

**“APPLICATION OF BLOCKCHAIN IN EDUCATION SECTOR”**



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**Application of blockchain in education sector**

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**Abstract**

Blockchain is the technology that is used to create the cryptocurrencies, like bitcoin. In the today's emerging world and rapid changes in technology, blockchain is now used in various areas like finance, commerce and judiciary etc. The disruptions in

the technology sector will have a significant impact on e-governance, institutional functions, business decisions and operations, education and in our daily life also. The adoption of blockchain in various modes of commerce, education etc. is expected to promote the development of knowledge-based economy on a wider scale. This paper will deal with how blockchain technology brings changes in the education sector and it can solve the issues being faced while it's adoption. Because education is a sector which is as important as finance and healthcare. Blockchain, this technology behind the much talked about Bitcoin, is admired as having the potential to transform the global economy due to its ability to increase transparency and trust. Why? Blocks of information that are time-stamping of life events or financial transactions are secured by complex algorithms that are hard to hack and cannot be erased and manipulated. Therefore, it has a very huge role to play in validating identity management, without the use of an independent third party. Recently, blockchain technology has gained more considerable attention from researchers and practitioners. This is mainly due to its unique features including decentralization, security, reliability, and data integrity

Blockchain use in the education sector is a new concept but school and college administrators should look ahead to the future. They should think about how to adopt this powerful technology.

## **Introduction**

Blockchain is a rising technology introduced in 2008. It was firstly used as a peer-to-peer ledger for registering the transactions of Bitcoin cryptocurrency. The aim was to eliminate all the third-party intermediaries and allow users to make their transactions directly. To achieve this, blockchain was designed as a distributed network of peer nodes. Each node in the network: carry a replica of the transactions ledger, writes an entry to its own ledger when it accept consensus from the other nodes in the network, broadcasts any transaction made by its user to the other nodes in the network, and checks, on a regular basis, that the ledger it holds is interchangeable to the ones across the network . As Bitcoin continues to grow in popularity, researchers and practitioners realize the excessive potential of its underlying technology. Blockchain's unique capabilities including immutability, transparency, and trustworthiness was then found to be useful not only in cryptocurrencies but also in many other fields. Therefore, an expanding number of blockchain-based applications have been developed in many other fields.

Ever wonder that the transactions can be completed more fast and easily without having to deal with wallet, banks and third-party applications? "THANKS TO BLOCKCHAIN". Imagine there are four friends A, B, C and D. All of them are at a restaurant. A pays the bill to the restaurant. All of them decide to split the expense amongst each other. Now, on the next day B pays him online without a hedge. Also, C and D also sends their shares to A but their transactions don't go through. It was due to some bank issues. Now A wants to know that what are the ways in which a bank transaction could fail: it can be due to some technical issues, or one of the accounts can be hacked, or the bank transfer limits may be exceeded, and sometimes additional charges like transfer charges etc. To solve this problem

concept of cryptocurrency came into existence. Cryptocurrencies are a form of digital and virtual currency that run on a technology known as BLOCKCHAIN.

Cryptocurrencies are immune to counterfeiting, they don't require a central authority, also they are protected by strong and complex encryption algorithms. In a world of thousands of cryptocurrencies like Zcash(ZEC), Ripple(XRP), Ethereum(ETH) and most famous Bitcoin. Now, suppose all of them have 2 bitcoins each as their contribution to the food they had at restaurant. Let's assume B, C, D have 3 coins in their pocket while A have 5. Firstly, B gives 2 bitcoins to A. A record is formed in the form of a block. The transaction details amongst all of them is permanently engraved in this block. This record also holds the number of bitcoins each of the friends own. So, after B's transaction A have 7 bitcoins and B have 1. Similarly, C and D also sends the coins to him and are left with 1 coin each. A record will be recorded for each of these transaction details as well as how many coins each party holds. These blocks are related to each other as each of them takes allusion from the previous one for the number of bitcoins each of the friend ownsnow. This chain of records or blocks is called ledger and this shared among all the friends which acts as a public distribution ledger, this forms the blockchain. So, what happens when B has only 1 bitcoin left and he tries to send 2 more bitcoins to A, the transaction will not go through. This is because all his friends have copies of the ledger and it is clear that B has only 1 bitcoin left. His friends will identify this transaction as invalid.

