WAYS OF USING ARTIFICIAL INTELLIGENCE IN EDUCATION

Serhii Maksymchuk
Postgraduate Student, Vasyl Stefanyk Prykarpattia National University, Ukraine
e-mail: smaksimcuk07@gmail.com, orcid.org/0009-0001-2369-2703

Halyna Voitkiv
Ph.D., Assistant at the Department of Physics and Methods of Teaching,
Vasyl Stefanyk Precarpathian National University, Ukraine
e-mail: h.voitkiv@gmail.com, orcid.org/0000-0002-2158-9577

Summary

Artificial intelligence today not only plays an important role in various industries, but also continues to integrate into all spheres of life at an extremely rapid pace. The educational sphere must also respond to these challenges, which must prepare future generations not only for living and working in such an environment, but also for conscious influence on it and its creation. The article describes the directions of artificial intelligence development, state policy regarding its implementation and use, ethical principles in the field of artificial intelligence, the perceived incompetence of the pedagogical community regarding artificial intelligence, and practical ways of using it in the educational process. Taking into account the concept of the development of artificial intelligence in Ukraine, the readiness of the pedagogical community and the results of observations of the educational process, the following methods of using artificial intelligence in the educational process are distinguished: improvement of the formation of the individual educational trajectory of the acquirer, improvement of the system for monitoring the process and results of training with the provision of feedback, diversification of the didactic tools for the educational process. Attention is drawn to the principles of using artificial intelligence that are common to all, namely: inclusive growth, sustainable development and well-being, human-centered values and justice, responsibility for the proper functioning of artificial intelligence systems.

Key words: artificial intelligence, education, ethical principles, individual educational trajectory, formative assessment.

DOI https://doi.org/10.23856/6108

1. Introduction

Artificial intelligence is becoming increasingly important in today's world due to the rapid development of technology and has become a key element in many industries. One of the areas where artificial intelligence is expected to be actively used is education. The introduction of innovative technologies into the educational process creates new opportunities for increasing the efficiency and accessibility of education.

The latest research by UNESCO in the field of using artificial intelligence in education talks about the benefits of using artificial intelligence – covering learning for people with disabilities or representatives of linguistic and cultural minorities, promoting personalized learning, creating flexible school systems, creating exciting content for learning, and risks that

are mostly associated with the lack of approbation of the use of artificial intelligence systems in education and their analysis *(UNESCO, 2019)*. Most of the publications of scientists are devoted to the possibilities of artificial intelligence. However, highlighting the experience of its practical use in the educational process is relevant today. Therefore, the purpose of our article is to research and generalize examples of practical use of artificial intelligence in education, state policy on the introduction of systemic artificial intelligence and ethical principles of its use.

2. Challenges that artificial intelligence poses to the pedagogical community

The researches of scientists: R. Gurevich, V. Bakhrushin, N. Morse, S. Sysoeva, V. Osadchyi, E. Polat, L. Chen, P. Chen and others are devoted to the issue of introducing artificial intelligence into the educational process. They focused their attention around defining the content of the basics of artificial intelligence, which is related to machine learning, algorithmic efficiency, image and voice recognition, and natural language processing systems. All studies also emphasize the challenges that need to be addressed when using artificial intelligence systems: technical reliability; data privacy; transparency; non-discrimination and fairness; accountability (recognizing that artificial intelligence is not always accurate); understanding responsibility when using artificial intelligence. Focusing on opportunities, we highlighted the following research results, in particular:

- the mechanization of teaching already today requires additional forms of pedagogical activity, adaptation of pedagogical approaches to work with automated technologies *(Holmes, 2022)*;
- the use of artificial intelligence is related to management and planning in the educational process, which is created on the basis of monitoring and evaluation of education results, learning analytics, using algorithms of predicted decisions *(Hutson, 2021)*;
- artificial intelligence has the potential to improve tracking and recognition of learning outcomes, as well as assessment and quality assurance, especially for competencies acquired in non-formal and informal contexts *(LearnDash Collaborator, 2020)*;
- artificial intelligence is a tool for an innovative learning environment, as well as a set of skills that need to be learned for work and life *(Skrypnyk, 2022)*;
- artificial intelligence is an «accelerator for education» – when used appropriately and responsibly, artificial intelligence can contribute to the equity and quality of education and promote lifelong learning.

