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BLOCKCHAIN TECHNOLOGY IN INDIAN EDUCATION SYSTEM

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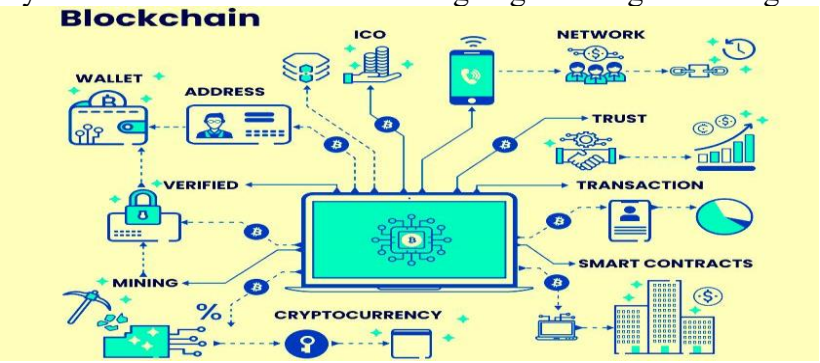
Abstract-
Blockchain is the foundational technology that allows cryptocurrencies like bitcoin to exist. Blockchain technology has been used in numerous domains such as banking, justice, and commerce as part of the fourth industrial revolution since the invention of the steam engine, electricity, and computer technology. The key blockchain-in-education applications discussed are the digitalization and decentralization of educational certifications and the enhancement and motivation for lifelong learning. The integration of blockchain technology into the education system has the potential to greatly improve the efficiency, security, and credibility of the educational process.

Keywords –
Blockchain in Education, E-learning , Bitcoin Cryptocurrency , Educational System .

1.Introduction – The global education sector has shifted from hardcopy learning materials and textbooks to online resources through the use of e-learning modules over the previous few decades. The considerable transformation in the education industry has been influenced by digitization. The major goal is to develop a prototype to examine blockchain in crucial educational sectors. Blockchain the technology behind Bitcoin came into limelight after the success of Bitcoin. As bitcoin becomes popular, a lot of researchers recognized the potential of the underlying technology. The distinct nature of Blockchain such as immutability, transparency and trustworthiness made it applicable to domains beyond Bitcoin. It is now a technology with multiple benefits for all business sectors. The biggest advantage of Blockchain technology, other than the decentralization of data, is that it is considered as one of the most trusted platforms for building secure data network and it cost effective as it removes intermediaries in distributed applications. It also offers the advantage of creating secure data that cannot be tweaked by anyone, once the data is entered in the public ledger. The education sector across the globe is one of the largest growing sectors with significant social, technical, and economic challenges. This study focuses on the benefits of Blockchain in the educational system and how to keep the blended style of student-teacher interaction going. Starting with the general idea, blockchain



is a revolutionary technology with the potential to revolutionize various industries, including education.

2.Background of the study -On Dec 28th, 2021, when Mr. Narendra Modi, Prime Minister of India at IIT Kanpur awarded the graduating IITians, the degrees based on Digital format of Blockchain, it

unveiled a new revolution and facet of Blockchain technology in education industry. Blockchains are typically managed by a peer-to-peer (P2P) computer network for use as a public distributed ledger, where nodes collectively adhere to a consensus algorithm protocol to add and validate new transaction blocks. Blockchain began with a man named Satoshi Nakamoto, who invented Bitcoin and brought blockchain technology to the world back in 2009. Students in a blockchain developer course will likely have to know a few programming languages such as Java or JavaScript.

3. Objective of the study –

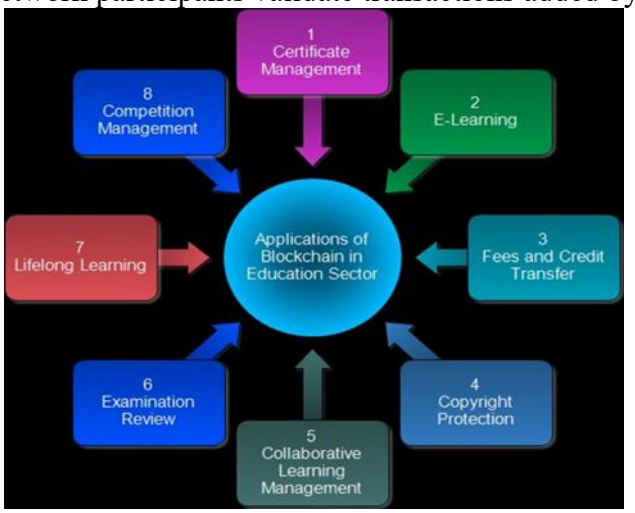
- To study the impact of perceived usefulness, perceived ease of use, and perceived risk in adoption of blockchain in education on Transformation in Education.
- To investigate the numerous factors that influence the adoption of blockchain technology in the teaching sector.
- To study the association of independent factors perceived ease of use & perceived usefulness in adoption of Blockchain in the presence of Perceived Risk.