Also, a hacker will not be able to alter the data in the blockchain because each user has a copy of the ledger, the data within the blocks are encrypted by complex algorithms. All of this is made feasible with the help of blockchain technology.

Blockchain can be described as collection of records linked with each other that are strongly resistant to alteration and are protected by cryptography. It can be used in various sectors like banking, education etc.

This paper will deal with application of blockchain in education sector, because there are many records which have to be maintained for students and with the help of blockchain records like attendance, marks and grades, additional courses and diploma's also can be stored in their personal blockchain record. These records cannot be deleted so full data security is present.

## **Literature review**

Blockchain is facing expansion in the education sector. There are so many ways of the uses of blockchain in the teaching or learning process. The scope is huge and it stands on the verge of transforming the complete scenario.

Let's look at some of the small steps that have been adopted in the education field.

**MOOCs:** The 'massive open online courses' are facing a huge success that use blockchain systems and also train students to help learn and implement these.

Taking into account the high costs of higher studies, platforms like upGrad and ODEM are offering affordable costs courses to students with less fees than they can get at any other institute when they will go in physical.

Also, today we witness the adoption of artificial intelligence, distance learning like MBA students can also have choice for Symbiosis(pune) for distance learning and smart classes which are being supported by the emerging technology in almost every other institute now also. Belief is that it will soon become an important part of schools also in the coming years.

Blockchain technology allows participants to secure the settlement of transactions, achieve the transactions, and the transfer of assets at a low-cost (Tschorsch and Scheuermann 2016). Any attempt to change any information will break the existing chains.

Even Mooc courses today are providing knowledge about blockchain technology. Thus, we can say that both blockchain technology and education are helping each other hand in hand. Education will increase the awareness of this technology.

Study lives its revolution. The massive appearance of MOOCs in recent years in our daily life permits everyone to learn on numerous topics, regardless of any country or level of education. In case for personal motivation or to enrich his resume, MOOCs are now a good substitute to conventional training. It permits you to train at your own pace, anywhere and also at a lower cost.

### **The reason why the blockchain has gained so much appreciation is that:**

It is not owned by a single entity, hence it is decentralized, the data is also cryptographically stored and the blockchain is immutable, so no one can tamper with the data that is inside the blockchain. Also, the blockchain is transparent so one can track the data if they even want to. A feature that makes blockchain stand out of the crowd and endeavour it as one of the primetime technologies is the security feature. Blockchain has not been hacked by anyone as of yet. This technology uses both public and private keys to secure the blocks created on the ledger.

While making a transaction, your public key is transformed into a private key and sent to the person who you want to make a transfer to. The private key sent to the user is a hashed form or version of the crypto-currency that is to being sent to the receiver. During this transaction, your private key is secured and is also not being exchanged with anyone.

One of the main reasons that blockchain has not been hacked till now is because every block that has been created in the system has its own unique cryptographic key created and stored in the next block. In this way, every block is connected to the another, and for a hacker to hack into any one of these blocks; he has to hack into each one of these blocks stored on the ledger to gain access to the system. Even if a hacker can hack into any one of the blocks, any unauthorized difference is noted by

the system and every block in the system gets a warning, thus blocking the concerned or affected block.

### **Objectives of the study**

- To provide an introduction to MOOC Courses and how blockchain can be implemented.
- What benefits blockchain technology can bring to the education sector.
- What are problems which are being faced while adoption of blockchain technology.
- How it can change the system and bring more efficiency.

