

**How to cite:** Halachev, P. (2023). Academics' Attitudes toward AI Challenges in Education: Tradition vs Innovation. *Futurity Philosophy*, 2(3), 39-55. <https://doi.org/10.57125/FP.2023.09.30.03>

## Academics' Attitudes toward AI Challenges in Education: Tradition vs Innovation

*Petar Halachev*

*PhD Informatics and Computer Science, Assistant Professor, Department of Informatics, University of Chemical Technology and Metallurgy, Sofia, Bulgaria, <https://orcid.org/0009-0008-2159-406X>*

**Corresponding author:** [x3m@mail.orbitel.bg](mailto:x3m@mail.orbitel.bg).

**Received:** June 11, 2023 | **Accepted:** August 26, 2023 | **Published:** September 30, 2023

**Abstract:** The capacity of artificial intelligence to continuously learn and improve suggests a future expansion in its application. This study aimed to identify differences in scientists' attitudes toward traditional and innovative teaching methods. A questionnaire comprising 15 questions was developed, covering demographic data, experience with artificial intelligence, and attitudes toward its use. The survey included 240 teachers from higher educational institutions in Ukraine, representing various ages and genders. The study found that 24.4% of respondents were in the 35-44 age group, while the 18-24 and over 65 age groups were the least represented. Additionally, 32.1% of respondents had 7 to 10 years of work experience, and 12.2% had less than 1 year. Respondents included 32.3% from technical specialties and 9.1% from artistic disciplines. Regarding artificial intelligence in education, 44.4% of respondents were neutral, and 1.1% were strongly negative. In response to whether they had used AI in their studies or work, 78% answered affirmatively, while 18.4% had not used it at all. Furthermore, 38.3% viewed the personalization of learning positively, but 54.5% highlighted potential risks concerning data protection, 43.1% indicated that AI implementation relies on technical capabilities, and 24.4% noted that AI might lead to job loss for teachers. The use of artificial intelligence has certain advantages, as it personalizes learning by considering individual characteristics and provides access to information. However, it also introduces challenges, including issues related to the protection of personal data and dependence on technology.

**Key words:** artificial intelligence in education, teaching methods comparison, data privacy concerns, personalized learning.

## **Introduction**

The technologies used today are being implemented in all spheres of human activity. This is education, politics, economy, social sphere. Artificial intelligence, which can be considered as one of the highest technological achievements, reproduces the intellectual activity of a person. AI users have the impression that they are interacting with a living person who can think, analyze, and reproduce in the same way. The use of AI in education has expanded significantly in recent years, as evidenced by a large number of publications (Adams & Haddad, 2021).

Today, AI is widely used in the medical field, in education and treatment: to create programs, optimize evaluation, practice practical skills on a virtual patient. AI can facilitate history taking, diagnosis and interpretation of results, as well as prescribe treatment (Alamgir, Mousa, & Shah, 2021). But the topic of using artificial intelligence in education and medicine is controversial. Collection of a large amount of data and compliance with ethical standards regarding the preservation of anonymity. And the introduction of AI into the educational process causes both admiration and fear on the part of teachers and scientists. Experts note that it is important to find out how AI affects traditional teaching methods (Alamgir, Mousa, & Shah, 2021; Alqahtani et al., 2023). The challenges facing the international scientific community today are very serious. On the one hand, the constant development of the latest technologies makes it easier for scientists and researchers to perform mathematical calculations, since computer programs contain algorithms for the necessary calculations, ready-made statistical data, etc. (Awasthi & Soni, 2023). On the other hand, the availability of automatic calculation programs and the capabilities of artificial intelligence force scientists to adapt to certain frameworks, to refuse the formation of their own concepts, to focus on computer modeling methods, instead of checking the functioning of theory in practice. In addition, the advantages of the widespread use of artificial intelligence do not extend to the definition of clear directions for conducting scientific research (Alqahtani et al., 2023).

### *Research Problem*

It is important when using artificial intelligence to resolve the issue of maintaining a balance between artificial intelligence and traditional educational values. Scientists who have a lot of work experience and the period of their active scientific activity was in times when artificial intelligence was not known, adhere to traditional teaching methods. Young scientists more often introduce innovative approaches in teaching, or in scientific research tend to trust artificial intelligence, which can also create a problem, since the information generated by artificial intelligence is not always reliable.

### *Research Focus*

In the conducted research, it is necessary to find out what are the differences in the attitude of scientists to traditional and innovative methods of learning in the educational process.

### *Research Aim and Research Questions*

The purpose of our study was to conduct a comparative analysis to identify differences in the attitude of scientists to traditional and innovative methods in the educational process.

Today, artificial intelligence is actively integrated into the educational and scientific process. This raises a number of questions that arise when using artificial intelligence: The use of information that is reproduced by artificial intelligence provides access to a wide range of materials, but sometimes this information may not be supported by any additional sources and therefore is not always representative. Automation of the educational process can reduce the role of the teacher in the educational process, and the lack of live communication can reduce the quality of the acquired knowledge. Different technical capabilities of participants in the educational process can increase the gap in receiving information and create a kind of discrimination. One of the key issues is the creation of opportunities to use the advantages of artificial intelligence in education and science while preserving traditional methods of teaching and interaction between a teacher and a student.

## Literature Review

AI combines two concepts: artificial, which is reproduced by machines, and intelligence is something that covers the sphere of human capabilities. That is, these are technologies that are capable of thinking, learning, and possibly will be able to reproduce the capabilities of the human brain, which have not even been studied at the moment. Today, AI technologies are widespread in almost all spheres of life and are aimed at increasing the efficiency of the sphere in which they are used.

The development Haenlein et al. (2019) of artificial intelligence began as early as the 50s of the last centuries with the introduction of the labyrinth search model, in the 60s heuristic programming appeared, and in 1970 Robinson developed a program that allowed proving theorems using a set of axioms. In 1973, the Prolog programming language appears, the author of which was Albert Kolmeroe. Developers Newell, Simon, and Shaw created the Logical Theoretician program, which proved theorems from a school program (Bansal, Goyal, & Choudhary, 2022).

MYCIN and DENDRAL systems were created in the USA in the 70s to help in medicine and chemistry and their main task was to create knowledge. During these years, work on the creation of V generation robots began in Japan.

The details of the research carried out at the ICOT institute were not revealed for ten years and the results of these studies were unsuccessful, but they studied a whole generation of specialists who were engaged in the development of artificial intelligence (Bansal, Goyal, & Choudhary, 2022).

Since the 80s of the last century, developments in the field of artificial intelligence have received a powerful financial base in the economically developed countries of the world, and this process continues (Alqahtani et al., 2023).

In 1997, the created computer programs enabled IBM Deep Blue to beat Gari Kasparov in a chess game. Since the 2000s, AI has been widely introduced into the social sphere by Facebook, Twitter, and Netflix, and in 2011, AI gained new capabilities and could generate certain functions. So the Watson system was able to understand speech and generate answers. In 2020, AI created vaccines against COVID, as it was able to analyze the RNA of the virus using LinearFold AI.

The created GPT, which in 2023 received the fourth improved model, is a promising direction of AI, but has many critics (Alamgir, Mousa, & Shah, 2021).

During the use of AI, you may encounter a number of ethical issues that require solutions at the current stage. Taking into account the fact that AI learns from the data it receives, it can make biased decisions in medicine and in court cases. When working with AI, he does not explain why exactly he

answers the question, why this direction was chosen, and also if AI is used by criminals, it is difficult to predict the consequences of such crimes. Errors of artificial intelligence during the regulation of vehicles can create accidents for which it is not clear who is responsible (Alqahtani et al., 2023).

