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# THREATS AND SOLUTION IN EDUCATION POLICY THROUGH BLOCKCHAIN

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**Abstract -** *Blockchain, a technology that is gaining adequate amount of attention from researchers and practitioners. This astonishing technology provides the feature of decentralization that means data is not stored on central location rather it is copied and spread across a network of computers. When a new block is updated or added in the chain, it is reflected on every system that is present in the network. Blockchain are considered as one of technologies providing powerful security. Blockchain's are dependent on cryptography which is a hashing function to achieve data security. Moreover, it also provides data integrity and reliability. This technology can play a very important role in field of banking, finance, health sector and the list goes on.*

*This amazing technology has vast scope in educational sector as it has potential to ensure the identity, privacy and security. In the present time educational industries are facing different crises that may be related to identity of learners as well as tutors. Some of the tutors are taking undo advantage of the existing system. They may perform certain illegal activities like getting employed in more than one institute, making fake or duplicate certifications, accessing the student privacy and performance, etc.*

*These all crises faced by educational system can be resolved with the help of Blockchain. As far blockchain is concerned it requires decentralized system that means we may require large amount of server which in turn makes the system very costly. hence, rather than using large amount of server we can store the data not cloud. Storing the data on cloud will make the data more secured and will provide flexibility in work practices. Also, by using cloud it will reduce the cost of data storage as compared to servers.*

***KeyWords*: Blockchain, Educational system, decentralized, secured, infrastructure, security and cloud.**

## 1.INTRODUCTION

Blockchain is appraised by numerous individuals to be a disruptive core technology. Blockchain technology propounds a great potential to foster various sectors with its unique amalgamation of characteristics, for example, decentralization architecture with built-in security to upsurge the trust and integrity of transactions, immutability to ensure the integrity of transactions by generating immutable ledgers, and transparency by sharing transaction details between all participants users involved in those transactions without any third-party implication. Blockchain technology (BT) has transfigured the exchange of information and media after the internet.

Blockchain has been canvased as a path-breaking innovation and the forerunner of a fresh lucrative period. Blockchain technology blends cryptography and distributed computing to provide a communal consensus algorithm to securely exchange value as it also provides us with better security since it uses public key infrastructure that protects against malicious actions to change data and efficiency in terms of cost, settlement speed, and risk management. Despite this growing interest and numerous advantages, little is known about the current state of knowledge and practice regarding the use of blockchain technology in the education system. Only a small number of educational institutions have started to utilize blockchain technology. Blockchain technology could become a standard format for issuing academic credentials shortly.

It's a complex task to run and manage the education institute. To overcome that issue we can make use of blockchain which may bring a big revolution in National Education Policy(2020).In this paper, it makes an original and timely contribution to the literature of educational technology by defining how blockchain technology is being utilized in crises of an educational system where fake or duplication of the certification or degrees of a teacher takes place and every teacher eligibility Test (TET) which will be conducted by National Testing Agency (NTA) those who qualify TET, will appear for interviews. So, as we stated there will be high chances of corruption and faking of data. It is one of the major issues in our educational system Looking towards this problem it can be resolved by blockchain technology where there will be a decentralized process for all faculties, like the data can be processed in different nodes and same data is accessible to government officials so that there could not be any collision but they can identify real and fake data very easily.

For a student aiming to build a career in the teaching sector, the marks play a vital role in the supply of knowledge that students could trust to judge their success at school or their potential in learning. But student marks modification is another growing issue, where the marks are stored on the university level and the university has to maintain the record of each student on their server. In case,

if someone knows the username and password of the system, he/she can easily modify the student's marks, and then afterward it can be very difficult to trace out the changes made in the system. These issues require a proper solution where blockchain can play an important role as it is one of the good technologies that will identify all these issues. One has to handle the decentralized system through blockchain in which no one can directly modify data. This can be done by the authentication process where we can provide with two-three step authentications and once verified and authenticated then only he/she can modify data.

