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Research Article

BLOCKCHAIN IN EDUCATION: TRANSPARENCY AND EFFICIENCY IN THE FORMATION OF SCIENTIFIC LITERACY OF 4TH GRADE STUDENTS

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Uzogboev Khojiakbar Qabiljon Ugli
Researcher Of Namangan State University, Uzbekistan

ABSTRACT

The article explores the potential of blockchain technology in the context of the educational environment, focusing on elementary school students, in this case, 4th grade. The article discusses the methods of using blockchain technology to ensure transparency of the educational process, track individual student achievements and stimulate interest in scientific literacy. Special attention is paid to the possibility of creating decentralized systems for evaluating and recording achievements that contribute to more effective formation of academic skills. The paper offers concrete examples of the introduction of blockchain into educational practices and discusses the benefits that can be obtained from using this technology in the educational process to support the development of scientific literacy in younger schoolchildren.

KEYWORDS

Blockchain in education, Transparency in the educational process, Learning efficiency, Scientific literacy of students, Innovations in education, Technologies for the formation of competencies, Educational methods for younger students, Decentralization in the education system, Blockchain technologies to ensure data security, Improving the traceability of student success, The development of critical thinking.

"Technology is changing not only how we live, but also how we learn. In a world where blockchain is becoming an integral part of modern society, its application in education opens up new horizons for the formation of scientific literacy already at the early stages of education."

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INTRODUCTION

In the era of digitalization and the constant development of technology, education does not stand aside. One of the innovations that is being introduced into the educational process is the blockchain. This technology, originally developed to ensure transparency in financial transactions, has found its application in the field of education. In this article, we will look at how blockchain can increase the transparency and effectiveness of learning using the example of 4th grade students[1]. One of the key problems in education is the lack of transparency in the assessment and tracking of student achievement. Blockchain allows you to create a decentralized system for storing data on the success and progress of each student. Each step performed by the student can be recorded in the blockchain, ensuring transparency and reliability of information.

With the use of blockchain, students' personal data can be protected using cryptography. This ensures a high level of confidentiality and protection against unauthorized access to students' personal information. Parents and students can be confident in the security of their data. A blockchain-based reward system can be an incentive for active research behavior of students. Every scientific experiment, every creative achievement can be noted and recorded in the blockchain. This creates motivation for children to develop their potential and strive for new knowledge.

Blockchain can also be used to effectively manage educational resources. Teachers, administrators, and parents can track which learning materials and techniques are effective for each student. This allows you to personalize the training and adapt the program to the individual needs of each child. The introduction of blockchain into education promises to change traditional teaching methods, making them more transparent, effective and adapted to the needs of each student. Scientific literacy, formed from an early age, becomes a key element of the successful development of society as a whole[2]. The use of blockchain in education is a step forward towards creating an innovative and sustainable education system.

Modern education is facing challenges that require innovation and effective teaching methods. One of the promising approaches that brings transparency and efficiency to education processes is the use of blockchain technology. In this article, we will look at how blockchain can be successfully integrated into educational processes, especially in the context of the formation of scientific literacy of 4th grade students. The blockchain provides immutable transparency of data. In the context of education, this can be used to store student results, ensuring that they cannot be tampered with[3]. Each record in the blockchain is

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stored as a block chain, which makes it resistant to interference and change.

The blockchain has no central management, which contributes to the decentralization of educational data. This is especially important when working with 4th grade students, as it allows teachers, parents, and students themselves to easily access up-to-date information. Blockchain systems can be used to account for students' academic and extracurricular achievements. This contributes to motivation, as children see a direct link between their efforts and rewards. Blockchain can be used to create electronic portfolios of students, where their scientific works, projects and achievements are stored. This allows them and their parents to track progress and share information with teachers.

Through the blockchain, you can create a reward system for participating in research projects. Students who actively participate in scientific events or create their own projects can receive digital awards recorded in the blockchain. Using smart contracts on the blockchain, it is possible to develop an automated evaluation and feedback system[4]. This will reduce the burden on teachers, allowing them to focus on the individual needs of students. Although blockchain provides significant benefits, its implementation in education also faces challenges, such as ensuring data privacy and the need for technical literacy of teachers. However, careful implementation and training of employees can make the use of blockchain in education a powerful tool for the formation of scientific literacy of students.