AI can use methods of analysis similar to those used by the human brain and solve extremely complex tasks by deduction, analogy, comparison. Artificial intelligence systems have the ability to learn, so scientists predict its constant improvement and coverage of an increasing number of fields of application. The use of artificial intelligence in medicine helps to solve a number of issues. The contribution of artificial intelligence to the health care system is the creation of treatment schemes their adaptation to the needs of the patient, taking into account the side effects of medicinal products (Landry et al., 2022). This function can be useful to practicing doctors, to minimize the time spent on developing a treatment scheme, to optimize the treatment process as a whole (Chaka, 2023). In addition, artificial intelligence is capable of statistical processing of information obtained as a result of research. The advantages of artificial intelligence include its ability for machine learning and the accumulation of necessary information (Lin et al., 2023). One of the characteristic features of artificial intelligence is also its broad possibilities of predicting the development of events for the patient (Chernenko, 2022). This property is extremely important for predicting the occurrence of cardiac events in patients with diseases of the cardiovascular system (Alamgir, Mousa, & Shah, 2021). Predicting the risk for these patients is quite a difficult task if the doctor uses tabular data only (Chlorogiannis et al., 2023).

With the help of artificial intelligence, it is possible to divide the process of anamnesis collection into several stages. Machine algorithms can extract important information from the patient's history, for example, the presence of cardiac events Eynde et al. (2022) in the history, namely myocardial infarction, cholesterol levels, and the presence of concomitant pathologies (Dave & Patel, 2023). Mobile applications can be considered a successful addition to the main exercise program (Dong et al., 2022). If the patient experiences threatening symptoms Chlorogiannis et al. (2023): shortness of breath, unbearable pain in the chest radiating to the left arm, dizziness, etc., he has the opportunity to inform the doctor in charge of him almost instantly to receive clear instructions and an algorithm action (Duong et al., 2019). In the analysis of X-ray images, artificial intelligence plays a significant role (Oka et al., 2021). With the help of artificial intelligence, it was possible to determine such indicators as the severity of the course of the disease, hospitalization rates, the number of cases requiring resuscitation measures, as well as indicators of fatal consequences. The task of the study was to form a clinical and radiological model for predicting the course of covid pneumonia within two weeks (Eynde et al., 2023). The sources of the main medical documentation were electronic media (Adams & Haddad, 2021). During the study, a CT machine was used to obtain images of the chest. A total of 214 patients were divided into 2 groups. The segmentation of pneumonia was determined using the U-net network. It is known that this type of neural network is characterized by multitasking (García-Martínez et al., 2023).

Punn & Agarwal (2022) developed a method for the segmentation of biomedical images to automatically identify images and compare them with those existing in the neural network. This allows for a clearer identification of changes in tissues and organs (Garrison et al., 2023). The goal of the XGBoost model was to determine the most important characteristics of CT lung images against the background of covid pneumonia (Hong et al., 2022). Research has established that the most important is the characteristic that determines the degree of severity of the course of covid pneumonia. In the study, it is noted that in patients who had a severe course of pneumonia, this characteristic was significantly higher than in those who had a mild course (Haenlein & Kaplan, 2019). With the help of Gradient Boosting tools, XGBoost creates an opportunity for machine learning, and also creates opportunities for gradient boosting, which makes it possible to quickly solve tasks and obtain a lot of data (Haenlein & Kaplan, 2019). It was also determined by a neural network that shortness of breath is an important characteristic for predicting the results of a chest radiological examination (Dong et al.,

2022). Another important indicator is an increased level of NT-proBNP, which indicates a decrease in lung function and also signals heart failure (Hairani et al., 2021). Application of artificial intelligence is also possible in geology. It is reported Quasim et al. (2022) that the field of artificial intelligence also extends to the determination of salt dependencies, which are indicators of hydrogen stores, which can be used as a powerful source of energy, which is critically important in the era of transition to alternative energy sources, reduced consumption of useful fossils and preventive measures regarding the greenhouse effect, which is threatening from the point of view of global temperature increase (Hong et al., 2022). The availability of accurate geographic coordinates (Zhou et al., 2019) is important, as the extraction of resources from the ground requires significant financial support and powerful equipment (Ikemura et al., 2021). Today, it is possible to establish hydrogen deposits by analyzing specific data. An important fact is that, previous assessments (Zhang et al., 2022) of the soil give only a superficial understanding of the factors that directly affect the characteristics of the reserves, which can negatively affect the storage of these resources (Khan et al., 2021).

To clearly determine the suitability of hydrogen resources for their use. To begin with, you need to assess the properties of the slopes, density and depth. The main purpose of the study was to develop a methodology for determining storage facilities in the region of south-western Poland. The density of the deposits was estimated at 130 meters, while the depth of the deposit was 1800 meters (Kivrak et al., 2021).

It is obvious that to obtain clear coordinates, it is necessary to use the most accurate geographical maps. Artificial intelligence algorithms include the following components (Malti Bansal et al., 2022): K-Nearest Neighbors, which is the basis for data classification; Support Vector Machine, which has a special parameter that contributes to the accuracy of prediction; Light Gradient Boosting Machine, which speeds up processes; and Extreme Gradient Boosting (XGBoost), which also increases the predictive ability of the system, among others (Lamanauskas & Makarskaitė-Petkevičienė, 2016).

In the published results, it was noted that the use of machine learning algorithms made it possible to better determine the characteristics of salt dependencies and more clearly evaluate their characteristics (Kivrak et al., 2021). The introduction of artificial intelligence into the educational process took place back in 2013 (Masters et al., 2019). AI was used for the purpose of predicting the success of students, predicting certain events (Landry et al., 2022). But educators, especially (Duong et al., 2019) those who adhere to traditional forms of education and are skeptical about the possibilities of using AI, emphasize that AI has not yet learned enough to widely implement it in the educational process (Lin & Chang, 2023). Artificial intelligence plays an important role in the assessment of students in higher education institutions. Since students represent the scientific potential of society in the future, they should receive quality education (Lubko & Sharov, 2019). The quality of education can be assessed using computer algorithms. The goal of higher education institutions, who seek to maintain their own prestige, is to evaluate the academic performance of students (Masters, 2019). A study was conducted using artificial intelligence technologies, dedicated to predicting the academic success of students. In literary sources Lamanauskas & Makarskaitė-Petkevičienė, (2016) it is reported that EDM was used to analyze the quality of knowledge acquired by students, which allowed a better understanding of the structure of students' academic success (Mohamed et al., 2022).

Some researchers propose evaluation using a hierarchical and sequential structure, where all objects correspond to a single node, specifically using a decision tree. It is noted that within the framework of the decision tree algorithm, it is possible to predict the academic success of students based on their behavioral characteristics. This information, as well as information about their social situation, can be obtained by conducting a survey. Other artificial intelligence methods include the Naïve Bayes method (Hairani et al., 2021). The basis of this method is Bayes' theorem, which evaluates the

relationship between conditions and statistical quantities (Nagi et al., 2023). AI can create continuous, lifelong medical education (Namoun & Alshantqi, 2020).

An algorithm can be created that will help analyze medical literature and provide the latest information and access to advanced technologies in any field, introducing them into the educational process (Dave & Patel, 2023). AI allows for its use in virtual simulations, which help pupils and students practice practical skills virtually without the fear of causing harm, damage, or destruction (Oka et al., 2021).

