

The use of artificial intelligence in optimising education management processes

Innovation and transformation of educational systems

As a strategic technology, artificial intelligence (AI) contributes to the transformation of the economy and symbolises a new stage not only in the history of digital technologies but also in the global development of modern civilisation. It also plays an important role in improving the quality and accessibility of education. The use of AI allows us to move from standard methods of teaching and education management to individual and effective strategies. This article analyses the use of AI in the field of education management and highlights innovative approaches introduced by AI. The potential disadvantages and ethical issues arising from the integration of these technologies into the field of education are considered. Prospects and directions of AI use in education are outlined. Conclusions are drawn about the importance of AI for current and future education.

Keywords: *information technology, artificial intelligence, educational process, learning technologies, education management*

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1. Introduction

In recent years, artificial intelligence (AI) technologies have rapidly entered the educational and scientific spaces, transforming the economy and society, and symbolising a new stage not only in the history of digital technologies but also in the global development of modern civilisation as a whole. AI has been defined as a strategic technology that offers many benefits to citizens and society as a whole, provided it is human-centric, ethical, sustainable and respects fundamental rights and values. At the end of 2022, OpenAI introduced the world to a number of its digital services that use the principles of human brain organisation and functioning, commonly referred to as AI. ChatGPT and DALL-e allowed the company to break all possible world records in terms of user growth. According to *The Guardian* (Milmo 2023), two months after the launch, the number of users exceeded 100 million, i.e. in January 2023, more than 590 million visits to the website from 100 million unique users were recorded. This has triggered a real AI revolution in the world. At the same time, the complexity of the technology itself, the ease of its use (it is accessible even to users who know only how to use messengers, as the ChatGPT interface is implemented similarly) and, most importantly, the quality of the text generation has sparked an active discussion in the global educational environment, including the university environment.

Undoubtedly, humanity will benefit from the new capabilities of AI, but this also entails solving many strategic tasks. First of all, the main one is the reliable use of AI systems' capabilities for the development of societies and human life, as the significant impact of these technologies is radically changing human existence. Second, being aware of the significant advantages and achievements of AI systems, it is necessary to predict unexpected challenges and risks that may arise as a result of such a continuous development of these digital systems, and accordingly to outline ways to prevent and eliminate them.

The use of AI in the educational process is not a fantastic idea for the future but a reality today. In January, a survey was conducted among Stanford University students. According to the results, almost 20% of students have already used ChatGPT to help with homework, exams and academic projects (Cu and Hochman 2023). A recent survey of teachers in the United States showed that two-thirds of educators have experienced a situation where students used ChatGPT to prepare homework without their permission. This figure is undoubtedly growing every month. It is obvious that in Ukraine, a significant number of pupils and students are already using ChatGPT, and this figure will soon become more and more significant (Intelligent 2023).

We must understand that in real life and professional activities, people will increasingly use such applications, and it is likely to become the norm in the coming years. Accordingly, the ability to use them effectively and ethically is an important skill, as is the ability to use Wikipedia responsibly. The relevance of this study lies in the fact that the use of AI and neural networks in student learning is one of the most promising areas of development in modern education (Semenets-Orlova, Rodchenko et al. 2022). AI technologies can have a positive impact on all aspects of the

educational process, help improve the quality of learning and ensure more-efficient knowledge transfer.

The purpose of the study is to analyse the use of AI in education management and its impact on process optimisation and transformation of educational programmes, highlighting various innovative approaches implemented with the help of AI. Exploring the role of AI in educational data analytics allows adapting educational processes to the individual needs of educational entities. Determining how AI technologies contribute to the effectiveness of management decisions in educational institutions allows improving planning, coordination and evaluation of educational processes and uncovering the potential challenges and ethical issues that arise in the process of integrating these technologies. The study will also outline prospects and directions for the development of AI in education and the importance of AI for current and future education.