From the analysis of the literature, it becomes clear that the issue of using artificial intelligence in education is moving to another stage of the development of the competence of teachers and scientists in this field, namely the stage of «perceived incompetence», by which we mean that some participants in the pedagogical process already know about artificial intelligence, some have used it, many want to use it, but for this you need to develop.

3. The concept of artificial intelligence development

Regarding the state policy in the field of artificial intelligence, the Concept of the Development of Artificial Intelligence (until 2030) has been approved in Ukraine, which defines the purpose, principles and tasks of the development of artificial intelligence technologies as one of the priority areas in the field of scientific and technological research. In the Concept,

«artificial intelligence» is understood as «an organized set of information technologies, with the use of which it is possible to perform complex complex tasks by using a system of scientific research methods and algorithms for processing information obtained or independently created during work, as well as to create and use own knowledge bases, decision-making models, algorithms for working with information, and determine ways to achieve set goals» *(Verkhovna Rada Ukrainy, 2021).* According to the Concept, «artificial intelligence technologies should contribute to the transformation of the economy, the labor market, state institutions and society as a whole». The analysis of the problems of the development and implementation of artificial intelligence technologies shows that the priority areas in which the tasks of the state policy for the development of artificial intelligence are implemented are: education and vocational training, science, economy, cyber security, information security, defense, public administration, legal regulation and ethics, justice *(Verkhovna Rada of Ukraine, 2021).* In the field of general secondary education, first of all, attention should be focused on intellectual pedagogical workers of the basics of artificial intelligence and the possibility of working with it in the educational process. Today, such opportunities lie in the improvement of the educational and methodological base with the help of artificial intelligence, the organization of courses for pedagogical workers on working with data and the basics of artificial intelligence, the expansion of digital literacy among schoolchildren (the use of digital tools for solving applied tasks, searching for information on the Internet, personal data protection, media literacy, digital hygiene, etc.).

4. Principles of implementation of artificial intelligence

The introduction of artificial intelligence is relevant all over the world, so it is important to implement uniform policies regarding the ethics of its use. The Organization for Economic Cooperation and Development on Artificial Intelligence has developed the following principles for the use of artificial intelligence:

- inclusive growth, sustainable development and well-being, which consists in creating conditions for reducing economic, social, gender and other inequalities and protecting the natural environment;
- human-centric values and justice, which consists in respect for the rule of law, human rights and democratic values throughout the life cycle of the artificial intelligence system;
- strength, reliability and security, consists in creating conditions regarding the impossibility of unauthorized use of data, ensuring their confidentiality;
- responsibility for the proper functioning of artificial intelligence systems by all its participants, in accordance with their roles (*OECD/LEGAL/0449, 2023*).

5. Ways of using artificial intelligence in education

Despite the great possibilities of artificial intelligence, in Ukraine, the practice of the educational process in institutions of general secondary education shows a small number of directions for its use. Artificial intelligence provides great advantages and opportunities to ensure:

- ***individual educational trajectory***, thanks to the analysis of the needs of students, the pace of learning and the level of understanding of the material. An example of artificial intelligence for learning is the foreign language learning application Duolingo *(LearnDash Collaborato, 2020),* which is used by both adults and children to improve the key competence

of mastering native and foreign languages. The main parameters with which the artificial intelligence system works in this application and others like it are the «engagement» of the student and the «difficulty» of learning. Student engagement and difficulty are interrelated: material that is too easy engages students early on, but encourages them to drop out due to a lack of tangible learning outcomes. Too complex material is a reason for many students to stop studying due to learning difficulties. Duolingo uses artificial intelligence to keep its students in a zone where they stay engaged and learn at their best;

• ***automated evaluation of training results and provision of feedback,*** in particular when conducting formative evaluation. Most educators are familiar with digital programs and resources that provide automated assessment and reporting. For example, Mentimeter, Wooclap, etc. In most educational subjects, there are platforms (intelligent systems) where students can undergo diagnostics of their knowledge in order to detect learning difficulties in time and improve results;

• ***methodological support of the educational process.*** Constructors of educational tasks and programs, which save time spent on the development of methodological materials for lessons, have become an important assistant to the teacher.