4. Literature Review – The use of blockchain technology in education is still in its early stages, but there are already many promising projects and initiatives underway. As technology continues to evolve, it has the potential to revolutionize the way we teach and learn, and to create more equitable and accessible educational opportunities for people around the world. Blockchain technology can be used to create secure and tamper-proof digital credentials and certifications. This can help prevent fraud and ensure that employers and educational institutions can easily verify the authenticity of an individual's qualifications.

5. The state of Blockchain in education research- It is worth noting that the use of blockchain in education is still in its incipient phases, which affects the access to and the quality of available research on the topic. As Alammary et al. (2019) state, "although the volume of literature on the application of blockchain to education has been increasing in the last few years, it is still fragmented, and no systematic review has yet been conducted on the topic".

6. Proof-of-work- To implement a distributed timestamp server on a peer-to-peer basis, we will need to use a proof-of-work system similar to Adam Back's Hashcash , rather than newspaper or Usenet posts.the proof-of-work involves scanning for a value that when hashed, such as with SHA-256, the hash begins with a number of zero bits. The average work required is exponential in the number of zero bits required and can be verified by executing a single hash. Proof of Work in the blockchain is a

consensus mechanism that lets miners add a new block to the network based on the computation done to find the perfect hash. Network participants validate transactions added by the new block.



Benefits of PoW

The following are the advantages of the Proof-of-Work (PoW) mechanism:

- A hard-to-find solution. Yet, easy verification.
- Initial consensus mechanism, PoW doesn't need the initial staking of coins before mining. One can start with 0 coins, and it will go only positive.

7. Basic Terminologies in Blockchain- Blockchain is basically a public distributed database which holds the encrypted ledger. Ledger means a file that keeps on growing constantly. Blockchain principally contrasts from a database because of its decentralization feature. Each and every record in a database stored in a central server. The blockchain technology market is expected to reach a valuation of nearly $400 billion by 2028, according to a recent report by Grand View Research. This is a projected compound annual growth rate of 82.4% over the next eight years. Most of this growth can be attributed to increased interest in cryptocurrencies. However, blockchain uses in other market verticals are also expected to drive a portion of this projected growth.

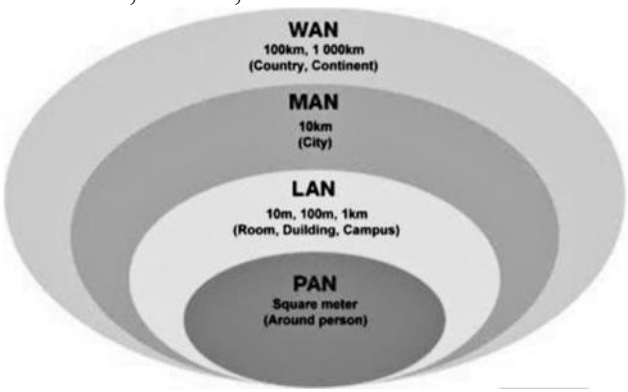
8. Discussion-

While the technology is still in its early stages of adoption in the education sector, the potential benefits are significant, and there is a growing body of research that supports its use in education.

9. Network – A computer network is a collection of two or more computers that are linked together to share resources, exchange files, or allow electronic communications. The computers on a network can be linked through cables, telephone lines, radio waves, satellites, or infrared light beams.

Types of Network :-

a) Local Area Network (LAN) - A network that is confined to a relatively small area, such as a school, building, or writing lab. LANs are typically privately owned by an organization that uses it.
b) Personal Area Network (PAN) - A network that connects electronic devices within a user's immediate area, ranging from a few centimetres to a few meters. A PAN may include wired and wireless devices.
c) Metropolitan Area Network (MAN) – A network that covers a larger geographic area by interconnecting a different LAN to form a larger network. Government agencies use MAN to connect to the citizens and private industries.
d) Wide Area Network (WAN) – A network that connects countries or continents. WANs interconnects connecting devices such as switches, routers, or modems.



