

CURRENT GLOBAL DEVELOPMENTS IN EDUCATION ПОТОЧНІ ГЛОБАЛЬНІ ПОДІЇ У ГАЛУЗІ ОСВІТИ

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Emotional artificial intelligence in teacher education: a new dimension of teacher-student interaction

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Abstract

The article explores the potential of Emotional Artificial Intelligence in higher teacher education. In the context of the digital transformation of education, Artificial Intelligence technologies play a crucial role in personalizing learning, enhancing teacher-student interaction, and adapting the educational process based on students' emotional states. The study examines the fundamental principles of Emotional Artificial Intelligence, emotion recognition methods (computer vision, voice analysis, biometric technologies), and their application in educational contexts. The advantages of implementing this technology in pedagogical universities are analyzed, particularly its ability to improve feedback between students and teachers, foster a more supportive emotional learning environment, and increase student motivation. Special attention is given to the challenges of integrating Emotional Artificial Intelligence into the educational process, such as ethical concerns regarding data privacy, technological limitations, and potential resistance from educators and students. The study identifies future research directions, including improving emotion recognition algorithms, developing ethical standards for the use of emotional data, and integrating Emotional Artificial Intelligence into digital learning platforms. The findings highlight the significant potential of Emotional Artificial Intelligence in pedagogical education to create an adaptive and emotionally responsive learning environment.

Keywords: Emotional Artificial Intelligence, personalized learning, teacher education, adaptive learning, emotional interaction, digital technologies

Емоційний штучний інтелект у педагогічній освіті: новий вимір взаємодії викладача і студента

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Анотація

Стаття присвячена дослідженню можливостей використання емоційного штучного інтелекту у вищій педагогічній освіті. У сучасних умовах цифрової трансформації освітнього процесу технології штучного інтелекту відіграють ключову роль у персоналізації навчання, покращенні взаємодії між викладачем і студентом, а також адаптації навчального процесу відповідно до емоційного стану студентів. У роботі розглядаються основні принципи функціонування емоційного штучного інтелекту, методи розпізнавання емоцій (комп'ютерний зір, аналіз голосу, біометричні технології) та їхнє застосування в освітньому контексті. Аналізуються переваги впровадження цієї технології у педагогічні університети, зокрема її здатність сприяти ефективнішому зворотному зв'язку між студентами та викладачами, покращенню емоційного середовища навчання та підвищенню рівня мотивації студентів. Особливу увагу приділено викликам інтеграції емоційного штучного інтелекту у навчальний процес, таким як етичні питання конфіденційності даних, технічні обмеження технологій та можливий опір з боку викладачів і студентів. Визначено перспективи подальших досліджень у цій сфері, включаючи вдосконалення алгоритмів розпізнавання емоцій, розробку етичних норм використання емоційних даних та інтеграцію емоційного штучного інтелекту у цифрові платформи навчання. Результати дослідження свідчать про значний потенціал застосування емоційного штучного інтелекту у педагогічній освіті для створення адаптивного, чутливого до емоцій студентів навчального середовища.

Ключові слова: емоційний штучний інтелект, персоналізоване навчання, педагогічна освіта, адаптивне навчання, емоційна взаємодія, цифрові технології

Statement of the problem. Modern education is undergoing radical changes under the influence of digital technologies, which are gradually shaping new approaches to learning and interaction between participants in the educational process. The integration of technologies into the sphere of education contributes to the expansion of learning opportunities and makes it more accessible, personalized, and effective. Artificial intelligence, big data, augmented and virtual reality, as well as automated systems for analyzing educational processes, are gaining particular importance. One of the newest and most promising areas of technological development is emotional artificial intelligence (AI), which is capable of not only analyzing a student's educational activities but also

recognizing his emotional state and adapting the educational process to individual needs.

The transformation of education under the influence of digital technologies requires a rethinking of traditional approaches to teaching and learning. Standardized teaching methods, which were previously based on the same approaches for all students, are gradually giving way to adaptive learning, which takes into account the cognitive characteristics, emotional state, and level of motivation of each student (Lazarenko & Hapchuk, 2024). In this context, emotional AI can play a key role, as it allows you to analyze non-verbal signals of the student, such as facial expressions, tone of voice, changes in behavior, level of engagement, and stress. Thanks to this, you can respond in a timely

manner to learning difficulties, offer additional support, or change teaching strategies (Emotional Intelligence in AI | the Princeton Review, n.d.).