## 2. LITERATURE SURVEY

This system is proposed by Qin Liu, Hongming Zhu, Qingchen Guan, Gill Green, Xiaowen Yang, Shaohan Yin. The proposed system uses the transparency and non-tampering features of blockchain. There exists information asymmetry between an educational institution and the industries. The current student data is not up to the mark with limited data without any history records which can have a great impact on an individual profession. There also exists the issues like diploma fraud, academic fraud, resume fraud and industries also lack verification of these things, as a result, the government and companies cannot obtain complete information about the student which may raise distrust between the universities and companies. This system uses certificate authority service and transactions with the help of the Hyperledger framework. This system increases the role of universities and companies and enables them to share the data transparently so that information symmetry is achieved. Transparency of blockchain is fully applicable in the student credit system, employment system, academic management, qualification certificate, etc. Blockchain provides digital proof of achievements evidence of authority for academic disputes and also reduces manpower and time. The system has proposed a new way for educational institutes and industries to share information transparently, also achieves information symmetry among student skill and knowledge. The system also contains certain drawbacks which can be overcome. The system has a Hyperledger Fabric CA server and Hyperledger Fabric orderer on a single node which makes the system fragile. The system also lacks backup and restoration. It also needs more API to import and export data. The authentication must be made more powerful.[1]

This paperwork has been published by Bin Duan, Ying Zhong, Dayu Liu which proposes an education blockchain technology base on learning outcomes that are predicated on the graduation demand index of the university, with skilled certification and uses machine-driven analysis code as a tool. Here, the issue was at the educational institutions where they have long monopolized the performance of learning certification, whereas learners, lecturers, and fellow learners have almost no autonomy for the educational method and results. However, the normal college-focused school room learning is slowly dynamic with the event of technology, correspondingly, long learning, on-line learning, mobile learning, and distributed learning supported project or realistic problem is turning into a more common. Electronic Learning Contract (ELC) could be an incessantly renegotiable working agreement between students and lecturers for assessing the outcomes of scholars as it focuses on cluster decision making by electronic conferences. But looking towards the technology of blockchain and online learning space, the education blockchain, and the smart contract model was used to improve the implementation of ELC. In this, the course-learning outcome accomplishment values, that is predicated on the quantitative and qualitative combination of grades, process and proofs, the course name, learning outcome name and therefore the weight of the course, etc. including the area unit all recorded within the block. In this educational blockchain, graduated students have not only diplomas however reached data that has constituted index capability of graduate demand throughout the learning method. Additionally, it conducted an assessment for learning outcomes, supported blockchain records by the third party, learn the interpretation of the result, and provide learning content for learners that might reach graduate necessities and most fitted their interests and supply leading that means for students' learnings. On account of the tutorial plan of OBE outcome-oriented, once the index points of graduate need set by majors are finished, it reaches the graduate standard and will award credentials to learners. Finally, the conversion from analysis of student's accomplishment to the post-job ability analysis results was successfully implemented using the blockchain technology.[2]

This system is projected by Muhamed Turkanovi., Marko Holbl, Kristjan, Marjan Heri, And Aida Kami Ali. Blockchain technology permits the creation of a suburbanized setting, wherever transactions and information aren't under the control of any third-party organization. Any transaction ever completed is recorded in an exceedingly public ledger in an exceedingly verifiable and permanent way. Based on blockchain technology, propose a global higher education credit platform, named EduCTX. This platform is predicated on the conception of the European Credit Transfer and Accumulation System (ECTS). It constitutes a globally trustworthy, decentralized higher education credit and grading system that can give a globally unified viewpoint for college students and better education establishments (HEIs), as well as for alternative potential stakeholders, like firms, establishments, and organizations. The projected system can exploit the advantages of the blockchain, as a decentralized design, giving security, anonymity, longevity, integrity, transparency, immutableness, and world scheme simplification, to make a globally trustworthy instruction credit and grading system. The EduCTX blockchain platform is visualized for processing, managing, and dominant ECTX tokens as educational credits and resting on a globally distributed P2P network, wherever peers of the blockchain network are Higher Education