Such services, which are already used in education, are:

• services for creating a story: Bedtimestory – creates a story for children to read before bedtime; MakeMyTale – creates a story according to the chosen genre, style, works; Tome - creates entire stories from scratch;

• services for working with text content: Pictory – extracts content from Zoom, Teams and webinar recordings; ChatGPT – ready to pick up information upon request; Talk to Books – creates a text, namely gives answers to questions, quotes from books;

• services for working with media and audio content: Mubert – creates music on text request; Kaiber – creates an animated video clip;

• services for creating voice assistants to improve the perception of information: Amazon Alexa and Microsoft Cortana – voice assistants that can create an integral role in the field of education, can create a barrier-free environment;

• services for performing administrative tasks: organization of work with personnel: Atoms.ua, E-schools – electronic journals and diaries; driving the learning environment and materials in the group.

• translation services: use of artificial intelligence to improve the quality of translation of foreign texts;

• chatbots that work in online education: Thinkster – uses artificial intelligence for individual mathematics training – users start with an assessment test, after which artificial intelligence adapts questions depending on the level of knowledge and mastery of the material; Querium – excellent use of artificial intelligence for virtual learning and analysis of student actions in solving STEM problems. The program provides instant feedback correctly regarding the incorrect performance of tasks, which allows you to avoid incorrect learning of the material;

• adaptive learning services: Aita by Knewton – uses adaptive learning to identify gaps in student knowledge and then fill them with high-quality learning materials. Artificial intelligence acts as a learning tool that identifies and exploits knowledge gaps *(LearnDash Collaborator, 2020).*

We believe that the listed digital opportunities complement the educational process and are the initial steps in the introduction of artificial intelligence in education. Their further use will be improved in the following areas: provision of individual feedback when evaluating a specific student, and when all information is available in the system about his academic success

and preferences; increasing the effectiveness of distance learning platforms by ensuring their interactivity and improving communication methods with them; providing a tool for the teacher to create an interesting learning environment. These directions are the topics of our further research *(Maksymchuk, 2023).*

6. Conclusions and suggestions

Thus, artificial intelligence today is present in all spheres, including education. The implementation of artificial intelligence in all sectors is supported by state policy, as evidenced by the Concept of the Development of Artificial Intelligence of Ukraine until 2030. Ethical issues related to the use of artificial intelligence are regulated by the principles of economic cooperation organizations. There is no specific system of using artificial intelligence in education, however, certain directions of its use are followed due to its practicality, convenience and assistance to both the teacher and the student. These directions are: methodical - used as an interactive teacher's assistant to improve the teaching of the material; personalization of learning – to provide feedback, to create a learning environment adapted to the individual. Further research will be directed towards the use of artificial intelligence to predict future states in education through the analysis of existing educational data sets, the selection of optimal actions for a specific institution.

References

1. Dotsenko, I. O. (2017). Aktualni problemy uprovadzhennia informatsiino-komunikatsiinykh tekhnolohii u vyshchii osviti [Actual problems of the implementation of information and communication technologies in higher education]. Kryvyi Rih. [in Ukrainian].
2. Holmes, W. et al. (2022), "Ethics of AI in education: towards a community-wide framework", International Journal of Artificial Intelligence in Education, available at https:// link. springer.com/article/10.1007/s40593-021-00239-1, accessed 23 June 2022.
3. Hutson, M. (2021), "Robo-writers: the rise and risks of language-generating AI", Nature Vol. 591, No. 7848, pp. 22–5.
4. LearnDash Collaborator, (2020). 4 Examples of AI Being Used in E-Learning.
5. Maksymchuk, S., Voitkiv, H. (2023). Shliakhy vykorystannia shtuchnoho intelektu u osviti [Ways of using artificial intelligence in education]. Kropyvnytskyi. [in Ukrainian].
6. OECD/LEGAL/0449. (2023). Recommendation of the Council on Artificial Intelligence.
7. Skrypnyk, L.M. (2022). Metodyka orhanizatsii informatsiino-konsultatyvnoho seredovyshcha zakladu profesiinoi osvity. Adaptyvne upravlinnia: teoriia i praktyka [The method of organizing the informational and consulting environment of the professional education institution. Adaptive management: theory and practice]. Kyiv. [in Ukrainian]
8. UNESCO, (2019). International Conference on Artificial Intelligence and Education, Planning Education in the AI Era: Lead the Leap, Beijing.
9. UNESCO, (2019). Education in the age of artificial intelligence. Paris : UNESCOO.
10. Verkhovna Rada Ukrainy. Zakonodavstvo Ukrainy. (2021). KONTsEPTsIIa rozvytku shtuchnoho intelektu v Ukraini [The concept of artificial intelligence development in Ukraine]. Kyiv. [in Ukrainian]