### **Methodology**

The study is based on secondary data. The study is based on qualitative research methods, using literature review and case studies to generate evidence. The research approach involves:

- Applications of blockchain technology to education sector
- Non-financial applications of this technology more generally
- Digital methods to store, secure, share and verify academic credentials

## **BLOCKCHAIN IN EDUCATION SECTOR**

### **Introduction to MOOCS courses**

MOOC stands for Massive Open Online Courses and as for the definition of the MOOC stated in the oxford online dictionary it says that, 'MOOC is a course of study made available on the internet without charge to a very large number of people and offers certificates also'

The concept of a certificate is nothing new and in education, the big 'certificates' include a student's diploma or GED. But in every field of education, students can earn certificates to provide evidence of an individual's learning achievements and this can then be used to check their readiness to progress to another grade level, and afterwards in career and vocational education programs, can measure their readiness for the workforce.

### **Advantages of MOOCs:**

1. Courses are offered for free or certificates are provided on paying a minimum amount
2. Access to courses provided by professors at the top schools
3. Courses are available to a vast or diverse audience across the globe
4. Learners' performance can be tracked easily using the data captured during the start of courses

5. Both professors and learners get worldwide exposure, thus improving knowledge sharing

6. It can be used as a tool in a blended learning program, where students can access more information than what is provided in the class.

“Even MOOC Courses today are providing knowledge about blockchain”

### **Security matters and Degree certification on College Campuses**

Unfortunately, education isn't much behind finance or healthcare when it is about data cracks. Beyond these two industries, education faced most of the data breaches in 2017. Student data, admitting it might look worthless because most young children and teenagers have less financial information, is actually welcoming a hot property among cybercriminals.

Security and authentication are becoming a big concern both on college campuses and students. Data breaches spots student records and kidnap information that can be used to create fake identifications and are sold by hackers. Safeguarding records with the blockchain make these frauds ineffective, securing students' identifications and school records. Now more schools from kindergarten to university are going digital, this could be key in assuring student privacy.

Adopting blockchain security protocols in education has its other uses as well such as defending employers against people who claim to have a degree but in reality, they don't have. Generally, people today lie about their degrees or qualifications to employers, against which proves are difficult to verify under current systems. When students enter the workplace, blockchain could also be used to assure employers that potential employees have the qualifications that they claim on their resume.

### **Issues of applying blockchain technology in education**

It is evident that there are certain drawbacks of applying blockchain in education sector. As a complicated system, some learning behaviours or learning outcomes need to be inspected by the instructors internally such as essays or classroom presentations. It is quite difficult to evaluate this type of learning activities by the pre-programmed smart contract without human interference.

If an educational blockchain system were put into operation in schools, all student's educational data would be unified into blockchain ledgers. The permanence feature of blockchain technology would operate as a double-edged sword. It abolishes the possibility of updating educational records.

The blockchain network has no basic authority, it is the very interpretation of a democratized system. Since it is a shared, common and immutable ledger, the information in it is open for anyone and everybody to look. So, anything that is built

on the blockchain is by its nature very transparent and everybody involved is answerable for their actions.

### **Advantages of blockchain in education sector**

The biggest advantage of blockchain technology is the capability for students, educators and employers to have control over the contact they make, plan material shared, information provided and the education accreditation earned. Blockchain allows for honest, peer-to-peer contacts, and as part of that technological planning, also provides customers with greater control over actions and information. This is an unimaginable and much-needed step towards the education sector as global communication, diversification, remote work and show career paths that shape the future of what higher learning and education looks like. Also, it enables cost reduction.

Blockchain technology will stimulate the end of a paper-based system for certificates. Educational institutions can publish any kind of qualification certificates or records of achievement forever and securely. Also, a possible automation issuance or record of the awards, recognition and transfer of credits. Storing and verifying the formal records of achievements completely lifelong learning are also possible with the blockchain.

Learners can record their own proof of formal and informal learning, share it with a desired public, and assure instant verified 'Lifelong Learning Passport'. Educational institutions can also start using blockchain-based cryptocurrencies to facilitate payments such as grants or other types of funding as well as students paying for their education.