2. Materials and Methods

The methodology for studying AI in the field of education management is based on the integrated application of various methods of analysis and synthesis, including analogy, abstraction, induction, deduction, dialectics and analytics. The analysis method is used to study the impact of AI on process optimisation and the transformation of educational programmes. This includes a thorough analysis of the links between AI and educational processes. The synthesis method explores innovative approaches introduced through AI, creating a holistic view of strategies for managing resources and improving education.

The study of the role of AI in education and training uses an inductive method to determine how technology can adapt educational processes to meet the individual needs of learners. The deductive method is used to formulate general conclusions and principles of the study. The dialectical method allows us to consider different perspectives and the interaction of technological innovations in the context of learning activities.

The method of analogy is used to identify potential challenges and problems that arise in the process of integrating information technology into education. The method of abstraction helps to discuss the prospects and directions of AI development in education. The generalisation method allows us to draw general conclusions about how AI contributes to the effective planning, coordination and functioning of educational processes. This methodology provides a systematic and in-depth study of the use of AI in education, taking into account various aspects and ensuring a comprehensive understanding of its impact and prospects.

3. Results

Current changes in the development of postmodern society are happening somewhat abruptly due to the creation and implementation of AI technologies. AI is a

product of human activity that, thanks to its ability to perform certain human functions, has significantly integrated into various industries and areas of social interaction, including the education sector, offering new solutions to improve learning and teaching and thus determining the future of society. Educational institutions should adapt their development strategy and focus on promoting responsible, high-quality, ethical and transparent use of AI tools by their employees and students in line with the current legislation, with the subsequent mitigation of the negative effects of its impact on society, culture and the economy. In general, the evolution of information technology-assisted learning dates back to the early 1980s and the publication of the first *International Journal of Artificial Intelligence in Education* in 1989, while the International Society for Artificial Intelligence in Education was founded only in 1993 (Tolochko and Godunova 2023).

There are great opportunities and prospects for using AI in education to transform the educational process into a more innovative, inclusive, efficient and effective one by introducing new high-quality learning methods that are fast, personalised and student-centred (Viznyuk et al. 2021). The real goal of AI in education systems should be to maximise the individualisation of education by offering students personalised learning paths according to their strengths and weaknesses and didactic material adapted to their characteristics while maintaining the quality of education and the integrative principle of education systems (Goksel and Bozkurt 2019; Mironova et al. 2022).

Significant changes in the use of AI in education, in particular in educational and research activities, are currently taking place in the following key areas:

1. assessment (in particular, automatic assessment and evaluation of students' learning progress and attitudes to learning, individual and group assessment, etc.);
2. prediction of learning status (prediction of student dropouts, risk groups, innovative abilities, career decisions), productivity or satisfaction, improvement of educational experience;
3. assisting (supporting students in their education, for example through anthropomorphic presence, which includes virtual agents and persuasive intervention through digital programs);
4. tutoring (tailoring individual strategies and approaches to the characteristics and needs of students);
5. learning management (learning analytics, sequencing of curricula and programmes, instructional design and student placement) (Peven, Khmil and Makogonchuk 2023).

One of the key arguments in favour of using neural networks is optimisation of the learning process. Delegating routine tasks to AI (creating drafts of lectures, assignments, assessment automation systems; expressing answers to frequently asked questions, or general answers to written questions, for example for a course project) can speed up and relieve teachers' work. AI technologies can support the digitisation of content, making it easier to find and use the right information. In addition, AI can provide learners with access to more diverse and relevant sources of information, enabling them to obtain comprehensive and useful information for their learning (Nagao 2019).

AI has the potential to stimulate students' motivation to learn. For example, the system is ready to offer gaming elements in the learning process to help students be more interested and engaged in their studies. Another advantage of using AI in the learning process is the automatic assessment of students' knowledge and skills. AI systems allow assessing not only closed-ended answers in a test format but also descriptive answers (Drach et al. 2023).

