

TECHNICAL SCIENCES

BLOCKCHAIN AND ARTIFICIAL INTELLIGENCE FOR INCLUSION

Dziatkovskii A.

Ph.D. in Education (Information Technologies)

CEO of PLATINUM software

development company

Palo Alto, USA

Abstract

The possibilities of using blockchain and AI in ensuring children's right to a quality, accessible and secure information environment in inclusive classrooms are substantiated. It is proposed to create a system of control over educational programmes used in inclusion classes based on the use of blockchain technology. The paper actualizes the problem of providing the educational process with the necessary educational programmes taking into account the diversity of students' educational needs. The authors present the recommended algorithm for controlling educational programmes. The possibility of increasing the efficiency of blockchain technology when used in conjunction with artificial intelligence (translators, voice assistants, software to monitor the functional state of the body, the degree of fatigue, etc.) is justified.

Keywords: digitalization of education, blockchain, artificial intelligence, special educational needs, educational programme.

Inclusion implies respect for each child's individual differences in learning.

The author's analysis of the problems of introducing information technology into the system of inclusive education has shown that this activity cannot be considered satisfactory: the existing means of digitalisation of the educational process do not fully meet the needs of children with special educational needs. In particular, this applies to existing curricula [3].

Not every curriculum can be mastered with equal success by children with different learning needs, including those with disabilities. The reasons may be related to the peculiarities of perception, analysis of the learning material, the specific needs of children in motor activity, the speed of the task. In any case, if the curriculum does not take account of the full range of special educational needs, it becomes a factor of discrimination against students [6;8].

If we consider that inclusion today is understood in a broad sense, that is, it should take into account not only the needs of children with disabilities, but also migrant children, children with poor language skills, children with temporary disabilities, etc., then we should admit that the principle of variability in the curriculum provision of the educational process is implemented rather poorly. This requires the improvement of the control system of educational programmes in order to create an accessible and secure information environment in inclusive classrooms, based on the principle "for all means for all", using the capabilities of blockchain technology to achieve this goal [1]. Blockchain technology makes it possible to collect data on each child about what problems he or she is experiencing in the learning process.

This data can be updated on a child-by-child basis by teachers and specialists, which helps to build up information for the work of supervisory groups [2]. Blockchain is also needed to check the portfolios and certification of teachers and specialists who are invited

to work in inclusive classrooms, to track the progress of their professional development in special pedagogy and special psychology [4;5]. Blockchain is also essential for creating a shared databank of professional literature for educators and specialists in the field of inclusion, including the possibility of professional advice for school staff in difficult situations.

In this way, blockchain helps to improve the management of the educational process. We have developed a scheme for collecting and storing such information using blockchain technology for further analysis, systematization and action [9;10].

The algorithm for using this technology includes the following steps:

- creation of digital physical space and software;
- their evaluation, including certification data;
- selecting the staff, including a reflection of the dynamics of professional development in special pedagogy and psychology;
- personal databanks on the child's needs and comfort level;
- specialist recommendations, feedback.

The first step involves creating an inventory of incoming (assignments, constraints, sources, standards, monitoring methods) and outgoing (documentation, indicators) data sets relating to educational programmes for learners, taking into account the diversity of their special educational needs. The data are downloaded to the system and analysed for usability. This can be assisted by artificial intelligence, which allows analysis and selection on several grounds at once.

The next stage is the stage of controlling the adaptation of educational programmes to the teaching and methodological support of the educational process with regard to special educational needs:

- inclusion of specialized adaptation disciplines (modules) into the variable part of the educational programme;

- selection of teaching methods, based on their accessibility;
- providing students with printed and electronic educational resources in forms adapted to their special educational needs (e.g. voice assistants, audio interpreters, audio visualisation systems, etc.)
- establishment of special physical and recreational activities by educational institutions, taking into account special educational needs;
- conducting current and final examinations, taking into account special educational needs;
- development, if necessary, of individual study plans and individual study schedules.