The implementation of artificial intelligence has prospects in all fields, but it is necessary to take into account all possible risks and determine a balanced strategy between traditional methods in education and innovative technologies.

If we take into account how rapidly AI has been developing in recent years and how quickly it is being improved, we can predict that this discovery has great prospects in all industries. The initial application of AI in education in the coming years has a tendency to expand, with more advanced translators and language recognizers being created, methods of creating educational programs being improved, and virtual laboratories and patients possibly appearing to enhance the practice of practical skills. The medical field is quite promising for the implementation of AI technologies from the point of view of personalized medicine. The processing of genetic data in this way will help to treat patients individually, and its application in the pharmaceutical field will allow the creation of new effective drugs, contributing to the development of such advanced medical fields as nanotechnology and genetic engineering.

Today, the development of geology is important for the search for new, undiscovered, and unknown natural resources. The information that AI currently possesses will help to systematize and find these resources. It can be expected that AI will be implemented very quickly in the transport sector and in the automation of production processes. All these directions are in the near future, but already today analysts are trying to predict how many jobs will be lost, which raises many questions.

## **Research Methodology**

It is represented by theoretical methods, such as analysis and synthesis, systematization and generalization of the received information, modeling. Questionnaires were developed to collect demographic data (age, length of service, field of education) and attitudes toward the use of artificial intelligence in education.

### *Sample and Participants*

240 teachers from four universities of Ukraine and have work experience of at least 5 years (to evaluate traditional approaches in science and education) and those who have been working for less than 5 years (to evaluate advocates of innovative approaches in education).

### *Instruments and Procedures*

We used a qualitative method for evaluation. The qualitative method contained many open questions, which made it possible to assess the attitude of teachers to traditional and innovative methods in teaching and scientific research

Teachers of educational institutions were asked to answer 15 questions of the questionnaire, which consisted of the following blocks: demographic data; experience working with sources of artificial intelligence; attitude to the use of artificial intelligence in education.

## Data Analysis

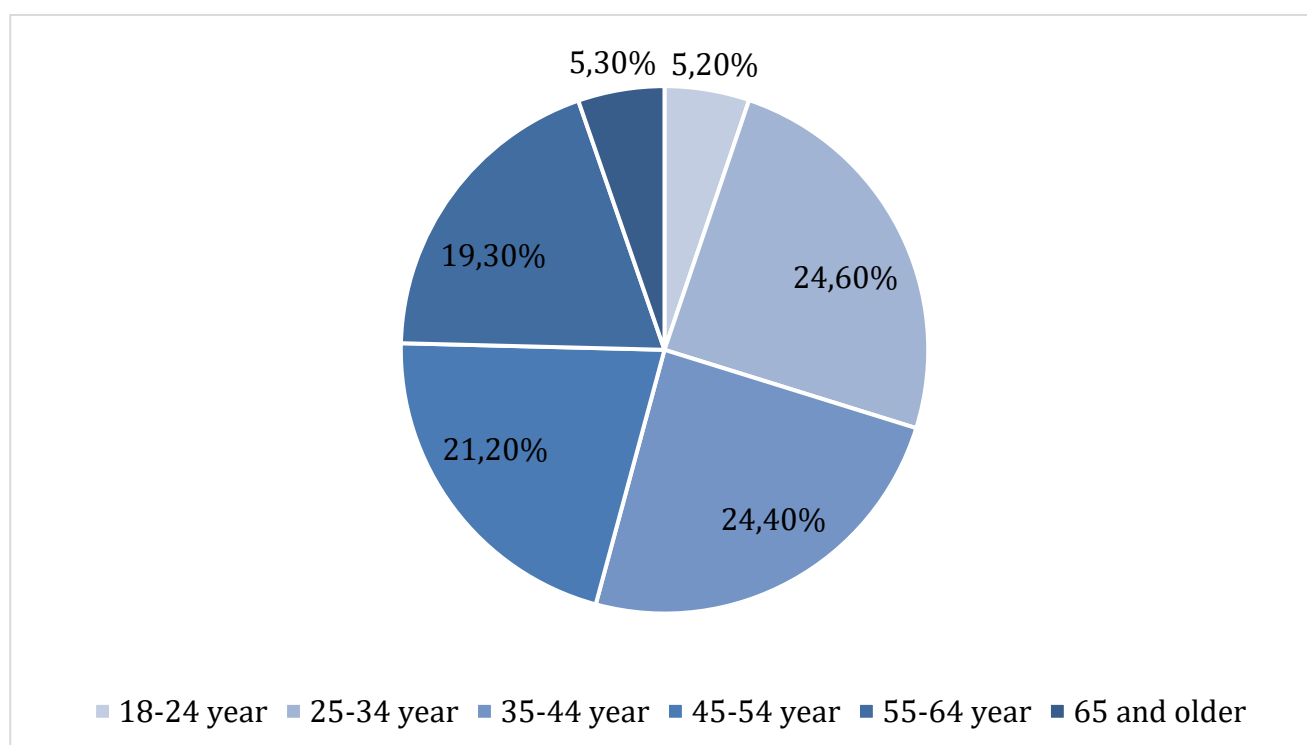
The validity of the test was determined using a qualitative approach using expert panel evaluation, followed by a quantitative approach using a content validity index. The CVI measures the proportion or percentage of judges who agree with certain aspects of an instrument and its items. This method consists of a four-point Likert scale, where: 1 = non-equivalent item; 2 = the item needs to be carefully reviewed so that equivalence can be assessed; 3 = equivalent product requiring minor adjustments; and 4 = fully equivalent subject. The consistency index in the expert group should be at least 0.80, and preferably more than 0.90.

### Research Results

The obtained demographic indicators showed that the largest age group that took part in the survey was from 35 to 44 years old and the smallest groups that took part in the survey were the age groups from 18 to 24 years old and over 65 years old, which is due to the fact that these age groups are the least numerous among university teachers (Fig.1).