AI systems provide a more objective assessment of knowledge and skills as they use standardised algorithms and evaluation criteria. This helps to avoid subjectivity in student assessment, which can be present in manual assessment. To combat the problem of cheating in online exams, many institutions use automated security software. These tools monitor students through their webcams during tests. Using AI, the software can point out suspicious movements or actions, such as when a student frequently looks away from the screen or someone else enters the room. AI systems provide high reliability of assessment because they are not affected by emotions and fatigue. AI also identifies mistakes in students' work that may be missed during manual assessment.

AI helps to create curricula that meet the personal needs and interests of all students. Each student has individual needs and interests that can be met by AI systems. For example, if a student has certain interests, the system can recommend learning materials that relate to this particular information area (Terepyshchy 2023). Thus, individualised learning helps students who have significant differences in prior knowledge and skills.

Later, each student can have an assistant, such as Siri or Alexa. This system has enough data and experience to enable the neural network to learn itself. The main functions must be laid out in such a way that timely questioning is a Socratic principle. And then the dream of ancient philosophers may come true – that every citizen will be educated as a philosopher (Sharov 2023).

The use of AI and neural networks is significantly increasing the accessibility of education. The use of online platforms and applications with built-in AI will allow students to get an education anywhere and anytime. AI can help provide access to education for people who had to move due to the war and continue their education in other countries. For example, AI-powered online learning systems can help students with internet access to get an education from anywhere. AI systems can make a significant contribution to improving the efficiency of management decisions in educational institutions through a variety of technologies and tools. The use of AI technologies in education can greatly facilitate management processes, contributing to the quality of learning and the efficiency of educational institutions. Here are some ways in which this can happen (Krupenina, Fedorchuk and Sabadosh 2023).

To begin with, AI systems can integrate and synthesise data from different sources, allowing for a more complete and in-depth understanding of a situation or problem. This is especially important in education, where individual attention to each student is key to achieving optimal results. Automated data processing allows you to create personalised learning approaches based on the unique needs and characteristics of each student. Machine learning algorithms are powerful tools for

analysing and understanding learning processes. The ability of these algorithms to identify complex patterns and trends in massive data sets allows not only immediate response to events but also planning management strategies to improve the learning process.

AI can also be used to predict and manage changes in the educational environment. Algorithms can analyse educational trends, predict possible risks, and recommend strategies to avoid or reduce the impact. This allows for more flexible and adaptive educational programmes that can meet the needs of a rapidly changing society (Yatsenko 2023). Automation through the use of specialised systems can play an important role in optimising resource decomposition and management. Scheduling automation systems not only simplify the process of scheduling events and classes but also take into account various parameters such as seat availability, availability and qualifications of teachers and other factors that affect the efficiency of the educational process (Semenets-Orlova, Shevchuk et al. 2022).

However, along with many positive opportunities, the use of AI in school education can cause certain problems. AI is already actively used by some students writing essays and papers, making it difficult for a teacher or someone who wrote the paper to understand either the AI or the teacher. Only China has developed a system for checking essays and other works using AI, but this system has not yet been implemented (Chen, Chen and Lin 2020).

The use of AI could lead to the automation of some processes in school education, such as checking assignments and assigning grades to students. This could lead to job losses for teachers and other educational institutions from a global perspective. The other problem is the restriction of freedom of expression and creativity in the learning process, as the AI system offers only a limited set of tasks and solutions. AI can lead to changes in communication between teachers and students, as well as between students. This can affect social interaction and the development of communication skills. Interaction with AI teachers is less emotionally charged, which affects students' motivation to learn. One more threat posed by AI is the lack of group interaction. The use of AI systems reduces students' ability to cooperate with other group members and develop social skills. One of the negative consequences of using AI is that students feel isolated and distant from the learning process. They may feel confused, not knowing who to turn to for help or advice, especially if they need one-to-one instruction.

The use of AI can lead to the collection and use of students' data without their consent or protection. There also can be such problems as dependence on technology and the loss of skills that could be useful in real life. AI can be programmed to stereotype and prevent discrimination based on race, gender, nationality or other categories. If AI is used to evaluate students, it raises questions about the objectivity of such an assessment and its fairness. AI and neural networks require a lot of high-quality data to be successful. If the data contains errors or inaccuracies, it can lead to incorrect results (Chen, Chen and Lin 2020).