Digital smart contracts can secure expedite transactions between parties. As such, Blockchain's assigned, peer-to-peer model can be a perfect companion to pool their resources for education. Managing or protecting digital intellectual property is another benefit with blockchain technology. This creates an example for researchers looking to create systems for schools, government organizations and companies. Thus, governing the exposure of important information. Blockchain allows educators to publish content openly as well as tracking any re-use, without putting limitations on the source material.

With Blockchain technology, the arrangement of automatic transfer of credits can be written as smart-contracts. Upon accomplishment of the conditions of the contract, the credits would automatically be moved. Learning activities could be registered on the blockchain can become much more interactive and reputations built on more tangible matrices.

Education is an important part of our lives. It is also the base to newer technologies. Blockchain technology is an example of such technology which can benefit the educational system. With the increase in the demand of the internet, educational stocks are right on our fingertips: in our phones and computers/laptops.

### **More transparency**

Transaction histories are getting more translucent through the use of blockchain technology because blockchain is a type of distributed ledger, all network members share the same documents as opposed to individual copies and that shared version can only be updated through consensus, which means everyone should agree on it. To change a single transaction, record would require the alteration of all the subsequent records and the conspiracy of the entire network. Thus, data or information on a blockchain is more accurate, consistent or transparent rather than when it is pushed through paper-heavy processes.

### **Enhanced safety and insurance**

There are several ways that blockchain is more secure than other record-keeping systems. Transactions must be agreed upon before they are documented. After a transaction is approved, it is encrypted and then linked to the previous transaction. This, along with the fact that information is stored across a network of computers instead of on a single server, makes it more difficult for hackers to compromise the transaction data.

### **Increased traceability**

If your company deals in products that are traded through a complex supply chain, then you're familiar with how hard it can be to trace an item back to its origin. When exchanges of goods are documented on a blockchain, you end up with an audit trail that shows where an asset came from and every stop it made on its journey.

### **Improved efficiency and speed**

When you use old, paper-heavy processes then trading anything is a time-consuming process that is prone to human error and sometimes often requires third-party mediation. By streamlining and automating these processes with blockchain, transactions can be completed more fastand efficiently.

### **Lower costs**

For most enterprises, reducing costs is a priority. With blockchain technology, you don't need as many third parties or middlemen to make guarantees as it doesn't matter that you trust your trading partner. Instead, you just have to trust the information on the blockchain. You also won't have to review so many documents to complete a trade because everyone will be having a permissioned access to a single, immutable version.



## **Conclusion**

Digital learning has become an everyday reality in the modern world. After all these courses are conducted online so study materials are kept and stored safely. Records of these courses includes discussion documents, interactive peer to peer discussions, training materials and clarifications. One can clear not only their doubts but also the doubts raised by other students studying the same course. This means a deeper understanding of the concerned course. The discussion guidelines provide quality learning time for students and professionals.

As we all know that digital life is in high demand, online education is also in high demand among students to get more knowledge. Although, it still faces problems as lack of results certification, poor privacy, data problems and the absence of sharing mechanism. Though blockchain is now being used in various fields due to the decentralized, de-trusted and reliable features. Therefore, this paper deals with the application of blockchain in education sector and the issues faced while adopting such technology.

The opportunity to help each and every student learn at the best pace and path for them is the most important benefit of digital learning. Thousands of next generation schools are prototyping the benefits of customization. One on one teaching is a good example of personalized learning, but it is quite expensive. The drastic shift to digital learning can approximate the benefits of teaching while freeing up time and efforts for teachers to address individual and small group needs. By permitting digital information to be distributed and not copied, this blockchain technology has created the backbone of a new type of internet. Formerly devised for the digital currency, Bitcoin blockchain, the technological community has now found a lot of other potential uses for the technology which can contribute to the success of all.

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