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ETHICAL AND PRACTICAL ASPECTS OF USING THE ARTIFICIAL INTELLIGENCE IN THE EDUCATIONAL PROCESS

Abstract. Philosophical and ethical challenges to the use of artificial intelligence include many aspects, ranging from privacy and data security to issues of responsibility for the actions of AI. The rise of AI is changing the nature of knowledge and the educational process, creating new opportunities and challenges.

The use of AI in the educational process raises not only questions of the technical organization of the educational process and evaluation of the results obtained with the help of AI, but also more global questions about the role of the teacher and student, about the social and ethical consequences of the transition to a new educational paradigm. Artificial intelligence is revolutionizing the education industry in various ways including virtual tutors, personalized learning, automated grading, smart content, intelligent tutoring systems, predictive analytics, student support systems, etc. However, the ethical considerations of implementing AI in higher education must be carefully examined to ensure that AI is used responsibly and ethically in the education sector.

The article discusses the emergence and development of AI, its understanding from a technical and philosophical point of view. The ethical issues of using AI and its role in the human community are discussed. The ethical and practical aspects of using AI in the educational process are analyzed, and actual problems of AI implementation into the studying process in universities are proposed.

Keywords: *artificial intelligence, education, ethics, pedagogy, learning process, learning tools.*

Introduction. Due to ChatGPT, artificial intelligence (AI) has become a part of people's lives and professional activities in recent years.

Artificial intelligence is understood as the property of artificial intelligent systems to perform analytical and creative functions that have traditionally been considered the prerogative of humans. It should be noted that the term AI originated from the English-speaking environment, in which the word "intelligence" means the ability to reason rationally and draw logical conclusions, while the word "intellect" is used to understand human intelligence.

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There is a point of view among some scientists that intelligence can only be a biological phenomenon. In Slavic countries, the phrase "artificial intelligence" acquired an anthropomorphic connotation and began to be perceived as an alternative to human intelligence.

The first development of AI prototypes began in the 50-60^s of the twentieth century. The term "artificial intelligence" was coined in 1956 by John McCarthy at a seminar at Dartmouth University. That same year, Allen Newell and Herbert Simon created the Logical Theorem Prover program, which was capable of proving mathematical theorems based on logical deductions (McCarthy, 2007).

Research in the field of artificial intelligence continued to develop; in the 80-90^s of the twentieth century, various methods and approaches were created to create systems capable of thinking and making decisions. In the XXI century, AI has taken a new stage of development through the use of deep learning (DL), neural networks (NN) and machine learning (ML) technologies, leading to significant improvements in the performance and capabilities of these systems.

Philosophical question "If machine can think?" was formulated by Alan Turing in 1950. He pushed researchers to create the science of modeling the human mind, resulting in the hypotheses of strong and weak AI. American philosopher John Searle coined the term "strong artificial intelligence" and described it as a program that would not just be a model of the mind, but a mind in the full (human) understanding of the term. Proponents of weak AI view programs as tools for solving certain types of problems and not possessing the full (human) range of cognitive abilities. For example, Roger Penrose argued that it is impossible to obtain the process of thinking on the basis of formal systems. Thus, in the concepts of "strong" and "weak" AI there will be a different understanding of the legal objectivity and subjectivity of AI. Innovations over the past decade suggest that strong AI solutions will continue to evolve (McCarthy, 2007).

Modern researchers offer the following classification of AI (Abdoullaev, 2023): Artificial Narrow Intelligence (ANI), that has a narrow range of human-like capacities and abilities; Artificial General Intelligence (AGI), that has human-like capacities and capabilities as in humans; Artificial SuperIntelligence (ASI), that has capacities and capabilities exceeding that of humans. As we can see, the proposed classification corresponds to the concept of "strong" AI. At the same time, the author claims that we are now at the first stage (Abdoullaev, 2023).

Analysis of recent research and publications. Over the past few years, scientific works have appeared whose authors systematically approached the study of AI and proposed ethical principles of modern AI policy, as well as mechanisms for introducing AI into the educational process (Jobin et al., 2019; Müller, 2021; Zhang & Aslan, 2021 ; Adams et al., 2023; Puthiyedath, 2023; Reiss, 2021; Sheikh et al., 2023; Abdoullaev, 2023; Nguyen et al., 2023).