AI and neural network systems are less flexible than teachers, which limits the ability to adapt to the specific needs of students. In addition, AI has a limited ability to perceive the context and the individual characteristics of students.

The use of AI to manage cybersecurity risks in education is rapidly becoming an integral part of the modern educational environment. As the use of technology in education increases, so does the risk of cyberattacks. AI-based cybersecurity solutions can help protect educational institutions from intruders, but implementing these solutions can pose several challenges.

The use of AI to manage cybersecurity risks in education is rapidly becoming an integral part of the modern educational environment. However, implementing these solutions can pose several challenges. Educational institutions need to ensure that their staff is properly trained to effectively use and manage AI solutions with access to the necessary resources to ensure that their AI solutions are properly maintained and updated and that they are properly integrated into their existing security infrastructure (Luan et al. 2020). By addressing these challenges, educational institutions can ensure that their AI solutions are effective in protecting their institutions from attackers.

There is an undeniable need for proper training to fully utilise the potential of AI. Before introducing new tools such as AI-powered writing and research assistants, students should learn how to formulate queries, interpret results and use the tool to complete tasks during practical classes. When using AI for grammar checking, teachers should emphasise to students that while the tool can detect mechanical errors, it does not always pick up on nuances of tone or style. Thus, teachers should encourage students to use the tool as a preliminary check but rely on their judgement for the final touch. Setting the right expectations ensures that AI is seen as a tool for improvement, not a magic wand (Alam 2021).

It is also important to remember that the use of AI in education requires significant investments that are not available to all educational institutions. AI and neural networks require a lot of high-quality data to function and learn. If the data being trained contains errors or inaccuracies, it leads to incorrect results. Another example is the use of an automated assignment grading system. If the system has been trained on data that contains errors, it will give students incorrect grades. Thus, poor data quality can lead to inaccuracies and incorrect functioning of the AI system in education. This reduces the quality of teaching and the provision of correct information to students.

The above disadvantages of using AI and neural networks in education show that these technologies cannot completely replace the human factor in education. However, they can be a useful complement to traditional teaching methods (Ouyang and Jiao 2021). The use of AI raises ethical concerns because it is capable of collecting and analysing large amounts of data, including students' data, which may contain sensitive information. This violates the privacy and security of such students. For example, an AI-assisted learning system collects and stores data on students' activity, including their progress, answers to tasks and knowledge gained. This data can be used to evaluate and address ethical issues such as discrimination and privacy violations. There are also ethical issues of accountability for the results produced by an AI learning system. If the system produces incorrect results, this has negative consequences for students, especially if their grades are used to make decisions about graduate school or employment.

The use of ChatGPT-like applications can reduce the spread of cheating in education, which involves writing assignments for money. On the other hand, new ethical challenges arise that need to be addressed now. The results of the Stanford University survey show that students actively use ChatGPT to help generate ideas for future essays and receive instant automatic feedback on their work. In this context, the use of AI tools should not be condemned but rather encouraged (Hwang et al. 2020).

AI applications can perform typical essays or labs with ‘perfect marks’, so this type of task should be a thing of the past. Instead, tasks that require analysis, an individual approach and critical thinking should take up an increasing share of the learning process. It is important to teach students not just to repeat existing ideas but to use them as a basis for creative solutions and new research. In this sense, ChatGPT-like applications open up additional opportunities for students and educators.

4. Discussion

AI, as a key player in the development of education, will not only bring significant changes to current approaches to learning but also provide the education sector with new opportunities to create effective and adaptive learning environments. The introduction of AI into education is a promising area that can significantly transform the current education system and prepare students for the challenges of the future.

