ЦУР4, БЛОКЧЕЙН И ИСКУССТВЕННЫЙ ИНТЕЛЛЕКТ

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Аннотация: Статья посвящена проблеме цифровизации ЦУР4. Доказывается, что использование искусственного интеллекта и блокчейна в системе образования может в значительной степени повысить качество и доступность образования для устойчивого развития не только на страновом, но и на межстрановом уровне, в перспективе – способствовать беспрепятственному обмену информацией, технологиями, педагогическими методиками на глобальном уровне для выполнения ЦУР.

Ключевые слова: ЦУР, ОУР, блокчейн, искусственный интеллект, устойчивое развитие.

SDG4, BLOCKCHAIN & AI

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Abstract: The article is devoted to the problem of digitalization of SDG4. It proves that the use of artificial intelligence and blockchain in the education system can significantly improve the quality and accessibility of education for sustainable development not only at the country level, but also at the intercountry level and, in the future, facilitate the seamless exchange of information, technologies, pedagogical methods at the global level to meet the SDGs.

Key words: SDGs, ESD, blockchain, artificial intelligence, sustainable development.

At the beginning of the third millennium, the rapid development of information technology, which is part of the process of globalization, has become one of the factors of significant transformation in the world educational process. Information and communication technologies have taken a significant place in the market of educational services. In recent years, record amounts of money have been invested in the EdTech market, - almost $20 billion in 2019 and more than $16 billion in 2020

[1]. However, the role of different IR-technologies in updating the content of education, dictated by environmental, socio-cultural and economic challenges of our time, as well as the achieved results, including personal, intellectual, psycho-emotional development and health of students, is far from clear and has not been fully investigated so far. Following the euphoria of the opening possibilities of the transition to an information society, the time has come to deeply comprehend the new digital reality and to design a digital reality taking into account the strategic objectives of a society striving for sustainable development.

It is important that the processes of digitalization of education, including the rapid spread of distance learning, create long-term resources for the development of global and national education, overcome barriers to the introduction of educational technologies with proven safety, and stimulate the development of educational systems.

Analysis of global startups that have attracted significant investments shows that the main investment areas are immersive technologies: virtual reality in education; use of artificial intelligence; robotics (robot kits that allow learning STEM and forming programming skills, Roybi products aimed at early language acquisition); educational services and various platforms; programs for content delivery and management of the educational environment (learning environment); and blockchain technology which opens up fundamentally new opportunities for the educational system and creates conditions for the educational system to reach a qualitatively new level of development [2].

In today's environment, long-term strategies that take into account environmental issues, social responsibility, and best management practices are of strategic importance for the future of all humankind. Such strategies require huge amounts of data, as well as data processing, evaluation, and accurate forecasts. And this is where the alliance between AI and blockchain is essential. They can help solve the most difficult problems of ESG and planetary sustainability, the severity of which is increasing every year. This industry is predicted to be worth $22.6 billion by 2025 [3]. Artificial intelligence has significantly increased the possibilities of information and communication technologies that can be used to achieve the Sustainable Development Goals. Countries are recommended to use ROAM (Human Rights, Openness, Accessibility, Multistakeholder participation) indicators at the national level [4].

We have already written about the possibilities of blockchain technology in alliance with AI in education for sustainable development [5]. Attention to the problems of using blockchain technology in the educational system is associated with

its ability to collect information, store it in an unchanged form, control the reliability of data, create rules and methods of management activities. Its use in the education system, according to researchers and practitioners, can significantly improve the quality of educational services, facilitate the smooth exchange of information, technologies, pedagogical methods at the global level to implement, for example, the Global Action Programme on Education for Sustainable Development, education for Global Citizenship, promotion of educational systems of all countries in the achievement of the Sustainable Development Goals as a tool for achieving the Sustainable Development Goals [5].

The relevance of this work is related to the presence of a number of contradictions, indicating the importance of the raised problem and the need to study the possibilities of using blockchain technology in the informatization of education in the context of globalization. I will name these contradictions:

- between the demands put forward by society to the education system in the context of society's solution of global problems and the insufficiently studied possibilities of informatization of education to meet these demands with the help of ICTs;
- between new challenges to ICT support for education in terms of online distance learning, and unpreparedness, under the conditions of informatization of education, to provide quality education using existing digital technologies;
- between the focus of education in the conditions of informatization on the already traditional technologies of digital learning and the apparent underestimation of the possibilities of using new technological solutions, such as blockchain technology;
- between the social order to improve the quality of management of educational organizations and underestimation of the possibilities of using blockchain to solve these problems [6].

Digital innovation of education is the basis for the implementation of the concept of "Education 4.0". The main directions of using blockchain in the digital transformation of modern education include: accreditation, document transfer, digital certification, multi-stage accreditation, student payment, data fixation, protection from changes, smart contracts [7]. Today, however, new challenges to education from the "Fourth Industrial Revolution", "Industry 4.0", the Sustainable Development Goals (SDGs) pose new, global challenges. This raises the problem of identifying and exploring new opportunities for the use of blockchain technology and AI in education [8].

Current trends and prospects for the implementation of blockchain technology in the digital educational space have been identified. These are technologies of collecting and storing information in a sequential chain of blocks with protection by means of cryptographic ciphers, its basic concepts, organizational principles of construction, architecture and classification of blockchain networks, blockchain proxy level. The use of blockchain technology based on Ethereum, EOS, Parity, Cosmos SDK is promising. A number of universities are already using the method of issuing digital certificates and diplomas, the consensus mechanism, the sharding method and have assessed the advantages of blockchain technology (distributed registry) in education.

They consist of a high level of transparency (distributed control over the network transferred to the users themselves), efficiency (high potential for fast and cheap transactions increases due to the removal of the need for intermediaries, third parties or a central controlling body), security (due to the innovative system of information storage in a database distributed throughout the network, such a system is extremely difficult to break and data to change or falsify), automation (the ability to distribute information through the network without copying it), and the ability to use the blockchain to solve new problems. This gives an opportunity to use blockchain in the Global Education Space for solving new problems: creation of common global educational services and resources, collection of big data of the world countries on the SDG implementation, unification of intercountry approaches to the implementation of the Global Action Programme on Education for Sustainable Development and the Roadmap. Stages and levels of implementation of new technological solutions in national education systems indicate the place of the country in the technological segment of educational system development, which determines its overall quality. Of course, the implementation of blockchain technology in the process of digitalization of education requires a scenario approach. We pose the problem of modeling the scenario of creating a "digital profile of learners" based on the use of smart contracts method and the creation of smart contracts in Ethereum network and justify their connection with the provision of sustainable development of educational organization.

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