Institutions (HEI) and users of the platform are students and organizations. The ECTX tokens represent a similar to student's credit value for completed courses, like the ECTS credits. Whenever a student completes a course, his/her home HEI can transfer the suitable variety of ECTX tokens to his/her blockchain address. The transfer data is kept on the blockchain, wherever the subsequent information is stored: (1) the sender is known because the connected HEI with its official name, (2) the receiver - student is anonymously bestowed, (3) token - credit price, and (4) course identification. moreover, exploitation his/her blockchain address, the scholar because the receiver of ECTX tokens is going to be ready to globally prove his/her completed courses, without any administrative, script, or language obstacles by merely presenting his/her blockchain address. For the sake of security, students are going to be allotted a 2-2 multi-signature address by their home HEI, therefore they're going to not be ready to transfer any of the gained ECTX tokens to alternative addresses the method of assignment students with ECTX tokens and their ability to prove the possession of these are going to be handled through a straightforward to use EduCTX blockchain API consumer, therefore creating the utilization of the EduCTX platform as intuitive as doable.[3]

In blockchain applications data are keep by encrypted cluster signature to, together with shared algorithms, solve the matter of anonymous abuse. These options for data storage and validation are the key issues for the effective use of education in blockchain, during which a large quantity of knowledge in terms of diplomas and degree certificates is changed among institutions. the upper education sector is thus a possible user for blockchain technology in terms of sensible contracts, because of its capability in permitting stakeholders to validate learning records and identity management, for instance. this might allow establishments to determine with that other instruction establishment (HEIs) to share data, thus avoiding those trustworthy qualifications (diplomas or certificates) could counterfeit or falsified also reduces the error. Firstly, literature posits that Blockchain provides a digital and decentralized learning infrastructure to all or any stakeholders through learning platforms, of relevant knowledge security for body use and with versatile style in terms of shared compliance for call making. It permits us, thus, to create links between various universities in tutorial programs, to boost governance by supporting the management in instruction with innovative resource allocation, and to reinforce its human resources effectiveness and digital competency. Secondly, with relevance HEIs, Blockchain permits rising technology in terms of securing and sharing authentic digital certificates, whereas, for students, it guarantees the safe sharing of essential tutorial knowledge between them and key agents equivalent to sponsors, editors, loan suppliers, and employers. Additionally, Blockchain application is especially helpful for students, with relevance to the certification method and knowledge management in engineering education, connected with the acquisition of technical knowledge through experimental methodologies. Thirdly, the literature suggests Blockchain technology as a large contribution for all stakeholders because it permits the facilitation of information organization, as an instance within the case of provision certificates, to stop counterfeit or falsified documents and making certain its privacy. Hence, it allows, safely and by a localized platform, the moving of students' learning records from one establishment to another, between sponsors and students, employers and students. Furthermore, it facilitates student quality programs and shares items of writing between authors and editors.[4]

The system is proposed by Shadab Alam, Huda Abdullah Yousef Ayoub, Rafan Abdulhaq Ahmed Alshaikh, Asmaa Hayawi Hussein AL-Hayawi. The authors have discussed the different aspects of blockchain technology. It states that a blockchain is a good approach for storing data, executing transactions, etc. The research offers detailed information regarding the security and privacy of blockchain and finally, it proposes reliable student record management. The study focuses on the issue of protection which may increase financial and human resources. The author focuses on three key themes those are blockchain in education, opportunities that blockchain could bring in the existing educational systems, and complexities to implement blockchain technology. The research is proposed to assess varied aspects of blockchain protection and privacy with its implementation in the educational industry. The study supports a blockchain-based software for tracking student's records and includes student's immutable documents that can be checked at some point in the process. The system preserves student's details and allows students to use them in the future. The advantage of using blockchain in education is the data stored in the blockchain is accessible and verifiable anytime with proper accountability. It helps in the verification and authentication process and hence may reduce human resources. It assists the educational sector by providing a secured platform for sharing data, increasing trust, reducing cost, and increasing accountability. It avoids tampering /fraud by preserving the data. Issues for defining blockchain in education are smart-contract cannot examine extra learning activities like essays and educational presentations, extra-curricular activities hence human involvement is needed in this type of evaluation. As blockchain is immutable, it reduces the possibility to delete or modify the data. Blockchain is a revolutionary system that permits people to record transaction scattered, public logs without any involvement of central authority.[5]