Although AI may still have its opponents and sceptics, this technology will not disappear. Those working to improve AI are confident that this innovative technology will only become more widespread in schools in the next five to 10 years. Researchers believe that AI-enabled educational programmes will be widely used in different countries, especially as more and more educational institutions expand their hybrid curricula. In addition, virtual reality AI will enable students to communicate with classmates at home and vice versa. This can create a more optimised and homogeneous remote classroom experience during distance learning. As AI research continues to advance and the field evolves, the implications of these new technologies for the educational landscape are enormous. It’s almost impossible to imagine a future where AI isn’t being used somewhere in the classroom, simply because the potential benefits are too compelling to ignore.

With AI-enabled teacher assistants, integrated virtual reality classrooms and gamified lessons, the ability to develop personalised instruction for individual students is becoming a major goal for educators. Teachers are well aware of how effective differentiated learning is for students with special needs. AI is designed to create unique individualised lesson plans for students without putting an additional burden on teachers’ time and resources. This change promises to open up learning to a whole generation of students who otherwise find it difficult to learn.

AI has already been widely used to help catalogue and grade student work. Right now, AI programs can already determine whether an article is plagiarised or written with the help of an AI program such as ChatGPT. These programs can also help with bulk grading, significantly reducing the amount of time an instructor has to spend

checking assignments. As these learning models grow in scale and capability, they will continue to be applied to more and more specific and complex projects.

An AI tutor can complement a student's education in several pragmatic ways. Virtual assistants can help students develop flashcards, mock exams and other practice tasks. Speech synthesis speech-to-text learning models or speech-to-text generation can help with learning new languages or be used to provide examples and learn phrases. These technologies can even be used in conjunction with traditional tutoring to create a hybrid tutoring session, giving students access to tutor guidance no matter where they are (Knox 2020).

By combining new approaches and technologies, you can shape the learning environment. Let's look at a few examples of how AI is being used in online learning. AI is changing online learning. It can be effective due to the ability to analyse student data and change the learning process itself based on the results of the analysis. The simplest and most direct use of AI is to monitor knowledge, automate assignment checking, detect and correct errors and help instructor systems determine the autonomy of assignments during grading. AI also helps to eliminate cheating by analysing camera images and user browsing activity. AI-based security systems determine the autonomy of tasks.

The positive effect of using AI for knowledge and skills, the ability to recognise text and voice with subsequent natural language analysis, which has begun to be used in foreign language learning, is significant. The chatbot allows for multiple re-reads when translating words, pronunciation, etc. – i.e. it acts as a tutor – which is important in online learning. Learning outcomes and assessment, quality of learning and speed of learning allow us to adapt learning to the characteristics of each person, their needs and mental abilities. AI systems allow educational institutions to develop individual learning profiles. Based on this, educators can assess students' capabilities to improve their knowledge and academic performance.

The use of voice assistants in online learning is positive. Students can use these tools to interact with course materials and meet their information needs. Instead of traditional handouts, teachers provide students with voice messages to advise them. Hence, this practice is one of the best uses of AI, as it reduces the human workload.

At the educational institution level, AI also helps to organise the learning process, managing the teaching team, students' performance, administrative tasks, etc. AI is greatly benefiting various foreign language translation services, such as Google, which has implemented Google Neural Machine Translation (GNMT) in its translators since 2016. GNMT significantly improves the quality of translation by training the system from information contained in millions of online sources. Thanks to its extensive end-to-end structure, the system learns to produce better translations over time. Let's take a look at some of the technologies used in the learning process and their role in it (Huang, Saleh and Liu 2021).

By combining these approaches and technologies, competent methodologists can shape the learning environment. Let us consider some approaches to the use of AI in online learning. Regardless of whether we are talking about academic learning or other life skills, each person is different. Everyone has their own needs and different levels of mental capacity. Teachers believe that it is necessary to cope with this

situation. Therefore, they believe that it is better to teach on an average. So, when AI comes into the picture, there is a whole new level of courtesy towards individual needs.

AI-powered systems now allow educational institutions to develop an individual learning profile according to each student's abilities. Based on this profile, educators around the world will be able to assess the abilities of their students better than ever before. Accordingly, they will also be able to help students significantly improve their academic performance.