**Figure 1**

*Age of teachers who took part in the survey*

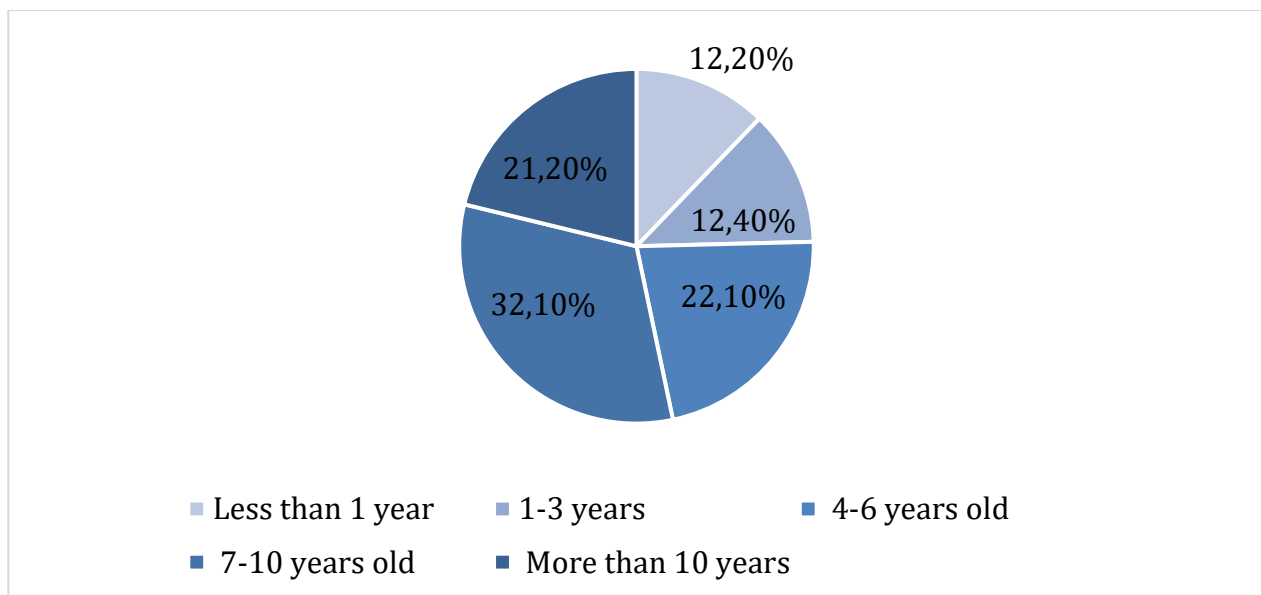


Source: author's own development

Participants in the age group from 7 to 10 years, which correlates with the age groups of 25-34 years and 35-44 years, turned out to be the most numerous group when determining work experience. The groups of teachers who have been working for more than 10 years and those who have been working for 4 to 6 years were almost equal in number. The smallest was the group of teachers who have been working for less than one year, which includes the smallest age group of 18-24 years (Fig.2).

**Figure 2**

*Work experience (in years)*

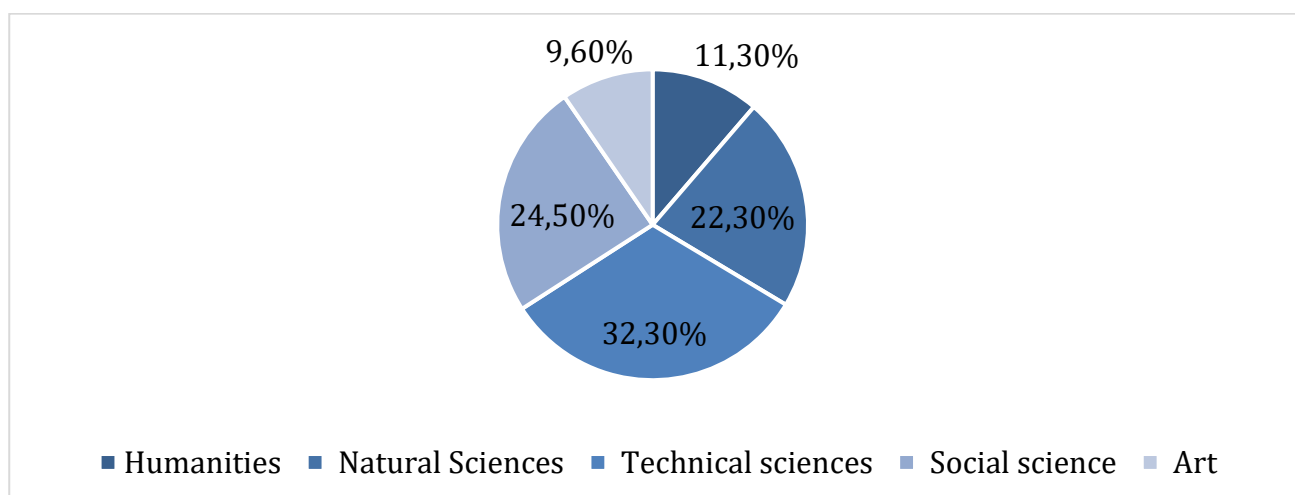


Source: author's own development

The largest participation in the survey was taken by teachers of technical specialties, 32.3%, and the least, 9.6%, by teachers of art universities. The groups of teachers who use AI among philologists and representatives of the arts turned out to be the least numerous, 9.6% and 11.3%, respectively (Fig.3).

**Figure 3**

*Field of study*



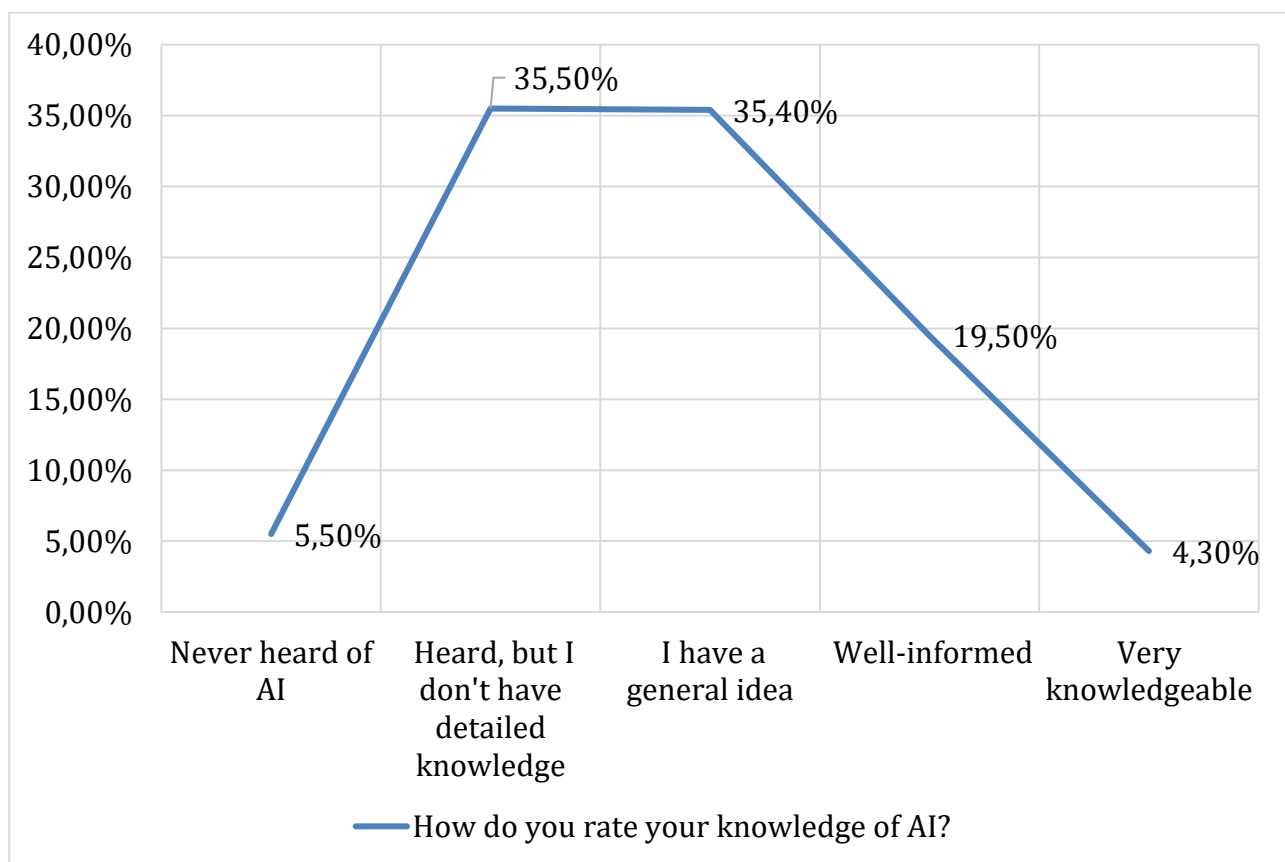
Source: author's own development

This percentage was obtained mainly by young scientists and teachers who work in the field of creating pictures in neural networks. Representatives of the older age group of art universities mainly adhered to traditional teaching methods and did not recognize the creation of pictures with a neural

network as art, as they noted in the answer to the question "If so, please provide an example of how you used AI?". Representatives of technical specialties most positively assessed the use of artificial intelligence for calculations, creating models, and writing program codes. Teachers of natural sciences: medical universities praised the use of artificial intelligence as an opportunity to use a virtual patient and practice practical skills. The teachers of social faculties noted that the use of artificial intelligence is positive and can be used to develop questionnaires, surveys, as well as to create evaluation algorithms for sociological surveys and interviews. To the question Have you ever used AI in your studies or work? 78% of respondents answered in the affirmative. 18.4% did not use artificial intelligence at all, and 3.6% of respondents had not heard of such an innovation in the educational process at all. This category of interviewees included teachers of the older age group, who are generally skeptical of innovations in education (Fig.4).

