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Survey on EDUCHAIN: A Blockchain-powered ELearning Marketplace with Social Impact

Devendra Chahuan[1], Sayan Khan[2], Ri2k Jain[3], Harsh Gupta[4], Dr. Vidya Chitre[5]

Department of Informa-on Technology, Vidyalankar Ins-tute Of Technology1,2,3,4,5
Mumbai, India

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ABSTRACT—Blockchain technology has gained popularity in the education sector due to its potential to address various challenges such as fraud prevention, security, and transparency. Educhain is a blockchain-based platform that aims to transform the education industry by providing secure and efficient record-keeping and verification of educational credentials. This survey on blockchain examines the current state of research on blockchain in education, highlighting the advantages and limitations of using this technology. A comparison of Educhain with other blockchainbased e-learning platforms is also presented, emphasizing its unique features and advantages. The paper focuses on deliberating potential areas for future research and development in the field of blockchain technology in education.

I. INTRODUCTION

Education is an essential aspect of modern society, and technology has transformed the traditional educational landscape. E-learning platforms have made it possible for individuals to access education from anywhere, at any time, and at their own pace. Despite the convenience offered by these platforms, several challenges still exist, such as the lack of transparency in course material ownership, course quality, and certification. Additionally, the traditional educational system often fails to equip students with the necessary skills and knowledge required in the rapidly evolving job market.

Blockchain technology has emerged as a disruptive force in several industries due to its unique properties. Blockchain is a decentralized, distributed ledger that maintains a tamper-proof record of transactions, making it virtually impossible to alter or manipulate the data. Blockchain can provide a transparent and secure platform for e-learning by ensuring that all course materials are owned by the rightful creators, and any transactions related to course selling are recorded immutably on the blockchain. Furthermore, blockchain can enable the creation of decentralized education systems that offer more flexibility, accessibility, and affordability to learners worldwide. It can also ensure the authenticity and credibility of educational certificates, which is crucial in the job market.

To address the challenges faced by existing e-learning platforms and leverage the benefits of blockchain technology, we propose a blockchain-based e-learning platform that enables users to upload courses and other users to buy courses where a commission of the course price goes to the platform, the course creator, and a small commission to NGOs associated with the platform. The NGOs can buy courses from the commission collected from the course selling, and the NGO students can learn from that course. The platform leverages blockchain technology to offer several benefits, such as transparency, immutability, and security. The platform also provides NonFungible Tokens (NFTs) as certificates for successful course completion, which can be verified and shared easily.

This platform can revolutionize the e-learning industry by providing a transparent, secure, and accessible platform for learners and educators alike. It can help bridge the skills gap by offering courses that are designed to meet the demands of the job market and providing learners with the necessary skills and knowledge. Additionally, the platform can enable learners from underprivileged regions to access quality education, as the platform is accessible from anywhere in the world. The platform can also benefit the creators of educational content by

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ensuring that they are fairly compensated for their efforts, and the commission earned by NGOs can be used for social causes, thereby promoting a more sustainable and equitable education system.

II. RELATED WORKS

Blockchain technology has emerged as a promising solution for various challenges in the education sector, including improving transparency, security, and efficiency. Several papers have explored the potential of blockchain in e-learning assessment and certification, including the use of smart contracts to automate the process and eliminate intermediaries.

In [1], "A Blockchain System for E-Learning Assessment and Certification," which proposes a decentralized blockchain network to provide a tamper-resistant and immutable record of assessment results and certifications. The use of smart contracts reduces administrative overhead and minimizes the risk of errors or fraud. However, the paper does not provide a comprehensive evaluation of the proposed system's performance, scalability, and security properties, which may limit its practical applicability.

In [2], "Blockchain Technology in Peer-to-Peer eLearning: Opportunities and Challenges," highlights the key features of blockchain technology, such as distributed computing, consensus mechanisms, and cryptographic security. The paper identifies one specific use case of blockchain technology in peer-to-peer e-learning and offers recommendations to mitigate challenges and increase the usability and popularity of blockchain technology in peer-to-peer e-learning. However, the paper only focuses on one specific type of e-learning, i.e., peerto-peer e-learning, and does not consider other forms of elearning.

In [3], "A blockchain-enabled e-learning platform" proposes a blockchain-based e-learning platform that leverages the benefits of blockchain technology, including increased trustworthiness due to added transparency and provenance, versatile privacy controls for learners, and increased transparency of assessments. The personalization features and user interface are highly praised, and all participants rated the system positively, expressing interest in enrolling in a platform like this in the future.