Such a transformation is especially important in higher pedagogical education, where future teachers form their professional skills, in particular communicative, emotional-intellectual, and analytical. The use of emotional AI in the training of teachers will contribute to the development of their empathy, improve interaction with students, and increase awareness of the importance of emotions in the learning process. A modern teacher must be not only a carrier of knowledge but also able to effectively respond to the emotional state of students, creating a favorable environment for learning.

An additional advantage of the technological transformation of education is the possibility of creating flexible curricula that adapt in real time. AI-based systems can analyze student progress, identify difficulties, and offer personalized recommendations. This is especially important for distance and blended learning, which is actively developing in connection with global challenges such as pandemics or changes in the structure of the labor market.

Despite the numerous advantages, the introduction of technologies into the field of education is accompanied by certain challenges. In particular, the issue of the ethics of using AI, preserving the privacy of student data, as well as the readiness of teachers to work with new digital tools, arises. In addition, it is necessary to take into account the risk of excessive automation of education, which can lead to a decrease in interpersonal interaction between teachers and students. That is why it is important to consider technological innovations not as a replacement for traditional education, but as a means of improving it and adapting it to modern realities (Zhao & Yu, 2024).

In general, the role of technology in the transformation of education is extremely significant, as it opens up new opportunities for personalizing learning, increasing its efficiency, and improving emotional interaction between teacher and student. Emotional AI in this context becomes a tool that can significantly improve the quality of education, especially in pedagogical universities, where future teachers are formed who are able to work in the conditions of a new educational reality.

Analysis of recent research and publications.

The relevance of the problem of using emotional AI in pedagogical education is growing against the background of the development of technologies that are actively changing the educational environment. In modern conditions, when the integration of AI into various aspects of education is becoming key, the issue of using emotional AI is gaining increasing importance. Emotional AI allows you to create personalized and adaptive learning environments that take into account the emotional state of students, which, in turn, helps to increase the efficiency of the educational process. Technologies that are able to recognize students' emotions can become the basis for creating systems that not only provide optimal conditions for learning material, but also help teachers respond in a timely manner to possible problems, such as stress or alienation of students. However, research into the use of emotional AI in an educational context remains at the initial stages. The high potential of this technology, although noted in general AI research, has not yet been thoroughly studied and applied in the field of higher education, in particular in the context of pedagogical education. Existing works that consider the use of emotional AI in other areas, such as medicine or business, provide important approaches, but need to be adapted to the specifics of the educational process. For example, studying the role of emotions in the educational process and teacher-student interaction through AI technologies can be an important step in improving the quality of education and optimizing pedagogical strategies. Studies such as Banafa (2024), Shrivastav (2024), Gordo (2024), and others focus on general issues of emotional AI and its application in various fields, but they do not pay enough attention to specific aspects of its implementation in education. At the same time, the growing role of AI in education, in particular through automated assessment and adaptive learning (Lazarenko & Hapchuk, 2024; Tan et al., 2024), creates the prerequisites for further research and implementation of emotional AI in the educational process, in particular in teacher education. Research at the intersection of emotional intelligence and AI technologies in the educational context is an important area for the development of innovative pedagogical approaches that can improve student-teacher interactions, increase learning effectiveness, and reduce student stress.

Research papers such as those presented by Mayrene et al. (2024) and Meylani (2024) open up prospects for the application of emotional AI in studies of student-technology interactions in the educational process, but do not yet fully address the issue of integrating these technologies into higher pedagogical education. Therefore, despite the existence of developments in the field of general AI, emotional AI in the context of pedagogical education remains an understudied area, which emphasizes the relevance of research on this issue.

The purpose of the article is to explore the potential of emotional AI to improve teacher-student interaction in the field of teacher education.