The next step is to control the requirements for the organisation of the use of distance learning technologies:

- use of e-learning tools that allow receiving and transmitting information in accessible forms, depending on nosologies;
- provision of students with disabilities with educational and methodological resources in forms adapted to their disabilities;
- ensuring a combination of on-line and off-line technologies, as well as individual and collective forms of work in the educational process carried out with the use of distance learning technologies.

The introduction of blockchain into the system of control of educational programmes for their possible use in inclusive classrooms will make it possible to:

- reliably, online, identify needs for improvement of existing educational programmes and development of new programmes adapted for use in inclusion classes;
- develop "curriculum passports" in accordance with the requirements of the programme's passage through the blockchain system;
- monitor in real time (smart contract algorithm) compliance with the requirements formulated at all stages of the implementation of the educational programme;
- maintain a unified electronic document flow (reporting on the state of the educational process, passports of educational programmes, reports on the state of health and learning achievements of students in inclusion classes, etc.).

Further, it is checked whether the standards for teaching persons with disabilities and the special educational needs of children are not violated. If not violated, they are included in the educational process. If not, the blockchain technology, together with the artificial intelligence software, denies the use of this educational programme.

Conclusion. Organizing the curriculum and selecting appropriate curricula in accordance with the 'for all means all' principle is a challenge for inclusive education. Digitalization of the educational process often

fails to take into account the potential of blockchain technology combined with artificial intelligence to address this challenge. The algorithm developed for the application of blockchain technology combined with the use of artificial intelligence can advance the realization of this principle. It allows controlling the choice of curricula taking into account the special educational needs of students.

References

1. Dziatkovskii A. Artificial intelligence and blockchain interaction in the context of inclusive education // Proceedings of the XXXVI International Multidisciplinary Conference «Recent Scientific Investigation». Primedia E-launch LLC. Shawnee, USA. 2022. DOI:10.32743/UsaConf.2022.9.36.344687
2. Dziatkovskii A. Education through the lens of blockchain and vice versa // Journal of Modern Education Review (ISSN 2155-7993), Academic Star Publishing Company. 2021. Issue 6. (USA).
3. Dziatkovskii A. and Hryneuski U. (2021) Researching the Usage of Blockchain in Higher Education // 1st International Conference on Technology Enhanced Learning in Higher Education (TELE), 2021, pp. 133-138, doi: 10.1109/TELE52840.2021.9482482. (Scopus) - <https://ieeexplore.ieee.org/xpl/conhome/9482410/proceeding>
4. Global Education Monitoring Report. Inclusion and Education: All means all. 2020.
5. Ghaffar, A. and Hussain, M. (2019). A blockchain embedded academic paradigm to augment legacy education through application. In Proceedings of the 3rd International Conference on Future Networks and Distributed Systems, №45, pp. 1–11.
6. Grech, A., & Camilleri, A. F. (2017). Blockchain in education. Luxembourg: Publications Office of the European Union. URL: https://www.pedocs.de/volltexte/2018/15013/pdf/Grech_Camilleri_2017.
7. Mathews, M. (2019). The blockchain movement in education. The Tambellini Group Blog, URL: <https://www.thetambellinigroup.com/the-blockchain-movement-in-education/>.
8. Raimund, R. and Rosário, A. (2021). Blockchain System in the Higher Education. Eur. J. Investig. Health Psychol. Educ. № 11, pp. 276-294.
9. Okolo C.M., Diedrich J. Twenty-Five Years Later: How is Technology Used in the Education of Students with Disabilities? Results of a Statewide Study // Journal of Special Education Technology, 2014. Vol. 29. № 1. P. 1–20.
10. Roebuck, K. (2019). Five ways blockchain is revolutionizing higher education. Forbes' Oracle Sponsored Blog, URL: <https://www.forbes.com/sites/oracle/2019/01/02/5-ways-blockchain-is-revolutionizing-higher-education/#677515497c41>.