Voice assistants can improve the perception of information. Amazon's Alexa and Microsoft's Cortana are used in this regard as indispensable assistants for teachers. Students can use these tools to interact with course materials and meet their information needs. Instead of traditional handouts on research materials, teachers provide students with voice assistants; for example, the University of Arizona has been practising this form of education for some time now to assist undergraduate students. This approach reduces the need for internal constant support from the teacher. In addition, students receive a higher level of education. This contributes to their academic experience. Thus, such a practice is one of the best examples of the use of AI, as it reduces the level of human workload.

AI can assist teachers in solving various tasks. In education, academic teaching and the presentation of educational material are not a single problem. At the level of the educational institution, it is necessary to manage the teaching staff and student performance, as well as to perform administrative tasks that ensure the continuous operation of the academic environment. For example, such tasks include human resources and learning environment management, core document management, group materials management, as well as non-teaching duties such as assessment and student collaboration.

In 2020–2021, Finland will provide EU residents with free access to the Elements of AI online course. The programme was created by the University of Helsinki and the Finnish technology company Reaktor. It is designed to encourage people to learn the basics of AI, regardless of their age and education. Everyone needs digital skills and awareness nowadays. The initiative costs the Finnish budget €1,679,000. Already, 700 Flanders schools in Belgium have started using AI in education this academic year. The local authorities signed an agreement with the British company Century Tech, which has developed a platform that allows for personalised learning. The goal is to enable each student to learn at their own pace and, at the same time, reduce the administrative burden on teachers. The idea is to move away from the traditional model of education, when teachers try to teach children at different levels, to one where the AI platform helps to adapt the types of tasks, time for their completion and assessment for each student. This is a kind of constant diagnostics and planning of a child's progress (Cope, Kalantzis and Sears Smith 2021).

In practice, it looks like this: schools upload the curriculum to the Century system, and then the platform breaks down its content into micro-lessons. Children take a quick assessment to determine who is at what level. The system then develops learning for each student, based on what they need to work on more. Unlike other adaptive technologies, learning based on clear algorithms and rules, the Century

platform uses AI that learns and adapts its knowledge of the student. During the learning process, it is constantly updated. The basic principles of neuroscience allow us to individually assess the level of concentration and perseverance of students, the pace and best time to study, and how long it takes for information to move from short- to long-term memory. The company claims that its technology saves teachers an average of six hours a week. Personal information about the child is only required to log in to the platform. AI does not use it.

China has plans to become a leader in the use of AI. The government spares no expense on large-scale projects that bring together leading IT companies, startups and schools. The number of classrooms equipped with AI cameras and brainwave trackers is increasing in China. Journalists of the American edition of the *Wall Street Journal* visited one of the primary schools in Shanghai. The lesson begins with all children wearing a special tracker on their foreheads, which looks like a hoop. A special sensor that lights up in different colours is located above the eyebrows. There are special sensitive electrodes there. They are also on both sides where the tracker is attached near the child's ears. The lesson begins with meditation. The tracker can determine the child's level of concentration at a certain moment. The information is immediately sent to a computer, and teachers and parents can see it.

The use of AI in schools in different countries is still in its early stages. However, there are already concerns about the confidentiality of personal data and the undermining of the status of teachers. Some believe that modern technologies will facilitate the rapid acquisition of information, while others argue that children are not ready for such experiments and do not perceive such innovations well. But we definitely cannot ignore or avoid all the opportunities and risks, achievements and disruptions that AI brings with it (Nguyen et al. 2023).

