



THE IMPACT OF ARTIFICIAL INTELLIGENCE ON THE DEVELOPMENT OF SCIENTIFIC RESEARCH COMPETENCES OF MASTER'S STUDENTS IN A DIGITAL EDUCATIONAL ENVIRONMENT

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Abstract

This article discusses the impact of artificial intelligence on the development of scientific research competencies of master's students. It also emphasizes the need for master's students to be aware of scientific approaches, concepts, theories, and the latest information in their discipline during their studies at a higher educational institution and their subsequent professional development.

Keywords: innovation, science, scientific and pedagogical activity, research, scientific research, discovery, self-awareness, scientific conferences, intellectual-developmental.

Introduction

The legal framework for the use of artificial intelligence in improving the methodology for developing scientific research competencies of primary education master's students has also been established. On October 5, 2020, the Decree of the President of the Republic of Uzbekistan "On approval of the "Digital Uzbekistan - 2030" strategy and measures for its effective implementation" was adopted. According to the document, a number of tasks have been set to implement the "Digital Uzbekistan - 2030" strategy [1].

The impact of AI on education is far-reaching and far-reaching. This is most evident when integrating AI into pedagogical education. First, AI provides students with a personalized learning experience by providing learning materials that are tailored to each individual's learning speed and style. For example, adaptive learning can analyze a student's performance and adjust the level of difficulty, allowing them to practice more in areas they are lacking[2].



AI can help teachers work more efficiently while reducing their workload. By automating time-consuming tasks like grading homework and exams, it allows teachers to spend more time on one-on-one interactions with students and developing course materials. In addition, AI-powered analytics can track student progress and reveal their AI strengths, suggesting additional instruction to teachers on these issues.

In distance learning and online learning platforms, AI can increase student motivation by providing interactive and engaging content. Virtual assistants and chatbots can provide 24/7 support to students, answer their questions instantly, and help them solve problems they encounter during the learning process[106]. This has become even more important, especially with the spread of distance learning during the pandemic. This process has opened up many opportunities for AI to develop research competencies in graduate students in pedagogical education.

Artificial intelligence in education is causing major changes in the implementation of research in pedagogical processes by introducing a number of innovations and conveniences. First of all, the ability to provide a personalized learning experience stands out. Systems based on artificial intelligence offer individual learning plans by analyzing the learning speed, interests and difficulties of learners. This allows students to develop at their own pace and increases the level of success. This serves to improve the methodology for developing scientific research competencies of primary education master's students during the study on the basis of effective use of research work in solving pedagogical problems and performing didactic tasks, mastering personalized learning experience, integrating artificial intelligence into pedagogical education, and frontally ensuring the intensity of functions inherent in the components of research.

Another key aspect of developing research competencies in graduate students by integrating AI into pedagogical education is that it simplifies the work that graduate students have to do. AI takes over time-consuming tasks such as automatically grading assignments and exams. This allows graduate students to focus more on providing one-on-one support and developing lesson plans.

Additionally, AI-powered learning tools are crucial in providing continuous feedback. For example, virtual assistants and chatbots support learners' learning processes by providing them with instant answers. These tools answer learners' questions, which keeps them engaged in the learning process.



Artificial intelligence analyzes educational data to provide teachers and education administrators with valuable recommendations. This information is used to make teaching methods and curricula more effective.

For Masters, artificial intelligence-based virtual assistants and chatbots provide continuous support throughout the learning process. They help students overcome obstacles in their learning process. This increases student motivation and engagement.

Another key aspect of AI's involvement in education is data analytics. Educational institutions can use the data provided by AI to analyze student performance and teaching methods. These analyses play a key role in improving educational policies and curricula. As a result, the integration of AI into pedagogical education creates significant benefits in many areas, such as teacher support, access and equity in education, continuing student support, and data analytics. This integration makes the research process more efficient.

Based on these considerations, it can be said that directing masters in higher education institutions to scientific research should be carried out as a targeted, educational technological process. In particular, in the organization of scientific research, information technologies create great convenience in searching, using, and copying the necessary analytical literature on the research topic, scientific sources, relevant tables, drawings, schemes, forms, and a number of other scientific materials related to the research area.

It is important for educational institutions to achieve their goals of improving the success of undergraduates and improving the educational process through the effective use of artificial intelligence technologies. Based on the above analysis and the following considerations, this study examined the impact of artificial intelligence on the field of education and the issue of integrating artificial intelligence into pedagogical education. Artificial intelligence technologies have developed rapidly in recent years and, in turn, have been integrated into pedagogical education, leading to many changes in educational processes. These changes sometimes provide positive opportunities, but sometimes they can create new problems. The issues of integrating artificial intelligence into pedagogical education were considered based on the following analysis.

