

Applications and Challenges of Blockchain in the Education Sector

Viraj Sancheti¹, Adesh Lalwani², Bhavesh Mehta³, Nishchay Kothari⁴ and Dr. Priya Shelke⁵

¹⁻⁵Vishwakarma Institute Of Information Technology, Pune, India

Email: {viraj.21910585@viit.ac.in, adesh.21910574@viit.ac.in, bhavesh.21910572@viit.ac.in, nishchay.21910679@viit.ac.in, priya.shelke@viit.ac.in}

Abstract—An education system serves as a measuring stick for a nation's progress[6]. Blockchain is one of the latest trends of tech world[8].Blockchain is an immutable, shared ledger facilitating recording of transactions which cannot be changed without changing all the subsequent blocks and agreement of all. Blockchain as a technology is used in various sectors such as healthcare, education, governance, etc because of its transparent, secure and reliable nature. Education indicates progress of the individual as well as the nation as whole. The method of organizing knowledge remains same everywhere. There are various problems faced by the education industry but the amalgamation of scientific knowledge and tech knowledge can do wonders in the education sector altogether. This paper introduces the blockchain topic, then discusses the applications like digital certification and record keeping and finally the opportunities and challenges of applying blockchain technologies in the education sector.

Index Terms— Blockchain , Technology , Education, Digital certification, Record keeping.

I. INTRODUCTION

Blockchain has been extensively discussed as the foundation technology behind cryptocurrencies [1]. Blockchain technology is a technology that can be set itself and decentralized [2]and make open records that have been executed from computerized events or all transactions and will be shared with participating parties . To show the authenticity of every transaction on the blockchain , it will be verified with a digital signature. Information stored on the blockchain will be sealed and cannot be changed, due to the use of digital signatures and encryption [2].

Blockchain has various characteristics like distributed nature, security, reliability, anonymity, etc., which can offer a wide range of benefits to education development. However, the blockchain research in education is rather scarce, and the application has just begun. Therefore, it is meaningful to analyze the previous studies, understand their advantages and disadvantages, and understand the threats[3].

The remaining paper is arranged in the following manner. Typical applications of blockchain in education at present are summarized in Section 3. Section 4 discusses the existing challenges, followed by Section 5 which discusses the future trends and Section 6 which finally concludes the paper.

II. APPLICATIONS

A. Identity and certificates management:

Certificates play a major role in education where the learning records are not only a gateway to knowledge but

become essential for peoples' careers. Current scenario of paper based certificates is transformed to digital certificates. This makes the entire process online and it is the need of the hour. The students can access all kinds of information of certificates obtained by them from anywhere and everywhere [3].

B. Students' learning progress record:

The blockchain stores data in the database located in different areas and it records data blocks. It records the data blocks in sequence and altering it or deleting it is not possible.

Blockchain technology is used to promote educational innovation through path innovation[5].

C. The following are some of the educational projects using blockchain:

Sony Global Education (SGE): It is a platform that protects and shares data using blockchain base.

APPII: It is useful for ensuring the qualifications and academic backgrounds of students and teachers, by using blockchain. This application is expected to maximize everyone's abilities. Users can make their profile and education history.

Parchment: It is a forum used to assess qualifications in academics, to process programs and produce certificates.

TeachMePlease (TMP): It provides a database of learning institutions for both online and offline schools. The programs available are very different from group learning classes for children ranging from individual sessions to private instructors.

III. CHALLENGES

A. Scalability

It is a challenge which becomes slow as the load increases. Educational institutions have many students thus leading to an increase in blocks sizes. As the number of students is more, the number of transactions become more and hence the increase in block size. Thus, scalability can be a hurdle when blockchain education solutions are explored and potentially adopted on a wide scale.

B. Scarcity of skilled engineers:

There is a severe shortage of skilled blockchain engineers and experts. In recent years, with the technology sector booming and the people turning towards application oriented education, the demand for human potential of blockchain has been increasing. Both the companies in the nascent stage and the reputed ones that desire to catch up with this technology are looking for engineers for developing a blockchain-based system. However, to develop a reliable and secure education system in blockchain that is fully functional and highly usable, a skilled team is required for research and development.

C. Lack of policy protection:

Development in blockchain faces the challenges of lack of policy protection and practical experience. Due to this, the decentralization will have a substantial impact on traditional education institutions.

D. Lack of universal guidelines:

Blockchain requires wide-ranging process alteration in the organization such as developing guidelines for the implementation of blockchain in instruction, e-certificates and grading because each institution has its own parameters which are being taken into consideration. As blockchain selection increments, modern guidelines are being characterized each day.

E. Inefficient in terms of throughput

Blockchains are repetitive in nature which makes them slow; as a result it may contribute for the inefficient forms of information capacity in terms of throughput [4].

IV. FUTURE TRENDS

It is very difficult to predict whether blockchain will have a significant, sustainable impact in education. Given that people are ready to invest any amount of money in their child's education, the need for blockchain based credentialing may increase.

Additionally, blockchain cannot be perceived as a threat for educational institutions, but rather as an innovative technology that can provide value across a wide range of educational processes including better education with enhanced reliability and security.

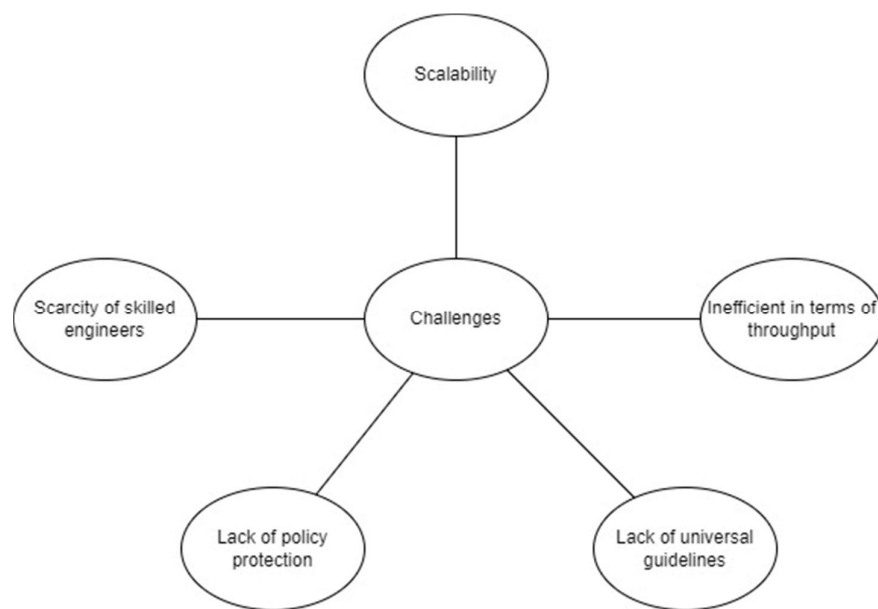


Figure 1. Challenges faced by Blockchain in Education

Path innovation promotes the development of educational innovation using blockchain technology.

V. CONCLUSION

Blockchain technology has been evolving and has created new technical foundations and useful models for educational and teaching reform. The applications and potential in the blockchain technology has been realized by not only the education industry but many other industries.

Therefore, they have invested resources such as funds and talents for diving deep into education innovation using blockchain. Presently, the application of blockchain in education is still in the preliminary stage. The application scope is very limited -it is expected that educational institutions, teachers, educational researchers and learners will hold an open and positive attitude to the impact and changes and made corresponding preparations for the extensive and in-depth application of blockchain technology.

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