We examined some didactic aspects of organizing and increasing the efficiency of the educational process in universities in the following works (Galushko et al., 2010; 2011; 2022). In this work, we adapt previously proposed approaches to modern conditions for introducing AI into the educational process.

To date, the most comprehensive review of documents containing ethical principles of AI is proposed by A. Jobin (Jobin et al., 2019). In particular, among the ethical principles of AI, the following are highlighted: transparency, fairness,

non-harm, responsibility, confidentiality, charity, freedom and autonomy, trust, sustainability, solidarity. Not all principles were present in all documents. It should also be noted that the proposed principles are declarative and the need to develop mechanisms for their implementation in practical activities.

C. Adams, P. Pente, G. Lemermeyer and G. Rockwell analyzed the principles proposed by A. Jobin, adapted them for children and proposed the following list of principles that, in the author’s opinion, are of utmost importance in developing a policy guide on AI ethics in the educational process: pedagogical expediency; children’s rights; AI literacy; teacher well-being (Adams et al., 2023).

The purpose of the article is the research of ethical and practical role of AI in educational process and to develop the principles of it’s implementation.

Formulation of the main material. To study AI and its impact on society, an interdisciplinary approach should be taken, because "strong" AI is based on:

- philosophical categories of induction, utilitarianism, epistemology;
- mathematical categories (formal logic, probability theory, statistics, algorithms and calculations, big data);
- neurosciences;
- cybernetics and computer engineering;
- categories of psychology (behaviorism, cognitive psychology);
- management theories (decision theory, operations research);
- linguistics and psycholinguistics.

From a technical point of view, AI is a computer program based on deep and machine learning technologies, as well as neural networks (Table 1).

Table 1

Components of Artificial Intelligence

<i>Artificial Intelligence:</i>	
A program, that can learn, reason, sense, act and adapt	<ul style="list-style-type: none"> ➤ Natural language processing ➤ Visual perception ➤ Automatic programming ➤ Intelligent robots ➤ Automatic reasoning ➤ Knowledge presentation
<i>Machine Learning:</i>	
Algorithms whose performance improve as they are exposed to more data over the time	<ul style="list-style-type: none"> ➤ Linear / Logic Regression ➤ k-Means, k-Nearest neighbor ➤ Support Vector Machine ➤ Principal Component Analysis ➤ Random Forest ➤ Decision Trees
<i>Deep Learning:</i>	
Subset of Machine Learning in which multiplied Neural Networks learn from vast amounts of data	<ul style="list-style-type: none"> ➤ CNN (Convolutional Neural Network) ➤ RNN (Recurrent Neural Network) ➤ GAN (Generative Adversarial Network) ➤ DBN (Deep Belief Network)

Source: created by authors based on (<https://twitter.com/Jousefm2/status/1609852141090242560?lang=ms>)

And if the technical side of AI is defined, then the philosophical and ethical issues cause a lot of discussion. The main philosophical issue is the ability of AI to imitate human thinking and behavior, and scientific research into the epistemology of AI is developing in this direction.

If AI can imitate human thinking, then questions will arise about the role of AI in human society and ethical and moral issues such as:

1) The impact of AI on human nature, both from the point of view of revealing new opportunities and from the point of view of the threat to human uniqueness and identity;

2) The objectivity and subjectivity of AI in the legal field of human society, the right of AI to self-awareness and freedom, as well as responsibility for its actions;

3) The impact of AI on socio-economic relations, GDP, employment and unemployment;

4) A possible threat of AI to human civilization, both from the point of view of the immediate threat of destruction and from the point of view of intellectual degradation.

The ethical problems of using AI include issues of privacy, security and data protection, trust in the results of AI activities, rights and responsibilities of AI, the need for its limitations, fairness and equality in the use of AI, as well as issues of intellectual property rights. These issues require the development of appropriate regulations and standards to ensure the safe, fair and responsible use of AI. These questions are especially acute for the education system, because the use of AI affects the personal and congenital development of future generations. Questions about the influence of AI on the very foundations of teaching and learning, on equality in education and access to it, on the influence of AI on children's rights and the ethical principles of the policy of introducing AI into the education system are already reflected in the relevant documents of UNESCO, the European Commission and the European Parliament. However, both the legislative basis for the use of AI in the education system and the practical mechanisms are only at the stage of development and discussion. However, AI has already begun to be actively used in the educational process.