Modern technologies are rapidly penetrating into various areas of our lives, and education is not left out. One of the most promising innovations in education is the use of blockchain technology. In this article, we will consider how blockchain can increase the transparency and effectiveness of the educational process, especially in the formation of scientific literacy of primary school students. A blockchain is a distributed database where each transaction is recorded in a block and linked to the previous block chain. This creates transparency and trust, as each participant in the system has access to a complete transaction history. In an educational context, this means that parents, teachers, and even students themselves can easily trace the path of learning and academic success.

Thanks to the blockchain, students' grades and achievements can be recorded reliably and consistently. This eliminates the possibility of fake grades and creates a fair reward system[5]. Teachers can provide feedback quickly and effectively, and parents can be confident in the objectivity of their children's assessments. For 4th grade students, the formation of scientific literacy is an important stage. Blockchain helps in creating a system where each student's scientific research or project is recorded in a

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block, creating a unique "digital footprint". This not only encourages students to take their studies more seriously, but also helps them develop scientific analysis and writing skills.

Thanks to smart contracts in the blockchain, many processes, such as grading, managing class schedules and even submitting documents for admission, can be automated. This frees up teachers' time and educational institutions' resources for better interaction with students.

Nowadays, blockchain technologies have become a key element in various fields, transforming the way we do business, finance, research and education. One of the promising areas of blockchain application is education, where this innovative technology can contribute to the formation of scientific literacy of primary school students. Blockchain provides transparency and non-deformability of data, which is important in the context of the formation of scientific literacy. All changes in information about student achievements will be recorded in the block and cannot be changed without the consent of all network participants. This ensures the reliability of the data and creates trust in the assessment and achievement system.

Blockchain allows you to create a decentralized system for recording student success, which can include grades, academic achievements and activity in the classroom[6]. This system provides a more objective assessment and allows teachers and parents to monitor each student's progress more clearly. The use of blockchain technology can make the learning process more interesting and motivating for students. The ability to track your achievements in real time and participate in decentralized software challenges can stimulate interest in science and active participation in the educational process.

Let's imagine a blockchain platform where each student has their own digital profile. Teachers, parents, and even students can contribute data on success, academic achievements, and participation in research projects[7]. Each data change is confirmed by a network of participants (teachers, parents, administration), which ensures transparency and reliability of information. In addition, students can be incentivized with tokens or points, which can be exchanged for additional learning opportunities or prizes. This creates an additional incentive for active participation in the learning process. The introduction of blockchain technology into the education of 4th graders promises to increase transparency, efficiency and interest in the educational process. The creation of a decentralized success accounting system will be an important step towards the formation of scientific literacy and motivation of students, which will have a positive impact on their future educational and professional path.

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In the modern world, technology is actively penetrating into various areas of human activity, and education is no exception. One of the innovative approaches that change traditional teaching methods is the use of blockchain technology. In this article, we will look at how blockchain can contribute to the formation of scientific literacy of 4th grade students, ensuring transparency and efficiency of the educational process.

The blockchain provides a continuous chain of records that cannot be changed or forged. This is especially important in an educational environment where transparency plays a key role. The teacher, student and parents can easily track the student's progress, grades and other achievements, which creates an honest and reliable reflection of their learning activities[8]. Using blockchain, each student can create a digital portfolio containing information about their achievements, projects and grades. This not only simplifies the process of providing learning outcomes for admission to the next grades, but also helps to develop children's responsibility for their achievements.

Let's consider a specific example of the implementation of blockchain in education for 4th grade students. Each student receives a unique digital identifier, which is associated with his blockchain portfolio. This portfolio records all grades, academic achievements, and project participation. Using a digital platform, a teacher can easily evaluate students' work, record results and comments. Parents, in turn, have constant access to their child's portfolio, which allows them to track their child's progress in real time. Although blockchain promises many benefits, its implementation in education may face certain challenges. One of them is the issue of data security. However, using modern encryption methods, it is possible to ensure a high level of protection of students' personal data.

Conclusion. Blockchain in education provides a unique opportunity to improve transparency, efficiency and responsibility in the educational process. For 4th grade students, this can become the basis for the development of scientific literacy and a responsible attitude to their education, which will undoubtedly have a positive impact on their future success. The introduction of blockchain technology into education opens up new horizons for the formation of a transparent, trusting and effective educational process. In particular, for 4th grade students, blockchain is becoming a tool to stimulate interest in science and create strong scientific literacy skills. It is necessary to closely monitor the development of this technology in education and use its potential to generate high-quality knowledge for future generations. The use of blockchain in education not only increases the transparency and efficiency of processes, but also stimulates students' interest in scientific research. The introduction of this technology

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into educational practices for 4th grade students can create a stable foundation for their scientific literacy and successful learning in general.

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