The issue of AI use in Ukraine has been one of the most important in the development of educational and scientific activities since the first days of the young state's independence. The Institute of Artificial Intelligence Problems of the Ministry of Education and Science of Ukraine and the National Academy of Sciences of Ukraine was established in 1991, and its scientists developed a draft National Strategy for the Development of Artificial Intelligence in Ukraine 2021–2030. The Institute's scientists proposed two areas of research based on application of the principles and mechanisms of human brain functioning, in particular its consciousness. The first area includes research for science, education, medicine, defence industry, agriculture, etc., and the second is the creation of a competitive new generation computer with a basic smart unit – artificial consciousness and a high level of AI. About the use of AI in research and education, research areas in computing systems have been identified. The government approved the Concept for the Development of Artificial Intelligence in Ukraine and an action plan for its implementation for 2021–2024 (Pankhnyk 2023).

The key problems in this area in Ukraine are insufficient funding for AI research projects in educational institutions; insufficient quality of higher education and educational programmes for training relevant specialists; and uncertainty of ethical approaches to the use of AI technologies. The functioning of real mechanisms for the protection of human rights and universal values, and not just their declarative

nature, is particularly critical, particularly in the context of the Russian Federation's armed aggression against Ukraine. That is why it is necessary for the national, institutional and individual levels to:

- facilitate attraction of grant funding for research activities in the field of AI;
- partially compensate researchers' expenses for participation in international conferences;
- support international cooperation in sharing best practices;
- promote the use of AI technologies in the fields of science, as well as interdisciplinary research at the intersection of AI and other fields of science;
- develop clearly defined rules for the use of AI based on the value principles justified by the EU and the European Association of Universities. Regulation of the use of AI should be carried out at the institutional level in line with the mission, vision, goals and values of the educational institutions based on the key ethical principles;
- assist teachers at the institutional level in mastering modern developments in the use of AI, as well as rethinking the role of the teacher in teaching and learning through AI technologies;
- since the application of AI in higher education can be carried out at all stages of the educational process, adapt approaches to teaching, learning and assessment for the effective and efficient use of AI, taking into account the socio-psychological consequences;
- inform participants in the educational process about the use of AI in educational and scientific activities as a tool or research method based on responsibility, ethics, transparency and academic integrity;
- take into account industry specifics, in particular pedagogy, which involves orientating applicants to quality standards within the framework of interaction between the applicant and the created 'rules of the game', as well as awareness of the nature of interaction with the AI system.

About compliance with ethical standards, the Concept envisages, first of all, the need to regulate social relations in the field of AI development at the legislative level and the development of an Ethical Code of Artificial Intelligence. The development and implementation of AI technologies in Ukraine is defined as one of the tasks of other regulatory acts, in particular the National Informatisation Programme for 2022–2024.

4. Conclusions

AI is playing an important role in improving the quality and accessibility of education. The use of AI allows us to move from standardised teaching methods to individualised and effective strategies. AI also enhances learning through the use of virtual reality and other immersive technologies, creating learning environments that encourage active participation and facilitate understanding of complex concepts. AI-enabled online platforms provide global access to learning resources, reducing geographical limitations and making education more accessible to a wider audience, especially in regions where access to quality education may be limited.

AI also helps automate routine tasks, such as grading, allowing teachers to focus on personalised guidance and stimulating students' creative thinking. However, the successful implementation of AI in education requires careful consideration of moral and security aspects. Maintaining a balance between technological capabilities and the role of the teacher is essential to ensure a warm and supportive educational environment where not only the intellectual but also the social and emotional aspects of students' personalities are developed. This synergistic approach maximises the potential of AI to create high-quality and accessible education.

The introduction of AI in education is a transition from reactive to strategic management, where the ability to predict trends plays an important role in the development of effective management strategies. The use of AI analytics allows us to gain a deep understanding of educational processes and respond to changes promptly, ensuring a higher level of adaptability and innovation.

AI can adapt to the different learning speeds and perception styles of students, providing a personalised approach. However, it is important to remember that educational success is not limited to advanced technologies. Teachers play an important role in nurturing, mentoring and creating an environment of emotional support for students. By striking a balance between technological capabilities and a humane approach, the educational process can become a holistic system that develops both the intellectual and the social aspects of the individual. Such a harmonious approach can prepare students for the challenges of the modern world by developing their technical and interpersonal skills for the successful functioning of society.

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