There are 10 key ways in which AI is transforming education: personalized learning, virtual tutors, automated grading, smart content, adaptive learning platforms, intelligent tutoring systems, predictive analytics, student support systems, administrative tasks automation, and enhancing teacher capabilities. (<https://appinventiv.com/blog/>).

However, the ethical considerations of implementing AI in higher education must be carefully examined. These considerations include academic integrity, data privacy, bias and discrimination, environmental impact, and labor exploitation. It is crucial for educators and policymakers to address these ethical concerns in order to ensure that AI is used responsibly and ethically in the education sector (<https://camosun.libguides.com/ai/>).

In our opinion, special attention should be paid to the following aspects of using AI in the educational process:

1) Influence on the cognitive abilities of schoolchildren and students. As researchers of the human brain note, neural connections in it are actively formed when overcoming obstacles and solving complex problems. The use of AI in the educational process reduces the burden on students, shifting the performance of

tasks to AI. Thus, students not only do not get the necessary experience of independent problem solving, but also lose opportunities for cognitive and intellectual development.

2) The influence of AI on the role of the teacher in the educational process. Already now, Deep Fake technologies allow you to reproduce a video of a person and a speech with a given text in a given language. Further development of these technologies will lead to the mass use of virtual AI teachers, with more extensive knowledge and capabilities than humans. At the same time, virtual AI teachers will be deprived of empathy and opportunities to share their own practical experience with students.

Conclusions. Thus, it is necessary to develop AI implementation mechanisms in the educational process, which should include:

1) Assessment of the impact of AI on the formation of students' cognitive abilities and the development of such forms and methods of using AI that will stimulate them;

2) Determination of a reasonable balance of involvement of the teacher and AI in the educational process from the point of view of ensuring quality education and personal development of students;

3) Development of the legislative basis for the use of AI in the educational process.

Otherwise, the next generations will face the negative and uncontrollable consequences of the influence of AI on human society.

Conflict of Interest and other Ethics Statements

The author declares no conflict of interest.

References

- McCarthy, J. (2007). What is artificial intelligence? URL : <https://web.archive.org/web/20151118212402/http://www-formal.stanford.edu/jmc/whatisai/whatisai.html>.
- 10 Ways AI in Education is Transforming the Industry. (September 21, 2023). URL : <https://appinventiv.com/blog/10-ways-artificial-intelligence-transforming-the-education-industry/amp/>
- Abdoullaev, Azamat. (2023). AI blog on LinkedIn. URL : <https://www.linkedin.com/in/azamat-abdoullaev-335a0881/>.
- Adams, C., Pente, P., Lemermeyer, G. & Rockwell, G. (2023). Ethical principles for artificial intelligence in K-12 education. *Computers and Education: Artificial Intelligence*, vol. 4, p. 100131. Doi : <https://doi.org/10.1016/j.caeai.2023.100131>. URL : <https://www.sciencedirect.com/science/article/pii/S2666920X23000103>.
- Artificial Intelligence in Teaching & Learning. URL : <https://camosun.libguides.com/ai/ethicalconsiderations#:~:text=Ethical%20Considerations%20of%20Gen%2DAI%20in%20Higher%20Education&text=These%20range%20from%20academic%20integrity,e nvironmental%20damage%2C%20and%20exploitative%20labour>.
- Galushko, I., Galushko, E. & Veselova, S. (2010). Ynnovatsyonnyy podkhod k reshenyyu dydaktycheskykh zadach vyssheho obrazovanyya [Innovative approach to solving didactic tasks of higher education]. Theory and teaching methods of fundamental disciplines in higher education: Collection of scientific works. Issue VI. Kryvyi Rih: Publishing Department of the NMetAU, pp. 51-56. [in russ.].
- Galushko, O., Veselova, S. & Galushko, I. (2011). Pidvyshchennya kreatyvnoho potentsialu studentiv za dopomohoyu audytornoyi navchal'no-doslidnyts'koyi roboty [Increasing the creative potential of students with the help of classroom educational and research work]. Ukraine's development strategy in the global environment: Collection of scientific papers, p. 170. URL: <https://pgasa.dp.ua/wp-content/uploads/2017/10/1-Galushko.pdf>. [in ukr.].
- Galushko, O., Kovalenko-Marchenkova, Ye. & Chistyakov, V. (2022). Didactic aspects of distance learning in the conditions of pandemic and martial law. *Scientific Bulletin of*