Summary of the main material. Emotional AI or Affective AI is a branch of AI that studies the imitation, recognition, and analysis of human emotions to improve the effectiveness of human-technology interactions. Its main goal is to provide artificial systems with the ability to identify the emotional state of the user, adapt behavior according to the received data, and create more natural and effective forms of communication between humans and machines. This is achieved through the use of technologies such as computer vision, natural language processing, machine learning, and biometric data analysis (Banafa, 2024).

A key element of emotional AI is the ability to recognize emotions, which is carried out based on various parameters. In particular, computer vision algorithms analyze facial expressions, facial microexpressions, and body movements, which allows you to identify emotions such as joy, sadness, anger, surprise, or fear. Natural language processing technologies, in turn, allow us to identify emotional states based on the tone of voice, speech rate, and lexical structures used by a person. Additionally, emotional AI can use sensory data, such as analyzing heart rate, skin conductivity, or changes in body temperature, to more accurately determine the user's level of stress or anxiety (Banafa, 2024).

The significance of emotional AI in the modern world is multifaceted and goes beyond purely technological applications. Its implementation helps improve the interaction between a person and digital systems, making it more intuitive, personalized, and effective. This is especially important for areas where communication and emotional intelligence play a key role, such as medicine, business, psychology, and education. In medicine, emotional AI helps detect signs of

depression, anxiety disorders, or cognitive impairments, which allows doctors to respond more quickly to a patient's condition. In the business sphere, such technologies are used to improve the customer experience, in particular in chatbots and voice assistants that can react to the user's mood and adapt the tone of the response (Shrivastav, 2024).

However, emotional AI acquires particular importance in the educational environment, where the interaction between a teacher and a student has not only a cognitive but also an emotional dimension. The use of such technologies allows for the creation of adaptive learning platforms that analyze the level of engagement and motivation of students in real time. For example, if a student shows signs of fatigue, the system can suggest a change in the pace of learning, additional explanations, or interactive exercises to maintain attention. The teacher, in turn, receives feedback on the emotional state of the audience, which allows him to timely adjust his teaching approach (*Issues—Emotional AI Lab, n.d.*).

In addition, emotional AI can help students develop emotional intelligence, which is an important factor for their future professional activities, especially if they are preparing to work in socially significant fields such as pedagogy. The use of technologies that help recognize emotions can teach future teachers to be more attentive to non-verbal signals from students, improving their communication skills and level of empathy. This, in turn, contributes to the formation of a new generation of teachers who are able to interact effectively with students, taking into account not only their level of knowledge, but also their emotional state (*Issues — Emotional AI Lab, n.d.*).

At the same time, the use of emotional AI raises certain ethical and technical challenges. The main issues remain data confidentiality, responsibility for decision-making, and the possibility of manipulating users' emotions. It is important that the development and implementation of such technologies takes place in accordance with ethical norms, taking into account human rights and ensuring voluntary consent for the use of emotional data (Gupta et al., 2024).

It is also worth noting that in the scientific literature, the concept of emotional AI has various interpretations. Here are several options for

interpreting the concept of “emotional artificial intelligence”:

1. Emotion recognition and analysis technology – a system that uses machine learning algorithms to identify a person's emotional state based on facial expressions, gestures, voice, and physiological indicators (Banafa, 2024).

2. Adaptive artificial intelligence – intelligent systems that not only recognize emotions but also change their behavior or responses according to the user's mood (Shrivastav, 2024).

3. Emotion modeling in digital systems – a direction of artificial intelligence that attempts to imitate human emotions in robots, chatbots, or virtual assistants to improve interaction (Gordo, 2024).

4. Emotional personalization tool – a technology that allows you to adjust content, learning processes, or user experience depending on the emotional state of a person (Predin, 2024).

5. Artificial emotional intelligence in communication – systems that help improve social human-machine interaction by making digital agents more “sensitive” to non-verbal signals (*Emotion AI, Explained | MIT Sloan, 2019*).

Thus, emotional AI is an innovative technology that has significant potential to improve human-machine interaction and create personalized, adaptive educational environments. Its integration into the educational process can contribute to a deeper understanding of students' emotional needs, improve the quality of teaching, and create a new level of communication between teachers and students. Despite the challenges associated with ethical aspects and technical limitations, emotional AI opens up prospects for the development of education, making it more sensitive to the individual characteristics of each student.