A system that records the information in such a way that, it makes it a hacker impossible to change or cheat the system defines as a blockchain. A blockchain technology (BCT) is widely used and has become a need of almost all industries including the education sector. Using such

technology, the authors Boris Dudder, Vladislav Fomin, Tan Gurpinar, Michael Henke, Mubashar Iqbal, Viktorija Janaviciene, Raimundas Matulevicius, Natalia Straub, and Haiqin Wu, has focused on essential wants of university education, the necessity to develop and deliver online courses, the necessity to interact in international cooperative projects, and also, they ought to develop systematic, knowledge domain problem-solving approaches. This also included a method for combining specific disciplines in the modular online course for universities, master programs, and job-trainings through European cooperation to promote interdisciplinary blockchain education. The design of the model named "Blockchain Network Online Education for interdisciplinary European Competence Transfer" (BlockNet) will be proposed by the authors in which they presented conceptualization interdisciplinary education based on a BCT which is a development on "BlockNet" projects. BlockNet project epitomized the final academic and therefore the specific blockchain-related essential wants by combining the progressive from empirical and educational analysis, transportation along with the relevant disciplines like the four scientific disciplines i.e., security engineering: to see education perspectives for BCT, economics and finance, supply chain management and computer science, also including its methods which help in building a knowledge base, and at same time domain-specific. The domain-specific competence model was developed within the BlockNet collecting the professional requirement and the competence items which were clustered within a Europe-wide analysis. The development of the knowledge domain course expands the horizons of every of the taking part in their vision and understanding of what BCT is and the way it is often applied to handle todays and future business desires. Significantly, the realization of the project creates new information and experience on the success and risk factors of international and knowledge domain cooperation, the quality to be of utmost importance to educators within the years to come back. After this procedure, the model was completed and described the competence level of each item for online courses in the future. Finally, the team designed a didactical and organizational concept for the interdisciplinary blockchain modular online course based on the model by deploying methods for active digital learning.[6]

The paper is a review considering the use of Blockchain in various parts of the educational system. It is conducted by Ali Alammary, Samah Alhazmi, Marwah Almasri, and Saira Gillani. This article mainly focuses on three parts (1) educational applications that have been developed with blockchain technology, (2) benefits that Blockchain technology could bring to education, and (3) challenges of adopting Blockchain technology in education. This review has discussed the basics of Blockchain along with the areas in which it can be effectively used. This review was performed with the help of guidelines by Okoli and schabram which contains eight different steps. The study states the application developed with Blockchain technology for educational purposes, Benefits of Blockchain in education, challenges of adopting Blockchain in education. The application of Blockchain is grouped into categories. Category one contains the Application of Blockchain is related to certificate management in which it handles all forms of academic credentials, transcripts, students' certificates, or any other forms of accomplishment records also digital certificates are taken into consideration. Category two contain application about competencies and learning outcomes management in which Greater attention was paid toward building some Blockchain applications to improve the learning objectives and enhance the attainment of competencies within the educational scope. Category three has applications related to securing a collaborative learning environment that focuses on the significance of using a Blockchain to support the learning environment. Category four has Applications related to fees and credits transfer. Another category concerns competition management, which utilizes Blockchain technology to facilitate managing competition operations and to enhance its efficiency and transparency, and many more. Blockchain technology could bring significant benefits to education, including high security, low cost, enhancing students' assessments, better control of data access, enhancing accountability and transparency, identity authentication, enhancing trust, improving the efficiency of students' records management, supporting learners' career decisions, and enhancing learners' interactivity. Despite the potential of Blockchain in education it also carries various challenges that should be taken under consideration such as security, privacy, cost, scalability, and availability. This review states that all the challenges should be resolved before adopting them in educational systems.[7]

This system is proposed by Akshay Karale, Harmeet Khanuja. In this, they have stated that educational systems can make tamper-proof certificates as well as can verify those with the help of blockchain. By using blockchain in education, it can reduce overall frauds and tampering of degrees or certificates. The verification of different types of documents takes place by the central authority or central institution we are a very time-consuming process. This system is built upon the Proof Of Work algorithm. This algorithm is the consensus algorithm that is used by many of the popular cryptocurrencies. The implementation of blockchain in education stated here is that the learner gives input his personal information with the Unique id and then the information is kept on to the learner's Blockchain. Afterward, the data is sent for verification to the respective verifying institution. After successful verification of the data, the success token is sent to the learner and then the data is safely stored onto the corresponding of the given type of the institute's private blockchain network. The certificates are stored digitally onto the blockchain network with the generated hash. The system also contains a digital signature feature to validate whether it is signed and checked by the valid user or not. The advantages of this model are data is