- Jobin, A., Ienca, M. & Vayena, E. (2019). The global landscape of AI ethics guidelines. *Nature Machine Intelligence*, 1, pp. 389–399. Doi : <https://doi.org/10.1038/s42256-019-0088-2>
- Müller, Vincent C. (2021). Ethics of Artificial Intelligence and Robotics. *The Stanford Encyclopedia of Philosophy*. Metaphysics Research Lab, Stanford University. URL : <https://plato.stanford.edu/archives/sum2021/entries/ethics-ai/>.
- Nguyen, Andy, Ngo, Ha Ngan, Hong, Yvonne, Dang, Belle, Nguyen, Bich-Phuong Thi. (2023). Ethical principles for artificial intelligence in education. *Education and Information Technologies*, 28, pp. 4221–4241. Doi : <https://doi.org/10.1007/s10639-022-11316-w>. URL : https://www.researchgate.net/publication/364325080_Ethical_principles_for_artificial_intelligence_in_education.
- Puthiyedath, Anjali Rajan. (2023). A Framework for AI Co-Creation in Pedagogy. URL : <https://www.linkedin.com/pulse/framework-ai-co-creation-pedagogy-dr-anjali-rajan-puthiyedath>.
- Reiss, M. (2021). The use of AI in education: Practicalities and ethical considerations. *London Review of Education*, 19 (1), 5, pp. 1–14. Doi : <https://doi.org/10.14324/LRE.19.1.05>. URL : https://www.researchgate.net/publication/349015045_The_use_of_AI_in_education_Practicalities_and_ethical_considerations#fullTextFileContent.
- Sheikh, H., Prins, C. & Schrijvers, E. (2023). Artificial Intelligence: Definition and Background. *Mission AI. Research for Policy*. Springer, Cham. Doi : https://doi.org/10.1007/978-3-031-21448-6_2. URL : https://link.springer.com/chapter/10.1007/978-3-031-21448-6_2.
- Zhang, K. & Aslan, A. (2021). AI technologies for education: Recent research & future directions. *Computers and Education: Artificial Intelligence*, vol. 2, p. 100025. Doi : <https://doi.org/10.1016/j.caeai.2021.100025>.

Олена ГАЛУШКО, Камерон БАТМАНГЛІЧ

ЕТИЧНІ ТА ПРАКТИЧНІ АСПЕКТИ ВИКОРИСТАННЯ ШТУЧНОГО ІНТЕЛЕКТУ В НАВЧАЛЬНОМУ ПРОЦЕСІ

Анотація. Філософські та етичні проблеми використання штучного інтелекту включають багато аспектів, починаючи від конфіденційності та безпеки даних і закінчуючи питаннями відповідальності за дії ШІ. Розвиток ШІ змінює природу знань і освітнього процесу, створюючи нові можливості та виклики.

Використання ШІ в навчальному процесі ставить не тільки питання технічної організації навчального процесу та оцінки отриманих за допомогою ШІ результатів, а й більш глобальні питання про роль викладача та студента, про соціальні та етичні наслідки переходу до нової освітньої парадигми. Штучний інтелект революціонує індустрію освіти різними способами, включаючи віртуальних викладачів, персоналізоване навчання, автоматичне оцінювання, інтелектуальний контент, інтелектуальні системи навчання, прогнозу аналітику, системи підтримки студентів тощо. Однак етичні міркування впровадження штучного інтелекту у вищій освіті мають бути уважно перевірені, щоб переконатися, що ШІ використовується відповідально та етично в освітньому секторі.

У статті розглядається виникнення та розвиток ШІ, його розуміння з технічної та філософської точок зору. Обговорюються етичні питання використання ШІ та його роль у людському суспільстві. Проаналізовано етичні та практичні аспекти використання ШІ в навчальному процесі та актуальні проблеми впровадження ШІ в навчальний процес у ВНЗ.

Ключові слова: штучний інтелект, освіта, етика, педагогіка, процес навчання, засоби навчання.

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