The global adoption of technology in education is also changing the way learning is done and how it is taught. Teachers are experimenting with AI in many



classrooms. Machine learning and AI have become key drivers of growth and innovation in many industries, and are also being used in education. 47% of learning management tools rely on AI capabilities. While AI-based solutions have been around for some time in the EdTech landscape, the industry has been slow to adopt them. 86% of academics say technology should be a central part of education. AI has the potential to improve both learning and teaching. The education sector is helping to develop the best programs for students and teachers [2].

In the 1950s, scientists began to explore solutions to artificial intelligence. The first solution to the question of when a system is considered intelligent was developed by Turing [3]. In 1956, John McCarthy gave the most comprehensive definition of artificial intelligence: "Artificial intelligence is based on the assumption that every aspect of learning, or any other property of intelligence, can be described as a property of a machine or program."

When it comes to the definition and application of artificial intelligence, most approaches emphasize only cognition and ignore other political, philosophical, and psychological aspects. The main definition of artificial intelligence focuses on reviewing past research in the existing literature. Artificial intelligence is defined as computational systems that include human-like processes such as learning, adaptation, synthesis, self-activation, and the use of information for complex processing tasks. While some artificial intelligence solutions rely heavily on programming, some of these solutions have an integrated system for prediction and learning.

Artificial intelligence is a term that refers to devices and equipment that are widely used in various countries around the world. It includes technologies such as smartphones, the Internet, search engines, various applications, and household appliances.[68] Currently, artificial intelligence is being used for Google's search engine.[3]

Investment in artificial intelligence can have an impact on the academic environment. This challenge poses challenges for educators in finding new dimensions, functions, and pedagogies for learning and teaching in different contexts. For example, the brain-computer interface has attracted the attention of researchers around the world. Computer scientists have proposed several solutions for controlling software through the brain-computer interface, taking into account analysis methods and brain signals in new computing systems, with some



approaches. A brain-computer interface can receive and encode brain activity. It can also make communication understandable. Our skills and abilities have advanced due to the rapid expansion of technology to use artificial intelligence functions. As Schleicher notes, “Innovation in education is not just a matter of putting more technology in the classroom, it is about changing teaching approaches so that undergraduates have the skills they need to thrive in competitive global economies” [4].

Artificial intelligence serves to improve and imitate the decision-making process of humans. Various artificial intelligence methods are used in adaptive learning systems. In addition, scientists have not yet developed a software tool that makes it easy to determine the learning style of learners from their learning behavior. This is an important tool in learning and teaching that can be easily configured and used in different learning environments, such as traditional or e-learning [4].

In the education system, educational goals can be adequately achieved with the help of artificial intelligence. Using artificial intelligence, teachers can analyze learners and identify slow learners in understanding topics. If a student has weaknesses in some areas or cannot understand several topics, the resulting artificial intelligence analysis will show this report to teachers or parents, after which appropriate measures will be taken by the teacher to develop learning.

The use of artificial intelligence technologies in the development of scientific research competencies of master's students, the use of foreign experience, paves the way for the increase of students' motivational and gnostic skills in mastering topics. The capabilities of artificial intelligence used in our research work are presented in the table below.

The above-mentioned artificial intelligence capabilities were used to develop the scientific research competence of master's students. During their use, students encountered a number of advantages or difficulties. Based on the experiences gained, a number of considerations were reached regarding the use of artificial intelligence.

Chat GPT program can be widely used by master's students as an assistant assistant. In addition, in language learning knowledge, it will be possible to achieve speech development based on voice conversation with artificial intelligence. This chat will answer any questions when studying the scientific problem chosen by students in detail [5]. In our research work, these chat capabilities were widely used in the



technological processes of education conducted with students at the stage of selecting a scientific problem and formulating a topic for master's students.

The Midjourney AI[5] program helps to present pictorial, illustrative images to explain the practical aspects of research work, to develop spatial images, and to express virtual images to illuminate research work. Images created on the basis of this program have been used in the development of training manuals and methodological developments created by researchers.

The AdobePODCACT[5] program has been widely used to improve the quality of online lessons and process audiovisual materials based on SMART technologies. It has made it possible to clarify the sounds of online lessons intended for delivery to students and remove noise. This, in turn, serves to improve the effectiveness of developing scientific and research competencies of primary education master's students based on the rational use of audiovisual materials based on SMART technologies in organizing the optimal trajectory of the educational technological process.

Copy AI[6] helps in recording the observational processes of research studies, creating advertisements, demonstrating new methods in videos, and creating creative videos for preparing multimedia resources. Primary education master's students mainly work with research aimed at methodologically improving the knowledge that students in grades 1-4 should acquire as the object of research work. Taking this into account, audio and video developments play an important role in choosing age-appropriate methodologies for primary school students. Therefore, using this program provides a number of advantages.