**Figure 4**

*How do you rate your knowledge of AI?*

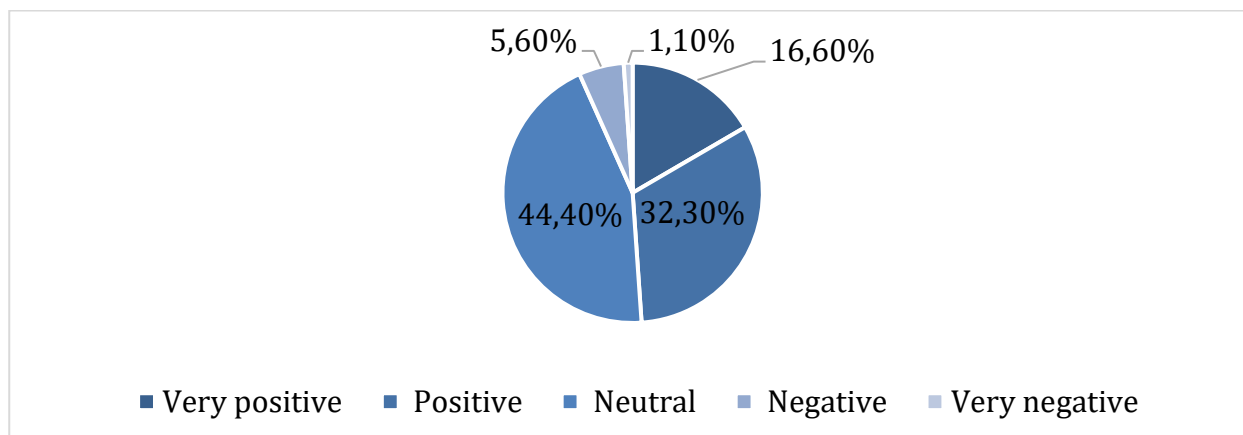


Source: author's own development

When asked how scientists and teachers feel about the introduction of artificial intelligence into the educational process, 44.4% are neutral and only 1.1% are strongly negative. 16.6% assessed the implementation of artificial intelligence in the educational process as a very positive process. The age group 35-44, 45-54 years evaluates the implementation of AI in the educational sphere neutrally. Supporters include representatives of the 18-24, 25-34 age groups, which is quite logical and is a consequence of their greater awareness of digital technologies, so it is much easier for these age groups to master modern innovations in various fields (Fig.5).

**Figure 5**

*What is your attitude to the implementation of AI in the educational process?*

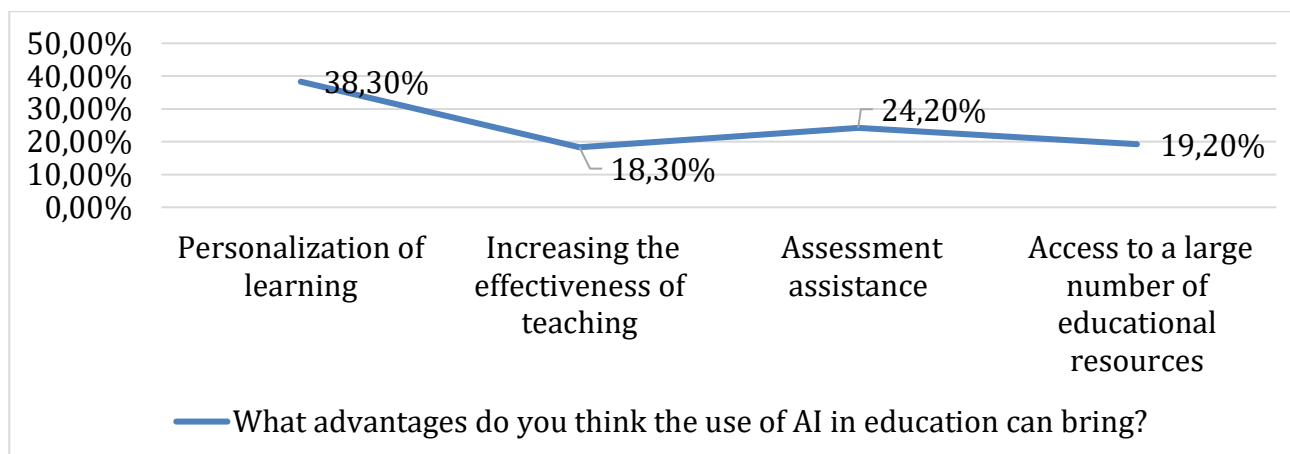


Source: author's own development

According to the research conducted, 38.3% rated the personalization of learning as a positive point when introducing artificial intelligence into the educational process, and also provides access to a large number of materials, which creates an opportunity for continuous learning, which is important for the concept of lifelong learning. 19.2% of respondents noted that AI creates access to a large number of information resources, and 24.2% rated AI as a helpful assistant (Fig. 6).