10. Privacy – Privacy, also known as data privacy or information privacy, is the ability to control how personal information is used, stored, and shared. This includes information such as name, location, contact information, and online or real-world behaviour. Personal information can be collected from devices like phones and GPS, and eventually shared with third parties. Privacy is important because personal data can be misused in many ways, such as through online tracking, loss of control, or lack of transparency. Privacy is a subset of data security, which protects data from unauthorized access, loss, or corruption.
System privacy requirements define the protection capabilities provided by the system, the performance and behavioral characteristics exhibited by the system, and the evidence used to determine that the system privacy requirements have been satisfied.

11. Calculations - Both 'calculate' and 'compute' mean to work out or estimate numbers or amounts. However, 'calculate' is a more general term that involves use of mathematical operations, while 'compute' is more specific and involves use of computers, algorithms, and more complex operations. A computation is any type of arithmetic or non-arithmetic calculation that is well-defined. Common examples of computations are mathematical equations and computer algorithms. Mechanical or electronic devices (or, historically, people) that perform computations are known as computers.

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13. The Market Adoption Challenge - This section will discuss the market adoption of blockchain-in-education solutions by exploring the view of potential beneficiaries (e.g. governance stakeholders in schools, governments, etc.) towards such applications (e.g. fears, concerns, etc.) and the key parties

that may influence such adoption. The insights presented are gathered not only from available research, but also from multiple interviews led with higher education institutions and blockchain education start-ups from the United States and Europe.

14. Research methodology - The primary data was collected in the form of a survey using a Google form. The software G*Power 3.1.9.2 was used to investigate the appropriate sample size on the basis of test family t-test and Statistical Test, Linear Multiple Regression. The software calculated a sample size of 343. As larger sample sizes allow researchers to better determine the average values of their data, even though a sample size of 343 was deemed adequate, 385 valid replies were evaluated for the study. The respondents came from all around India. The programme utilized to determine the structural equation model was SmartPLS SEM.

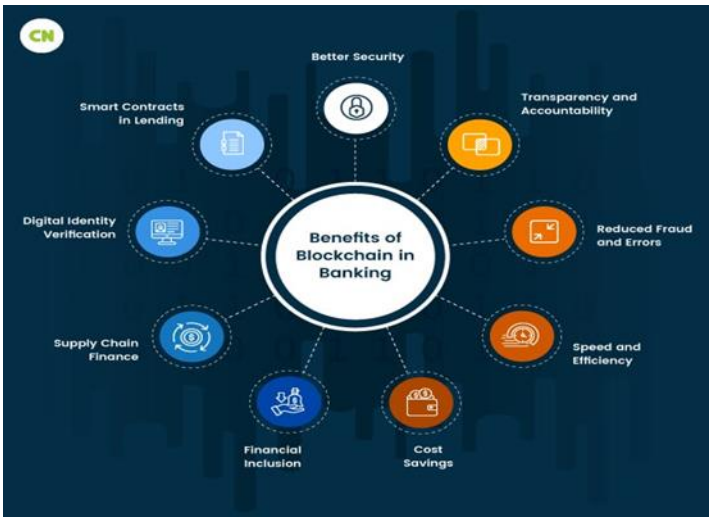
15. Limitations - Despite the numerous advantages of conducting a systematic review, there are some limitations that need to be considered: selection bias, publication bias, inaccuracy in data extraction, and misclassification . with regard to selection bias, researchers are likely to choose studies that support their claims . Yli-Huumo, et al. proposed a few technique

16. Limitations and Further study – This research still has certain limitations. The concept of blockchain technology is still very new. There is a lack of knowledge regarding how blockchain can be used in education. This study's sample size is restricted to educational institutions (knowledge providers) and students (knowledge recipients). Suppliers of blockchain-in-education solutions (e.g., start-ups) should be considered in the future to better understand the suggested paradigm. Second, blockchain is a technology that is not self-contained.

17. Banking - For banks, blockchain makes it easier to trade currencies, secure loans and process payments.
Uses of Banking in Blockchain technology :-

- Security
- Trade finance
- Alternative settlement system
- Credit
- Identity verification
- Payments
- Contract
- Audit
- Asset management
- Cost
- Fraud prevention
- Payments and remittances
- Privacy

- Transparency
- Bank
- Currency
- Fundraising



18. Conclusion- Based on blockchain technology, this paper constructed a smart laboratory information management system of Internet of Things, and designed each model layer in the system. Through experiments, the system environment of the information management system designed in this paper was deployed, and the information processing module, data processing module, and system throughput are tested in turn. In addition to this paper, there were still many problems that need to be explored and solved. In the consensus mechanism proposed, the process of node grouping can effectively guarantee the fairness of proxy node generation in blockchain and the degree of decentralization of blockchain. However, when the number of nodes in the blockchain network was small, it was impossible to effectively group the nodes to elect proxy nodes.

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