According to our interpretation, based on the analysis of scientific literature, emotional AI is a direction in the development of AI aimed at recognizing, analyzing, modeling, and responding to a person's emotional state. The main difference between emotional AI and traditional AI systems is their ability to take into account not only the logical aspects of communication but also non-verbal signals that reflect the user's internal emotional state. This technology aims to create a more natural interaction between humans and machines, which increases the efficiency of automated systems in various fields of activity.

The main characteristics of emotional AI are its ability to process large amounts of data, analyze non-verbal and verbal signals, and adapt its behavior based on the information received. Such systems use machine learning algorithms to recognize facial expressions, changes in voice, gestures, and physiological reactions, which allows them to draw conclusions about the emotional state of a person. An important aspect is also the modeling of appropriate reactions that can imitate human emotions, which significantly improves the efficiency of interaction between the user and the system (*Emotion AI, Explained | MIT Sloan, 2019*).

Emotion recognition methods in emotional AI are based on various technologies, the main ones being computer vision, natural language processing, and analysis of physiological parameters. Computer vision is used to analyze facial expressions, eye movements, head position, and other nonverbal cues. For example, using neural networks, the system can detect microexpressions that indicate hidden emotions that a person does not always express consciously. Natural Language Processing (NLP) technologies allow analyzing the content and tone of speech, intonation, and speed of speech, which makes it possible to determine the user's mood and even their stress level. In addition, analyzing physiological parameters such as heart rate, skin conductivity, and cortisol levels allows for even more accurate results regarding a person's emotional state (Marr, 2021).

The application of emotional AI covers a wide range of industries, as the ability to adapt digital systems to a person's emotional state opens up new prospects for automating and personalizing interactions. One of the key areas of application is medicine, in particular psychiatry and psychology, where the technology is used for early diagnosis of depression, anxiety disorders and post-traumatic stress disorder. For example, emotional AI systems can analyze a patient's language, facial expressions and behavioral characteristics, detecting signs of psychological disorders before they become apparent to a doctor. This allows for the prevention of mental disorders and improves the quality of psychotherapeutic treatment (Marr, 2021).

In business, emotional AI is actively used to improve the level of customer service. For example, chatbots and virtual assistants equipped with emotion recognition technologies can adjust the tone of the response according to the client's mood,

which contributes to a better perception of the service. In addition, emotion analysis is used in marketing, in particular to assess consumer reactions to advertising. Computer vision technologies allow us to analyze facial expressions while viewing advertising content, determining what emotions it evokes, which helps to create more effective marketing strategies (Meylani, 2024).

The use of emotional AI in education is particularly promising, where it contributes to the personalization of the learning process. Intelligent learning platforms equipped with emotion recognition systems can monitor the level of interest of students, detect moments when they lose attention or have difficulty perceiving the material. For example, if the system determines that a student is tired or shows signs of irritation, it can suggest a change in the learning format, take a break, or adapt the educational material. Teachers, in turn, can receive analytics on the emotional state of the audience, which allows them to adjust their teaching style to increase the effectiveness of the learning process (Tan et al., 2024).

As we can see, emotional AI is a promising direction in the development of modern technologies, which allows creating more adaptive and effective systems of human-machine interaction. Its application in medicine, business, and education demonstrates significant potential for improving the quality of services and increasing the level of personalization. At the same time, the development of this technology requires further research, in particular on the ethical aspects of its use, since the recognition and analysis of a person's emotional state are related to issues of confidentiality and responsibility for making decisions based on emotional data. Despite these challenges, emotional AI is already changing the way people interact with digital technologies and opens up new opportunities for improving human-machine communication.

Modern pedagogical education actively integrates digital technologies that contribute to increasing the efficiency of the educational process. One of the most promising innovations is the use of emotional AI, which allows analyzing the emotional state of students and adapting learning to their needs. Emotional AI can significantly improve teacher-student interactions, creating a more personalized and flexible learning environment. Its ability to recognize and interpret students' emotions

helps teachers better understand the level of interest, motivation, and difficulties students face during the learning process (Tan et al., 2024).