**Figure 6**

*What advantages do you think the use of AI in education can bring?*

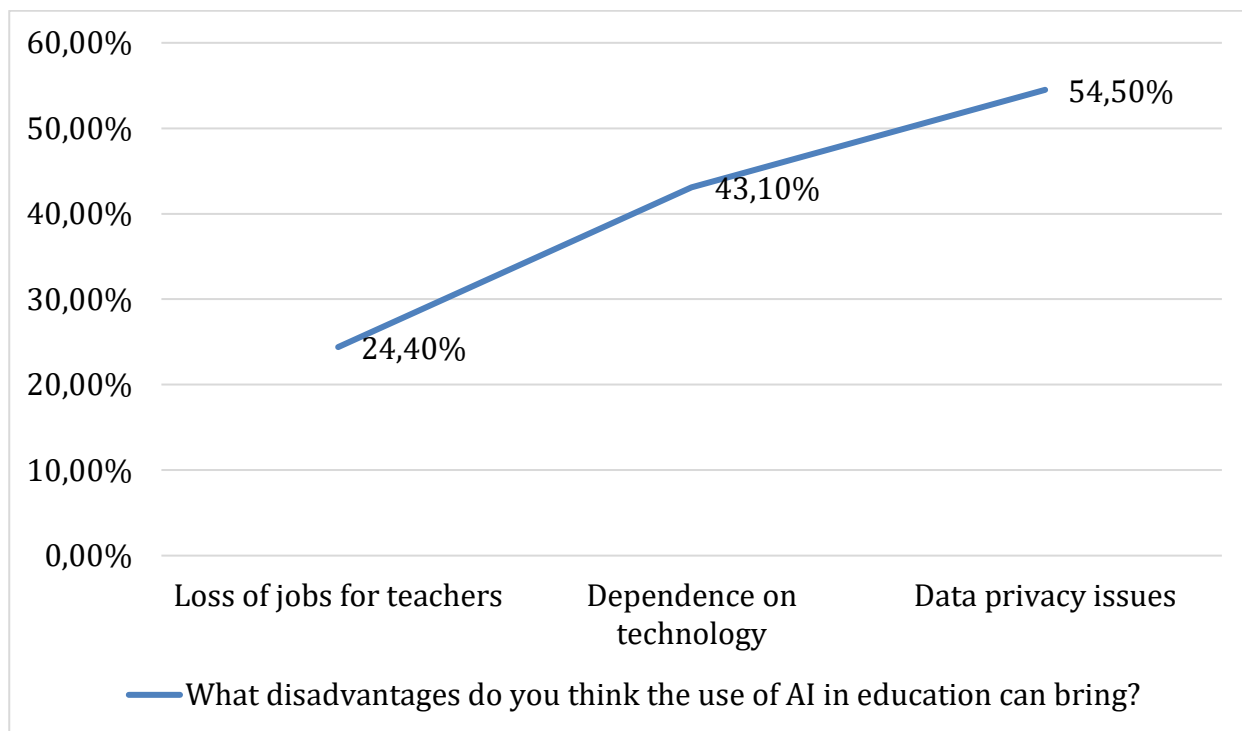


Source: author's own development

54.5% of teachers indicated possible risks regarding the impossibility of protecting personal data, 43.1% indicated that the implementation of artificial intelligence depends on technical capabilities, which can create discrimination among students. 24.4% said that the use of AI could cause teachers to lose their jobs.

**Figure 7**

*What disadvantages do you think the use of AI in education can bring?*



Source: author's own development

The survey results indicate that participants aged 35-44, mainly from technical disciplines, generally view the integration of artificial intelligence (AI) in education positively. This group recognizes AI's potential to improve teaching efficiency and support ongoing learning. In contrast, older participants and those from the arts and humanities fields express reservations, particularly about data privacy and job security. These concerns highlight the importance of addressing potential risks to ensure the fair and effective adoption of AI in educational settings.

## **Discussion**

The use of AI today is at the stage of discussion, but despite this, technological innovations are gradually being introduced and among young scientists there is an opinion that artificial intelligence can solve the issue of the quality of education and can become a personal teacher and take into account all the individual characteristics of a pupil and student, which emphasizes personalized education (Oka et al., 2021). Until recently, there was only a traditional education system, which has a classic model with classic lectures and classroom practical classes, but COVID-19 required an immediate response, especially in the educational field, to ensure the continuity of education and avoid physical presence (Panukhnyk, 2023). Artificial intelligence tools were introduced into the educational process even then. This is the use of platforms for distance learning and virtual laboratories (Pizhuk, 2019).

The use of AI elements is an auxiliary tool in the work of the teacher and student. AI helps to evaluate knowledge and analyze problematic issues (Punn & Agarwal, 2022). AI offers automatic assessment of students' knowledge, and also provides an opportunity to establish feedback between participants of the educational process (Quasim et al., 2021). Participants in the educational process who are supporters of the introduction of innovative technologies into the educational process should

remember that AI should improve the educational process, and not contribute to the formation of discrimination between the participants of the educational process. The use of AI in education gives pupils and students access to previously closed knowledge, which is clearly a positive point, but raises questions about the limits of privacy and access to personal data. The growth of interest among scientists in AI and its use as an auxiliary tool in making calculations, or creating certain models, in conducting statistical research is promising (Salcedo et al., 2021). But the ethical aspects of using AI are increasingly being discussed among scientists around the world (Sekandi et al., 2023). In order to improve and control the use of AI, it is necessary to conduct sociological surveys that make it possible to identify problematic issues and solve them in a timely manner. Artificial intelligence is constantly improving and learning. One of the promising areas of recent years is the creation of neural networks that can solve extremely complex tasks. Artificial intelligence is being implemented in all industries and the use of AI in the economy is extremely promising, completely changing the approaches to conducting business operations. Economists are looking at the possibilities of AI to create economic growth models. Given the fact that within a few hours, artificial intelligence can perform extremely complex calculations and carry out complex analytical studies, establish cause-and-effect relationships. But the introduction of AI also has certain threats in respect of ethics. The use of AI in business operations due to the use of its capabilities in controlling employees can threaten the dominance of the employer over the employee (Viswanathan et al., 2022).

AI has been widely used in the medical field and medical education. A study of the use of artificial intelligence in medical practice was conducted in 2023 (Yaacob et al., 2019). The purpose of the study was to establish the degree of effectiveness of using artificial intelligence in the CT study of covid pneumonia caused by the Omicron strain. In the conditions of a pandemic, it is necessary to quickly process patient data, as soon as possible to determine the drugs that are the drugs of choice for this disease, etc. In order to form a single database of CT images, which are required for systematic analysis of pathology, determination of the most frequent localization of lesions, etc., regular statistical reporting is necessary, which can be supported by algorithms of artificial intelligence (Zhang et al., 2022).

A similar study using artificial intelligence was conducted in Korea to determine the outcome of tuberculosis treatment, as this disease is still considered unpredictable (Zhou et al., 2019). The course of tuberculosis, as well as the body's response to treatment, is influenced by a number of certain factors: the patient's age, body mass index, and the presence of bad habits. The researchers note that subjectivity is always present in the analysis of X-rays, and the opinions of specialists can differ significantly. Patients with confirmed rifampicin-sensitive pulmonary tuberculosis were admitted to the study (Zhou et al., 2019).

It is noted that the results of the use of artificial intelligence in predicting the course of the disease in patients were statistically better than those demonstrated by specialists, which definitely indicates the human factor in establishing a diagnosis and predicting the consequences of the disease and treatment. When predicting the course of the disease, it is important not only to diagnose the presence of cavities on X-ray images, but also other indicators, such as, for example, the presence of mycobacteria in sputum.

The application of artificial intelligence covers more and more fields and is an auxiliary tool in medicine, economy, educational process, scientific research and even in the field of art.

The introduction of AI today has demonstrated the possibilities that have already been achieved in various fields: medicine, economy, technical industries, education. But the use of AI must be guided by a human being, as the thoughtless use of AI can create a number of problems related to the violation of privacy. For example, a system that allows you to recognize pathological processes in images and is

used for useful purposes in medicine, when using a face recognition system, can violate ethical boundaries and reveal information that a person intends to keep secret. A similar trend may be the entry of personal data into the general network, which may contribute to its unwanted dissemination, as well as for the purpose of collecting personal data, which can be used by criminals for the purpose of blackmail, the use of weapons of mass destruction on a certain group of people. The use of AI in the judicial system can violate the personal boundaries of people when recording their conversations using Siri, Alexa software. The medical field becomes more vulnerable when using AI in terms of the possible leakage of personal data of patients, as well as the possible improperly designed treatment protocol. The use of AI in the social sphere has many threats, especially for children. This is how programs for manipulating the human psyche and linguistic programming can be created, and unfortunately, they are created. The use of AI in the workplace for the purpose of monitoring the effectiveness of working hours may be justified from the employer's point of view, but ethical issues and the right to privacy are violated. The use of artificial intelligence must be controlled by human intelligence.