stored securely with the help of different authentications, it increases the speed of operations and hence helps the educators to store data quickly, most of the resources are open source which in turn reduces the cost. The drawback of this system may be that it is immutable i.e., we cannot modify the data once it is stored, as it is stored on a distributed system in a decentralized manner the data leak may happen which in turn challenge the security and privacy of the data, if the digital signature gets copied by some unauthorized user, then it may be inevitable to stop it. It is a great challenge to maintain data integrity in terms of blockchain.[8]

## 3. METHODOLOGY

Education, one of the most important aspects which can't be achieved without a teacher. A child can't even think of shaping his life and future without a teacher. It's a teacher who reaches the nation to the summit of success. However, it is very important to ensure there exists the quality of teacher education, deployment, recruitment, empowerment of teachers, and service conditions, at the desired level but actually, it is not. According to the Justice J. S. Verma Commission (2012) constituted by the Supreme Court, a majority of stand-alone TEIs- over 10,000 in number are not even attempting serious teacher education but are essentially selling degrees for a price [9.1]. He wants to clearly state that a broken teacher education sector is putting millions of children at risk. The low quality of teacher educators, the gaps in teacher's accountabilities and the acute scarcity of institutional capacity to prepare teachers have further plagued the teacher education system. This skill mismatch has created a huge amount of learning crisis in the Indian education system. Looking towards the crisis faced in our education system, the whole education system needs to be updated as soon as possible. Everything from what to learn, how to learn, and why to learn needs to be remodeled and redefined as the learning needs of the current generation of learners have outgrown the current education system's capability.

Therefore, New Education Policy (NEP) came into existence. As per the new policy 2030, the main goal is to ensure to produce a quality of teachers to safeguard the future of

Students. They proposed an idea of the minimum degree required for teaching will be a four-year integrated BEd. However, this BEd course will be modified consequently. Dual BEd degrees with a spotlight on one language and having bilingual lectures are offered too. BEd programs can enable specialization within the education of 'gifted children. One and two- year BEd choices will be obtainable. Two-year-BEd is for candidates having a Bachelor's degree, and one-year BEd programs are offered solely to those who have completed the equivalent of a four-year multidisciplinary Bachelor's degree or who have obtained a Master's degree.

Apart from this, the Teacher Eligibility Test (TET) will also be modified as per the new system. Earlier, the TET was divided into two parts- Part 1 and Part 2. Now according to New Education Policy, the school structure has been divided into four parts- Foundational, Middle, Preparatory, and Secondary. TET will also be developed consequently. For subject teachers, appropriate TET or the National Testing Agency (NTA) will take a look at scores of the test within the corresponding subjects and also be taken into consideration for recruitment. The NTA can hold exams for all subjects and a common aptitude test and only those who qualify for TET can demonstrate or appear for interviews and express their knowledge of the local language. As per the NEP, "Interview will become associate integral as a part of teacher hiring" [9.2].

Additionally, smaller post-B.Ed. certification courses will be made widely obtainable, at multidisciplinary colleges and universities. Although, there are a lot of chances for illegal activities to take place during these interviews, aptitudes, and certification courses. Fake certifications/documents can easily be created and assisted. Also, at the time of aptitude marks can be tampered with ease. During the interview process in existing systems, the proper validation does not take place, and hence validating with a fake degree can easily be selected, and in turn, we fail to produce quality teachers. It is very necessary to tackle all these problems to avoid any malpractices in the education system.

All these are possible only if there is transparency in data like in Blockchain. Blockchain in the education sector is currently providing a far better way to escape from challenges. blockchain in education will bring an enormous revolutionary change that transforms the education sector to the next level. There are lots of use cases of blockchain in education and it all at once together helps in bring a healthy education system.