Platform	**Features**	**Commission Structure**	**NFT Certificates**	**Focus**
EduChain	Course creation and purchase, NGO support, NFT certificates	Yes, supports NGOs	Yes	Social impact
A Blockchain System for E-Learning Assessment and Certification [1]	Tamper-resistant assessment and certification records, smart contracts	Not mentioned	Not mentioned	Assessment and certification
Blockchain Technology in Peer-toPeer eLearning: Opportunities and Challenges [2]	Distributed computing, consensus mechanisms, cryptographic security	Not mentioned	Not mentioned	Peer-to-peer elearning

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A blockchainenabled elearning platform [3]	Increased transparency and trustworthiness, privacy controls, personalized features	Not mentioned	Not mentioned	General elearning
Noordex	Course purchase across various subjects	No commission structure	Not mentioned	General elearning
Edublock [4]	Verification of academic credentials	No commission structure	Not mentioned	Verification of academic credentials
Plato	Course creation and participation	No commission structure	Not mentioned	General elearning

III. METHODOLOGY

The purpose of this paper is to examine the existing literature on blockchain-based e-learning platforms that take payment in tokens and evaluate their effectiveness in providing efficient and secure payment options for tutors, while also generating revenue for the platform and supporting NGOs. Additionally, the project aims to utilize the blockchain to provide transparency and trust in social welfare for NGOs by tracking the funds transferred on-chain and recording the authentic validation of course completion through NFT certificates. The paper focuses on selecting the correct blockchain which addresses challenges related to scalability, interoperability, and transaction fees.

The target population for this survey is anyone interested in elearning platforms that use blockchain technology for payment and revenue sharing, including educators, students, developers, investors, and other stakeholders in the education industry. In this paper, we have reviewed and analyzed multiple research papers that focus on blockchain and e-learning platforms, token payments, revenue sharing, and PoS blockchains.

The data for this paper was collected through a comprehensive search of online databases and academic libraries for relevant research papers on blockchain-based e-learning platforms. The data collected from the research papers were analyzed using descriptive statistics and thematic analysis to identify key themes and trends in the literature.

The paper relies on previously published research papers and may not capture the full range of opinions and experiences of stakeholders in the education industry. However, based on the literature review and analysis, this paper concludes that blockchain-based e-learning platforms that use token payments and revenue sharing have the potential to provide efficient and secure payment options for tutors, while also generating revenue for the platform and supporting NGOs. Moreover, blockchain can provide transparency and trust in social welfare for NGOs, and NFT certificates can record the authentic
validation of course completion

IV. PROPOSED METHODOLOGY

1. User Registration: The first step is to register on the elearning platform using blockchain technology. The user can register either as a learner or a tutor. The registration process involves providing basic information such as name, email address, and password.
2. Browse Course: Once registered, the learner can browse through the list of courses available on the platform. Each course has a fixed price, and a portion of that amount will go to an NGO supporting education.
3. Purchase Course: After selecting the course, the learner can make the payment using a cryptocurrency supported by the blockchain

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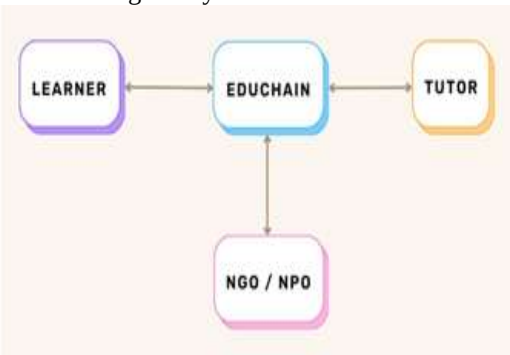
network. The payment gateway is secured by smart contracts that ensure the transaction's transparency and security.

4. Course Access: Once the payment is verified, the learner can access the course material. The course content is stored on the blockchain network, ensuring that it is tamper-proof and immutable.
5. NGO Contribution: A portion of the course fee paid by the learner goes to an NGO supporting education. The platform has a built-in mechanism for transferring funds to the NGO's wallet address, ensuring transparency in the process.
6. Course Upload: The platform allows learners to upload their own courses and become tutors. The uploaded courses are verified by the platform's administrators to ensure their quality and relevance to the platform's users.
7. Course Purchase: Other learners can purchase the courses uploaded by tutors using the same payment mechanism described above.
8. Blockchain Network: All transactions on the platform are recorded on the blockchain network, ensuring data security and immutability. The platform uses smart contracts for automating various processes, such as immutability, enhancing the trust and transparency of the system. Overall, the proposed e-learning platform has the potential to address some of the challenges of traditional elearning platforms, and by supporting NGOs, it can contribute to the goal of democratizing education globally



V. CONCLUSION

In conclusion, the e-learning platform proposed using blockchain technology has the potential to revolutionize the traditional model of e-learning by offering a decentralized, secure, and transparent platform for learners and tutors. With the added feature of supporting NGOs, the platform enables learners to contribute to a noble cause while gaining knowledge themselves. The platform offers a win-win situation for everyone involved, as NGOs can access quality educational material for their students, while learners can avail of a plethora of courses at reasonable prices. Additionally, the platform's peer-to-peer nature allows learners to become tutors, further democratizing the education system. By leveraging blockchain technology, the platform ensures data security and payment, course verification, and fund transfer to NGOs.

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