### **Suggestions for Future Research**

Experts in various fields note that the percentage of AI use will only grow. The use of AI in the educational process has all the prospects. Pupils and students already massively use AI elements for quick access to the necessary information, scientists use AI to determine a promising scientific direction, write articles and statistical data processing, but here there is a threat of obtaining unreliable data and introducing it into the scientific and then the educational process. The prospects for use in medicine are significant, since AI can be implemented in diagnostics, which, based on network data, can provide a more accurate diagnosis, but there is also a risk of not taking into account the individual characteristics that exist in direct contact between a patient and a doctor. In the future, AI may also perform surgical interventions, but here, too, the individual characteristics of patients will not be taken into account. According to the developers of AI, the introduction of the process into medicine contributes to the personalization of treatment, which aims to take into account all the individual characteristics of the patient, but AI receives information from the network about similar cases and there is no possibility to take into account all these characteristics, this is dangerous, especially in the treatment of genetic diseases, which are currently time trying to treat in utero.

AI can develop economic programs for development, but no one can currently predict how these programs will be implemented in human society. Humanity must remember that AI is a social intelligence that has accumulated generations of experience and will continue to do so. But he also accumulates mistakes and this should also be remembered.

### **Conclusions and Implications**

Despite the significant advantages of using artificial intelligence in various fields, in particular in the field of scientific research and education, its perception by society remains heterogeneous. The negative attitude towards artificial intelligence is observed mostly among older citizens, but there are cases when schoolchildren and students do not approve of the excessive spread of artificial intelligence. From a psychological point of view, the new generation has a tendency to develop "clip thinking", the essence of which is that the duration of thought processes is significantly reduced, and attention is focused on receiving quick information. Undoubtedly, artificial intelligence allows society to get results almost instantly. This, on the one hand, allows not to focus attention on long analytical processes. However, on the other hand, the availability of automatic text generation programs leads to their abuse during the writing of scientific papers by students. This has a significant impact on the consciousness of the young generation, reduces the incentive to think about problems and one's own analysis, and imposes the psychology of consumption.

## Acknowledgements

None.

## Conflict of Interest

None.

## Funding

The Author received no funding for this research.

## References

- Adams, S. J., & Haddad, H. (2021). Artificial intelligence to diagnose heart failure based on chest X-rays and potential clinical implications. *Canadian Journal of Cardiology*, 37(8), 1153-1155. <https://doi.org/10.1016/j.cjca.2021.02.016>
- Alamgir, A., Mousa, O., & Shah, Z. (2021). Artificial intelligence in predicting cardiac arrest: Scoping review. *JMIR Medical Informatics*, 9(12), e30798. <https://doi.org/10.2196/30798>
- Alqahtani, T., Badreldin, H. A., Alrashed, M., Alshaya, A. I., Alghamdi, S. S., Bin, O., Saleh, K., Alowais, S. A., Alshaya, O. A., Rahman, I., Yami, A. I., & Albekairy, A. M. (2023). The emergent role of artificial intelligence, natural language processing, and large language models in higher education and research. *Research in Social and Administrative Pharmacy*, 19(8), 1236-1242. <https://doi.org/10.1016/j.sapharm.2023.05.016>
- Awasthi, S., & Soni, Y. (2023). Empowering education system with artificial intelligence: Opportunities and challenges. *Shodhsamagam*, 6(1), 1–4. [https://shodhsamagam.com/uploads/issues\\_tbl/Empowering%20Education%20System%20with%20Artificial%20Intelligence%20%20Opportunities%20and%20Challenges.pdf](https://shodhsamagam.com/uploads/issues_tbl/Empowering%20Education%20System%20with%20Artificial%20Intelligence%20%20Opportunities%20and%20Challenges.pdf)
- Bansal, M., Goyal, A., & Choudhary, A. (2022). A comparative analysis of K-Nearest Neighbor, Genetic, Support Vector Machine, Decision Tree, and Long Short Term Memory algorithms in machine learning. *Decision Analytics Journal*, 3, 100071. <https://doi.org/10.1016/j.dajour.2022.100071>
- Chaka, C. (2023). Fourth industrial revolution – A review of applications, prospects, and challenges for artificial intelligence, robotics, and blockchain in higher education. *Research and Practice in Technology Enhanced Learning (RPTEL)*, 18(2). <http://rptel.apsce.net/index.php/RPTEL/article/view/2023-18002>
- Chernenko, N. I. (2022). Shtuchnyy intelekt v upravlinni personalom [Artificial intelligence in personnel management]. *Tavriiskiyi naukovyi visnyk. Seriya: Ekonomika – Tavriiskiyi Scientific Bulletin. Series: Economics*, 12, 76–83. <https://doi.org/10.32851/2708-0366/2022.12.11>
- Chlorogiannis, D. D., Apostolos, A., Chlorogiannis, A., Palaiodimos, L., Giannakoulas, G., Pargaonkar, S., Xesfingi, S., & Kokkinidis, D. G. (2023). The role of ChatGPT in the advancement of diagnosis, management, and prognosis of cardiovascular and cerebrovascular disease. *Healthcare (Basel)*, 6(11), 2906. <https://doi.org/10.3390/healthcare11212906>
- Dave, M., & Patel, N. (2023). Artificial intelligence in healthcare and education. *British Dental Journal*, 234(10), 761-764. <https://doi.org/10.1038/s41415-023-5845-2>
- Dong, C., Qiao, Y., Shang, C., Liao, X., Yuan, X., Cheng, Q., Li, Y., Zhang, J., Wang, Y., Chen, Y., & Ge, Q. (2022). Non-contact screening system for COVID-19 based on XGBoost and logistic regression. *Computers in Biology and Medicine*, 41, 105003. <https://doi.org/10.1016/j.compbimed.2021.105003>
- Duong, M. T., Rauschecker, A. M., Rudie, J. D., Chen, P. H., Cook, T. S., Bryan, R. N., & Mohan, S. (2019). Artificial intelligence for precision education in radiology. *British Journal of Radiology*, 92(1103), 20190389. <https://doi.org/10.1259/bjr.20190389>