According to the New Education policy of India, every person who is a teacher by profession should be B. Ed degree holder. Recruitment agencies should be able to identify the fake degrees and certifications, so that the purpose of NEP may be fulfilled. It will be a tough task to evaluate the teachers at the time of recruitment also the proper verification and validations of a person's identity should be carried out. These all tasks may require a lot of time and human resources which may not be feasible everywhere.

If this process is implemented using a blockchain then the country may end up with quality teachers and will truly shape the future of the new generation. With the help of blockchain, only the students having an authentic BEd degree will be recruited. Moreover, the educational system implemented using block-chain can store valid data of students as well as all the authentic certifications which are obtained during the tenure of education can also be stored.

Block-chain helps to maintain data integrity and security of data. If blockchain is used in education then the data stored in it is immutable which means nothing can be altered or modified.

In the proposed methodology, the candidate who is having qualifications and is aiming to work in the teaching field has to opt for a BEd degree in TEIs or HEIs. The TEIs and HEIs offering BEd degrees are connected in a distributed network containing blockchain. During the admission process regarding BEd degree, the institutions may upload initial valid documentation of the candidate as per the algorithm proposed by HEI's and TEI's and the details of the candidate are encapsulated in blocks. These blocks are then verified by other nodes in the network. The levels of verification can be established according to the requirements.

As per NEP, during the BEd course candidate has to pursue different multidisciplinary skills which in turn may result in different authentic certifications and those can be stored in blockchain for future betterment. After the completion of the course, candidates have to appear for the teacher's eligibility test (TET) which is nothing but an aptitude test for all subjects as well as a common aptitude test. The candidates aspiring for subject teacher has to appear for both tests. All these tests will be conducted by National Testing Agency and these NTA centers are connected in a network of blockchain. Whenever a candidate sits for an exam the score which he has achieved will be directly saved in nodes of blockchain. This will stop tampering of marks as blockchain is immutable and hence only the deserving candidate will be taken forward for interviews.

Some of the data may be publicly available for the recruiting agencies to validate authentic degrees and certifications and hence the recruitment of fake degree holders will be stopped. Moreover, educational policy has stated that the interviews should be conducted in the local languages. Hence to ensure this practice, the interviews can be recorded and can be added to the blockchain so that NTA can verify them. Once the data is stored in the blockchain network it cannot be changed again.

This may result in the production of high-quality teachers, data integrity, and credibility, also efficiency will be achieved.

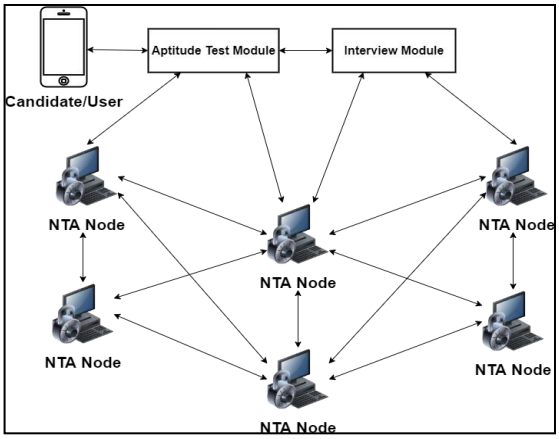


Fig1.Testing Diagram

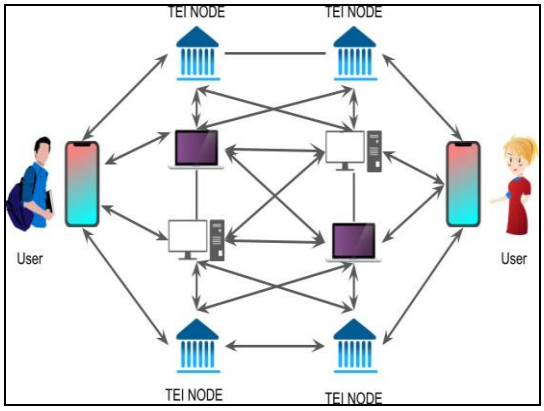


Fig2. Methodology

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## BIOGRAPHIES

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"Passionate, hardworking, driven and fearless person to discover new things and always try to implement in upcoming world "

"A complete resourceful person and ability to complete all the task with dedication, energy and cheerfulness"

"A highly ambitious, analytical mind, self-motivated, dedicated and hardworking individual with willingness to learn new skills"