it has access to the authorized level of users. Security is another feature blockchain offers where the data added into the blocks are not that easy to get modified.

Structure of Blockchain:
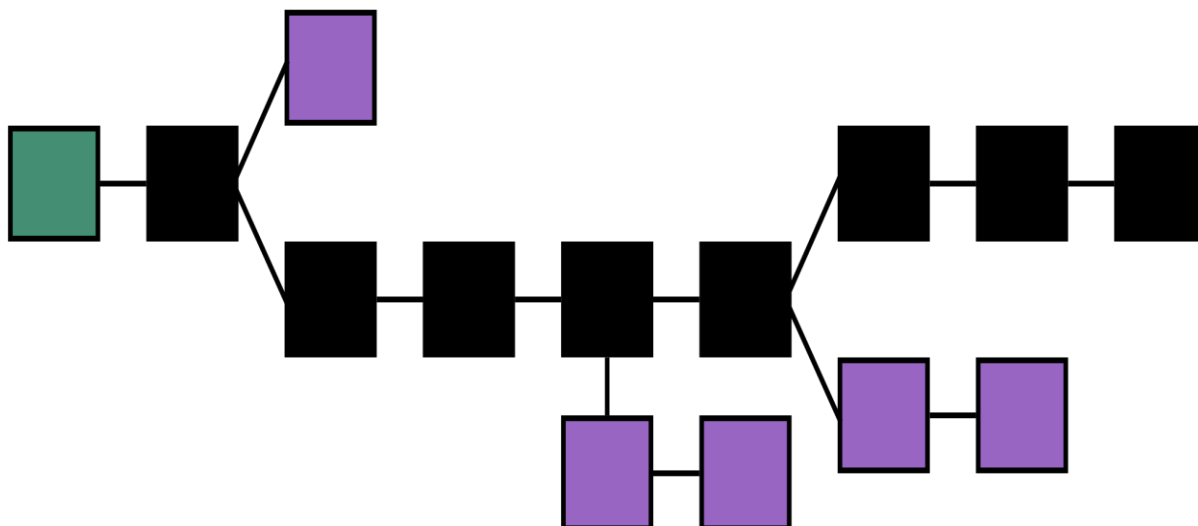
Green   -   Initial block or Genesis block.

Black   -   New blocks linked by time to blockchain.

Purple   -   Orphan blocks existing outside the main chain.

II. BLOCKCHAIN - USAGE IN EDUCATION

Blockchain is being used in various streams like bitcoins and crypto currency effectively and considerably more when compared to other fields, but it is in the emerging phase in educational sectors. Over the past several years, more high-profile projects have received significant media attention, fuelling further interest in the technology. Blockchain helps to solve and address problems that have proven difficult to solve using traditional technologies.

Blockchain helps the students to store their credentials and skills learnt for further usage especially during the times of career seeking. Also the credentials cannot be modified since it is not managed by any central unit but the whole administration goes into the hand of the student so that the data related to oneself can be more accurate. They can also share it with the hiring organization for consistency of data about the student.

Certain institutions make use of blockchain technology in storing and maintaining student records. Plagiarism is a common and a serious issue in institutions, blockchains are used to solve this issue and maintain the records by protecting the identity of the student. Certain institutions use it to protect confidential data such as the copyright for a better and unique institutional management; this includes the project patents and the curriculum followed by the institution and the credits earned over various events. This also includes the accreditations of the institutions which make it easier for the student to know the consistency and academic value of the institution.

III. APPLICATIONS OF BLOCKCHAIN IN EDUCATION

(1) **Improve record keeping:** The most optimistic use of blockchain in education is to transform the listing of degrees, certificates and diplomas, making documents digital and under the learner's control, without the need for peace-maker to verify them. Blockchain could be used for making a complex process of recording into a simple process. Record keeping through block chain improves the level of security of data and the validation of certificates is less needed since it maintains consistency.

(2) **Increase efficiency of existing methods:** Blockchain-based educational institution diplomas are a great improvement, but perhaps the ultimate use case is the creation of a virtual transcript or record of all education

achievements throughout one's entire lifetime. It would reduce frauds, stream-line student transfers between institutions, reduce the overhead relative to document verification, and make moving between countries and states less complex. The above cases in turn can help the institution to manage the records with an ease.

(3) Digitalize payments: Processing student payments is work-intensive and may involve the student, parents, scholarship agencies, financial institutions, governments and educational institutions. But in the future even crypto currencies could be used as a method of payment..

(4) Create a distributed learning model: Nowadays, in education blockchain use cases have focused on record keeping and efficiency, while the real disruptive power often lies in creating new business models. Between the educational institutions, it will relay on blockchain and smart contracts as the basis of the relationship between students and the instructors.

(5) Digital Signature: The important record a student holds in his curriculum like projects can be signed digitally. This can improve the confidentiality of the contents. The sign can be trusted and validated that it is from the appropriate user on the other end.

IV. CHALLENGES IN ADOPTING BLOCKCHAIN FOR INSTITUTIONS

Every institution has its own way of representing data and records, so the appropriate guidelines for following the same needs updating the blockchain system which in turn makes it expensive and difficult to handle the system. Certain methods followed by the university are the curriculum for the institutions under them so the case of decentralization can affect this relationship a little. It takes much time to implement it in real time since it takes much expense to get started and needs approval from all the sources and stakeholders of the institution undertaking it. The process in blockchain formation is repetitive and can immensely reduce the scaling capacity of data storage resulting in lowered throughput. The above discussed points might make blockchain an optional choice not to select for institution management but still various institutions which are popular apply blockchain serving various purposes.

Few institutions using blockchain as a part of administration are as follows (1) The University of Nicosia used blockchain for maintaining its student's credentials. (2) Sony Global Education used blockchain for creating an assessment platform to store and maintain degree certificates. (3) Massachusetts Institute of Technology (MIT) along with Learning Machine Company created an online learning platform using blockchain. (4) Holberton School used blockchain technology to store student's degree information that can be accessed using a unique Id.

V. CONCLUSION

Block chain technology is an open source with a wide range of possibilities and it itself is a disruptive technology. It has the ability to move from a centralized system data logging to a distributed system and it ensures maintenance of privacy and zero alteration of information. The benefits of applying blockchain in education empowers learners, enhancing security, improves the efficiency of educational institutions, business and students by integrating more trust and transparency within transactions in our society. The goal of this paper was to compile useful insights that will help to improve the educational process.

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