One of the key areas of application of emotional AI in pedagogical education is the recognition of students' emotions in real time. This is achieved by analyzing facial expressions, gestures, and tone of voice, as well as behavioral and physiological indicators. For example, computer vision systems can track students' facial expressions during lectures or online classes, determining their level of attention, interest, or fatigue. If a student shows signs of confusion or stress, the system can signal the teacher that additional explanation of the material is needed or a change in the method of presenting information is needed. Similarly, voice data analysis allows for the detection of emotional state based on timbre, intonation, and rate of speech, which can be useful during oral responses or discussions in an educational environment (Mayrene et al., 2024).

An important aspect of the application of emotional AI in pedagogical education is the possibility of adaptive learning, which is based on the analysis of the emotional state of the student. Traditional approaches to learning often do not take into account the individual characteristics of students, which can lead to a loss of motivation or information overload. The use of emotional AI allows you to create flexible educational platforms that adjust educational materials, the pace of presentation, and the level of complexity of tasks according to the emotional reaction of the student. If the system detects a decrease in the level of concentration, it can offer interactive exercises or change the format of information presentation to keep the student's attention. On the contrary, if the student demonstrates high engagement, the system can offer additional in-depth tasks to develop his abilities (Mayrene et al., 2024).

In addition to improving the individual learning experience, emotional AI can also help teachers improve the effectiveness of their teaching methods. Analysis of students' emotional reactions to certain topics or methods of presenting material makes it possible to evaluate the effectiveness of educational approaches and make timely adjustments. For example, if students consistently show low engagement when explaining a topic, this may indicate the need to change the approach, use new

teaching formats, or add additional visualization of the material (Lin & Chen, 2024).

Therefore, as noted in scientific studies, the use of emotional AI in pedagogical education opens up new opportunities for personalization and improvement of the educational process. Real-time recognition of students' emotions allows teachers to better understand the needs of the audience, and adaptive learning systems contribute to the flexible adjustment of educational programs according to the emotional state of students. In the future, the integration of emotional AI into educational processes can significantly improve the quality of pedagogical education, creating a more comfortable, effective, and emotionally sensitive learning environment.

The introduction of emotional AI into higher education opens up new opportunities for improving the learning process, making it more adaptive, personalized, and focused on the individual needs of students. The use of such technologies contributes not only to improving learning outcomes but also to increasing the emotional well-being of participants in the educational process. At the same time, there are a number of challenges that can slow down or complicate the integration of emotional AI into the educational environment (Lin & Chen, 2024).

One of the key advantages of using emotional AI is the possibility of personalizing the learning process. Modern educational systems often have a one-size-fits-all approach to teaching that does not always take into account the individual characteristics of students. Emotional AI technologies allow you to adapt educational materials according to the level of engagement, emotional state, and cognitive load of the student (Lin & Chen, 2024).

Another important advantage is the improvement of feedback between the teacher and the student. Teachers are able to analyze not only students' academic performance but also their emotional reactions to the learning material. This allows them to quickly adjust their teaching methods, identify difficulties in understanding certain topics, and find approaches that best meet the needs of the audience. In addition, the use of emotional AI can improve the quality of distance learning, compensating for the lack of direct contact between the teacher and students (Marr, 2021).

Creating a supportive emotional environment is another important aspect of implementing

emotional AI. University education is often accompanied by high levels of stress, which can negatively affect students' cognitive abilities and their ability to absorb information. Emotional AI technologies can help identify signs of emotional burnout, overwork, or anxiety, which allows teachers and administrators of the educational institution to react in a timely manner and implement supportive measures. Such systems can recommend breaks, relaxation exercises, or referral to psychological services for students, which contributes to improving the psycho-emotional climate in higher education institutions (Marr, 2021).

However, along with numerous advantages, the integration of emotional AI into teacher education is accompanied by a number of challenges. One of the most controversial issues is the ethical aspects of the use of technologies, in particular, issues of confidentiality and psychological impact on students. Emotion recognition and analysis involve the collection and processing of personal data, which may raise privacy concerns. Misuse of such technologies or inadequate security may lead to the leakage of sensitive data or its use without the consent of students. Furthermore, excessive monitoring of students' emotional states may create additional psychological pressure and be perceived as an intrusion into their privacy, which requires the development of clear ethical norms and regulations (*Emotional Intelligence in AI | the Princeton Review, n.d.*).