- Eynde, J., Lachmann, M., Laugwitz, K. L., Manlhiot, C., & Kutty, S. (2023). Successfully implemented artificial intelligence and machine learning applications in cardiology: State-of-the-art review. *Trends in Cardiovascular Medicine*, 33(5), 265-271. <https://doi.org/10.1016/j.tcm.2022.01.010>
- García-Martínez, I., Fernández-Batanero, J. M., Fernández-Cerero, J., & León, S. P. (2023). Analysing the impact of artificial intelligence and computational sciences on student performance: Systematic review and meta-analysis. *Journal of New Approaches in Educational Research*, 12(1), 171-197. <https://doi.org/10.7821/naer.2023.1.1240>
- Garrison, C. M., Hockenberry, K., & Lacue, S. (2023). Adapting simulation education during a pandemic. *Nursing Clinics of North America*, 58(1), 1-10. <https://doi.org/10.1016/j.cnur.2022.10.008>
- Haenlein, M., & Kaplan, A. (2019). A brief history of artificial intelligence: On the past, present, and future of artificial intelligence. *California Management Review*, 61(4), 5-14. <https://doi.org/10.1177/0008125619864925>
- Hairani, H., Anggrawan, A., Wathan, I., Latif, K. A., Marzuki, A., & Zulfikri, M. (2021). The abstract of thesis classifier by using naive Bayes method. In *International Conference on Software Engineering & Computer Systems and 4th International Conference on Computational Science and Information Management (ICSECS-ICOCSIM)* (pp. 312-315). IEEE. <https://doi.org/10.1109/ICSECS52883.2021.00063>
- Hong, W., Zhou, X., Jin, S., Lu, Y., Pan, J., Lin, Q., Yang, S., Xu, T., Basharat, Z., Zippi, M., Fiorino, S., Tsukanov, V., Stock, S., Grottesi, A., Chen, Q., & Pan, J. (2022). A comparison of XGBoost, random forest, and nomograph for the prediction of disease severity in patients with COVID-19 pneumonia: Implications of cytokine and immune cell profile. *Frontiers in Cellular and Infection Microbiology*, 12, 819267. <https://doi.org/10.3389/fcimb.2022.819267>
- Ikemura, K., Bellin, E., Yagi, Y., Billett, H., Saada, M., Simone, K., Stahl, L., Szymanski, J., Goldstein, D. Y., & Reyes, Gil M. (2021). Using automated machine learning to predict the mortality of patients with COVID-19: Prediction model development study. *Journal of Medical Internet Research*, 23(2), e23458. <https://doi.org/10.2196/23458>
- Khan, I., Ahmad, A. R., Jabeur, N., & Mahdi, M. N. (2021). An artificial intelligence approach to monitor student performance and devise preventive measures. *Smart Learning Environments*, 1(1), 1-18. <https://doi.org/10.1186/s40561-021-00161-y>
- Kivrak, M., Guldogan, E., & Colak, C. (2021). Prediction of death status on the course of treatment in SARS-COV-2 patients with deep learning and machine learning methods. *Computers in Biology and Medicine*, 201, 105951. <https://doi.org/10.1016/j.cmpb.2021.105951>
- Lamanauskas, V., & Makarskaitė-Petkevičienė, R. (2016). University study quality: Understanding, improvement, influential factors. *Quality Issues and Insights in the 21st Century*, 5(1), 31-46. <https://oaji.net/articles/2017/451-1505927122.pdf>
- Landry, M. D., van Wijchen, J., Hellinckx, P., Rowe, M., Ahmadi, E., Coninx, K., Mercelis, S., Hansen, D., & Vissers, D. (2022). Artificial intelligence and data-driven rehabilitation: The next frontier in the management of cardiometabolic disorders. *Archives of Physical Medicine and Rehabilitation*, 103(8), 1693-1695. <https://doi.org/10.1016/j.apmr.2022.03.022>
- Lin, K.-Y., & Chang, K.-H. (2023). Artificial intelligence and information processing: A systematic literature review. *Mathematics*, 11, 2420. <https://doi.org/10.3390/math11112420>

- Lubko, D. V., & Sharov, S. V. (2019). *Methods and systems of artificial intelligence: Education manual*. Melitopol: FOP Odnorog. <http://www.tsatu.edu.ua/kn/wp-content/uploads/sites/16/knyha-msshv-v-byblyoteku.pdf>
- Masters, K. (2019). Artificial intelligence in medical education. *Medical Teacher*, 41(9), 976-980. <https://doi.org/10.1080/0142159X.2019.1595557>
- Mohamed, M. Z. B., Hidayat, R., Suhaizi, N. N. B., Sabri, N. B. M., Mahmud, M. K. H. B., & Baharuddin, S. N. B. (2022). Artificial intelligence in mathematics education: A systematic literature review. *International Electronic Journal of Mathematics Education*, 17(3), em0694. <https://doi.org/10.29333/iejme/12132>
- Nagi, F., Salih, R., Alzubaidi, M., Shah, H., Alam, T., Shah, Z., & Househ, M. (2023). Applications of artificial intelligence (AI) in medical education: A scoping review. *Studies in Health Technology and Informatics*, 29, 305, 648-651. <https://doi.org/10.3233/SHTI230581>
- Namoun, A., & Alshantqiti, A. (2020). Predicting student performance using data mining and learning analytics techniques: A systematic literature review. *Applied Sciences*, 1, 237. <https://doi.org/10.3390/app11010237>
- Oka, K., Shiode, R., Yoshii, Y., Tanaka, H., Iwahashi, T., & Murase, T. (2021). Artificial intelligence to diagnose distal radius fracture using biplane plain X-rays. *Journal of Orthopaedic Surgery and Research*, 16(1), 694. <https://doi.org/10.1186/s13018-021-02845-0>
- Panukhnyk, O. (2023). Artificial intelligence in the educational process and scientific research of higher education applicants: Responsible boundaries of AI content. *Galician Economic Journal*, 83(4), 202-211. [https://doi.org/10.33108/galicianvisnyk\\_tntu2023.04.202](https://doi.org/10.33108/galicianvisnyk_tntu2023.04.202)
- Pizhuk, O. I. (2019). Artificial intelligence as one of the key drivers of the economy digital transformation. *Economics, Management and Administration*, (3(89), 41-46. [https://doi.org/10.26642/ema-2019-3\(89\)-41-46](https://doi.org/10.26642/ema-2019-3(89)-41-46)
- Punn, N. S., & Agarwal, S. (2022). Modality specific U-Net variants for biomedical image segmentation: A survey. *Artificial Intelligence Review*, 55(7), 5845-5889. <https://doi.org/10.1007/s10462-022-10152-1>
- Quasim, M. A., Khan, S., Srivastava, V. K., Ghaznavi, A. A., & Ahmad, A. H. M. (2021). Role of cementation and compaction in controlling the reservoir quality of the middle to late Jurassic sandstones, Jara Dome, Kachchh Basin, Western India. *Geological Journal*, 56, 976-994. <https://doi.org/10.1002/gj.3989>
- Salcedo, J., Rosales, M., Kim, J. S., Nuno, D., Suen, S. C., & Chang, A. H. (2021). Cost-effectiveness of artificial intelligence monitoring for active tuberculosis treatment: A modeling study. *PLoS One*, 16(7), e0254950. <https://doi.org/10.1371/journal.pone.0254950>
- Sekandi, J. N., Shi, W., Zhu, R., Kaggwa, P., Mwebaze, E., & Li, S. (2023). Application of artificial intelligence to the monitoring of medication adherence for tuberculosis treatment in Africa: Algorithm development and validation. *JMIR AI*, 2(1), e40167. <https://doi.org/10.2196/40167>
- Viswanathan, V. S., Toro, P., Corredor, G., Mukhopadhyay, S., & Madabhushi, A. (2022). The state of the art for artificial intelligence in lung digital pathology. *Journal of Pathology*, 257(4), 413-429. <https://doi.org/10.1002/path.5966>

- Yaacob, W. F. W., Nasir, S. A. M., Yaacob, W. F. W., & Sobri, N. M. (2019). Supervised data mining approach for predicting student performance. *Indonesian Journal of Electrical Engineering and Computer Science*, 16(3), 1584-1592. <https://doi.org/10.11591/ijeecs.v16.i3.pp1584-1592>
- Zhang, L., Li, J., Wang, W., Li, C., Zhang, Y., Jiang, S., Jia, T., & Yan, Y. (2022). Diagenetic facies characteristics and quantitative prediction via wireline logs based on machine learning: A case of Lianggaoshan tight sandstone, Fuling area, Southeastern Sichuan Basin, Southwest China. *Frontiers in Earth Science*, 10, 1018442. <https://doi.org/10.3389/feart.2022.1018442>
- Zhou, X., Zhang, C., Zhang, Z., Zhang, R., Zhu, L., & Zhang, C. (2019). A saturation evaluation method in tight gas sandstones based on diagenetic facies. *Marine and Petroleum Geology*, 107, 310–325. <https://doi.org/10.1016/j.marpetgeo.2019.05.022>