The Beautiful AI[6] program closely supports the creation and improvement of creative and systematic presentations. This leads to a lot of results in a short time. The use of these three programs by students has become very widespread today. In our research work, it is also used at the stage of practical application and experimental testing of the research work of master's students.

Bing AI[7] is one of the most popular methods for collecting theoretical and conceptual information. Students, despite our wishes, prefer to use the Internet rather than open books and other literature. This requires us to set tasks based on modern approaches in our research work. This program can summarize more than a hundred pieces of information on selected problems, provide general conclusions, and logical reasoning. Another advantage is that, unlike other programs, it can



provide a link to the source. Those who want to study the information in more depth can gain some knowledge through this link. We have given recommendations and comments on the use of this program for master's students in the stage of working with literature and studying archival materials. This program was used in some aspects of their research activities.

AI has the potential to draw attention to which topics in lessons need improvement, as teachers may not always be aware of gaps in the teaching materials, which can lead to confusion for learners. Lessons can be tailored to the profile of students and stimulate their interest with different content and lessons. AI can help teachers with homework. For example, Coursera, an open online course provider, grades students' answers to problems. When a student answers an assignment incorrectly, the system alerts the teacher and sends a message to prospective students with suggestions for the correct answer. This AI system helps explain lessons and ensure that all students are on the same conceptual foundation. Thus, when using technology for teaching strategies, teachers can take advantage of the automatic data generated by students. Because these digital information systems tend to store and process large amounts of information quickly in a short period of time. Apart from these special algorithms, these systems can also determine the level of student activity and understand the student's behavior patterns in the classroom and report these results to the teacher. The implementation of this technology will help teachers manage their classes properly and they will be able to spend less time on documents and more time extracting invaluable insights from artificial intelligence tools for high-quality research-based teaching.

This study is a literature review that aims to synthesize existing information on the impact of artificial intelligence on education. A literature review is a research method that allows researchers, academics, or practitioners to synthesize and evaluate information on a topic in a systematic, understandable, and reproducible manner. This study uses written sources.

The study used a survey model, which is one of the qualitative research methods. Survey models are research approaches that aim to describe a past or present situation as it is. An attempt is made to identify the phenomenon, person, or object that is the basis of the study and the subject of the study within the existing conditions without making any effort to change or influence it. This study used the document scanning method to collect data. Collecting data by examining existing



records and documents is defined as document scanning. Document scanning is the process of scanning, reviewing, taking notes, and evaluating sources for a specific purpose [8].

Artificial intelligence plays an important role in various aspects of educational processes. However, the impact of artificial intelligence on the development of research skills in pedagogical education depends on several advantages. This study discusses the impact of artificial intelligence in the field of education. Artificial intelligence technologies have developed rapidly in recent years, bringing about various changes in educational processes. These changes sometimes provide positive opportunities, sometimes create new problems. The transformation of artificial intelligence in education is discussed from the perspectives of students, teachers, and educational institutions.

However, some controversial points related to the use of artificial intelligence should also be taken into account.

The first is the ethical dimension of AI technologies. [9] Issues such as data privacy, protecting students' personal information, concerns that AI systems may be biased, and adherence to ethical standards need to be considered. Educational institutions need to be mindful of these ethical issues and protect the rights of learners when using AI.

Second, human factors such as the role of the teacher, interaction with learners, teaching strategies, and learner-teacher relationships play an important role in the learning process. It is important to consider how these factors are affected and how the role of teachers is transformed by artificial intelligence technologies. Artificial intelligence should be used to support teachers and provide personalized learning experiences, but the importance of the human factor should not be ignored.

Taking into account the above considerations, it can be noted that, in our opinion, the easiest way to develop high-level scientific research competence in master's students is to take actions aimed at increasing the knowledge, media analysis, and creativity of students of pedagogical higher education institutions. In this case, students achieve competence through mastering, developing, and improving scientific research.

Ensuring the effectiveness of education is a comprehensive technological process. In the process of updating the content of education, the introduction of new types of education (such as project work, practical training, training and research) in

higher education institutions and their implementation in practice are highlighted as one of the problems that need to be solved methodologically, having their own logical basis, both psychological and pedagogical and philosophical aspects. In the current education system, the use of methods that form the skills of master's students to independently search for new knowledge, acquire it, collect the necessary information, put forward hypotheses, come to a certain opinion, and draw a final conclusion is relevant.

Thus, artificial intelligence technologies have great potential in the field of education. They can provide students with a personalized learning experience, reduce the workload of teachers, and support educational institutions with data analysis and guidance. This research work has served to demonstrate the importance of improving the methodology for developing scientific research competencies of primary education master's students, effectively using research work in solving pedagogical problems and performing didactic tasks, mastering a personalized learning experience, integrating artificial intelligence into pedagogical education, and providing frontal support for the intensity of functions inherent in the components of researchability.

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