Technological limitations also pose a serious challenge to the implementation of emotional AI in higher education. Despite the rapid development of machine learning algorithms and emotion analysis, current systems are still far from perfect. The accuracy of emotion detection can depend on individual characteristics of the person, cultural differences, and the context of the situation. For example, the same facial expressions or intonations can have different meanings in different cultures, which can lead to erroneous conclusions. In addition, integrating such technologies into educational institutions requires significant financial costs, which may be prohibitive for many universities, especially in conditions of limited funding for the education sector (*Emotional Intelligence in AI | the Princeton Review, n.d.*).

Another barrier is the acceptance of emotional AI by teachers and students. Resistance to new

technologies is a typical phenomenon in the field of education, especially when it comes to innovations that change traditional approaches to teaching and learning. Some teachers may perceive the use of AI as a threat to their professional autonomy, fearing that automated systems could replace their role in the learning process. In turn, students may feel uncomfortable with the constant monitoring of their emotions and behavior, which can negatively affect their well-being (Predin, 2024).

Thus, the introduction of emotional AI into higher pedagogical education has significant potential for improving the learning process, improving the quality of teaching, and creating a more comfortable and adaptive environment for students. At the same time, the successful integration of these technologies requires taking into account ethical aspects, overcoming technological limitations, and forming a positive attitude towards innovations among teachers and students. The development of regulatory mechanisms, increasing the level of digital literacy, and taking into account socio-cultural characteristics can contribute to the effective implementation of emotional AI into the pedagogical education system, ensuring a balance between technological progress and ethical principles of education.

Emotional AI is one of the most promising and rapidly developing areas of technology, and its potential in the pedagogical sphere continues to grow. Technological changes affecting the development of emotional AI are continuously transforming not only the ways of interacting with technologies but also changing the very nature of educational processes. One of the main trends playing a role in the development of emotional AI is the improvement of deep learning algorithms and neural networks, which allows for a significant increase in the accuracy of emotion recognition. The introduction of new approaches to model training, such as transformers and hybrid methods, allows for more flexible integration of emotional data into the system, reducing the number of errors and increasing their ability to adapt in different contexts, in particular in education. Significant progress is also expected in the field of computer vision, where modern face and gesture recognition technologies allow for accurate determination of the emotional state, which is of direct importance for

the development of emotional AI in the educational process (Banafa, 2024).

One of the most relevant directions is the integration of emotional AI into existing learning platforms and pedagogical methods. The integration of AI into the educational environment opens up new horizons for personalized learning that adapts to the individual emotional and cognitive needs of students. This requires continuous monitoring of students' emotional states during learning sessions, which will allow learning systems not only to respond to problems in real time but also to predict possible difficulties. This, in turn, will allow teachers to quickly adjust teaching methods, offering additional materials or support to those students who show signs of emotional stress or overload. Adding emotional AI to platforms such as Moodle, Coursera, Blackboard, etc. will create a more interactive and personalized environment where learning is adjusted to the emotional reactions of students (Tan et al., 2024).

In addition, the implementation of such technologies also has great potential for optimizing pedagogical methods. Teachers will be able to receive not only feedback on students' academic achievements but also data on their emotional state, which will allow them to improve interaction with the audience. In particular, emotional AI can become the basis for new teaching methods, such as adaptive learning, where the system adjusts educational materials, interface, and pace of delivery depending on student reactions. For example, virtual laboratories and simulators incorporating emotional AI can provide even more personalized learning experiences, supporting students in learning through real-time assessment of their emotional state (Tan et al., 2024).

As for the directions of further research, they should focus on several key aspects. The first important direction is to improve methods for accurate emotion recognition, since at the moment there are certain difficulties in determining emotions using only one of the channels, such as computer vision or voice analysis. Combining different recognition methods – from voice analysis to monitoring physiological responses (e.g., pulse, sweating) – can provide a more accurate picture of a student's emotional state, opening up new opportunities for adaptive learning. The technical aspect that needs to be developed also consists in ensuring high accuracy and reliability of algorithms

in various contexts, which, for example, reflects the influence of cultural and individual differences on emotional reactions (Predin, 2024).

Another important direction is the study of ethical and legal aspects of the use of emotional AI in education. Since technologies related to the collection of data on the emotional state of students require special attention to confidentiality and privacy protection, it is necessary to develop clear policies for the use of such data. The issues of ensuring the voluntariness of data collection, limiting access to personal information, and transparency in the use of technologies should be at the forefront of research aimed at the practical implementation of emotional AI in pedagogical activities (Lazarenko & Hapchuk, 2024).

It is also worth focusing on studying the socio-psychological aspects of the impact of emotional AI on students and teachers. To do this, it is necessary to develop methods that allow for the effective integration of emotional AI into the educational process without excessive psychological pressure, providing a comfortable environment for learning and preserving the mental health of the participants in the process. It is also important to study the attitude of students and teachers toward such technologies, in particular, the level of acceptance of new technologies and their fears about interference in private life.

In general, the prospects for the development of emotional AI in higher pedagogical education are promising, but to achieve maximum efficiency, it is necessary to resolve a number of technical, ethical, and social issues. Further research should focus on creating such models of emotional AI that would ensure a high level of personalization of the educational process, integration of new technologies into traditional teaching methods, and also meet ethical standards and needs of educational institutions.

Conclusions. Thus, emotional AI has great potential to transform pedagogical education, especially in the context of improving the quality of teaching and optimizing the interaction between teachers and students. Emotional AI can be used to personalize the learning process, in particular, to adapt educational materials and teaching methods to the individual emotional and cognitive needs of students. This allows you to create a more effective and comfortable learning environment in which the student feels supported by a system that responds to

his emotional state. In particular, by analyzing students' emotions, teachers can timely adjust the approach to learning, preventing stress, overload or emotional burnout, which is an important aspect for achieving high academic results. Adaptive systems based on emotional AI are able to change the pace of material delivery or offer alternative teaching methods in real time, which increases the efficiency of knowledge acquisition. In addition, such technology allows you to provide more personalized support for students, helping them to stay involved in the learning process and preventing a decrease in motivation. Another advantage is the ability to automatically monitor students' emotional state during training sessions, which allows for timely response to problems, providing effective support from both the teacher and the training system.

At the same time, the effectiveness of using emotional AI in pedagogical education depends on many factors, in particular on the technical capabilities and the level of development of emotional AI systems themselves. Today, there are certain limitations in terms of the accuracy and ability of such systems to adapt in various educational contexts. Emotion recognition technologies, in particular, require further improvement for a more accurate interpretation of students' emotional reactions, which depends on cultural, individual and contextual differences. Despite these difficulties, emotional AI technologies have significant potential for improving the pedagogical process, especially given the development of machine learning and big data, which allow for continuous improvement of recognition and adaptation algorithms.

Emotional AI can also be useful for creating a more favorable emotional environment in universities, reducing the level of stress and tension among students, which has a positive effect on their psychological state and ability to learn. Thanks to emotion monitoring, teachers can respond in a timely manner to signs of stress or burnout, providing psychological support and resources to preserve the psycho-emotional health of students.

However, the implementation of such technologies requires addressing a number of challenges, including ethical, legal, and social issues. One of the main aspects is the confidentiality of student data, as the collection of emotional information should be carried out with high standards of security and privacy protection.

Therefore, it is necessary to develop clear ethical norms and regulations for the collection, storage, and use of such data to avoid their unauthorized use or misuse. It is also necessary to take into account the potential psychological impact that constant monitoring and assessment of emotional state can have to ensure comfort and safety for students. Overall, emotional AI is proving to be an extremely promising tool for improving the effectiveness of teaching in teacher education. Provided that

technological and ethical challenges are overcome, this direction can significantly change teaching approaches, making them more flexible and focused on the individual needs of students. Further research should focus on improving emotion recognition technologies, developing ethical standards, and providing a technological infrastructure for the implementation of emotional AI in educational systems.

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