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Modern Information Technologies and Their Application in Education

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Abstract

The article analyses the impact of generative artificial intelligence (GAI) on modern education. The study meticulously examines and justifies the necessity to develop innovative methodologies and technologies for the integration of AI within educational settings, accentuating the merits and potential hazards associated with this integration.

Keywords: Generative artificial intelligence (GAI), multimedia technologies, risks and benefits.

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1. Introduction

Every stage of evolution has its own achievements.

Today, advances in the use of information technology are driving the search for new ways to address the challenges facing modern education. The use of multimedia technologies in the teaching of various subjects is an integral part of the modern educational process. At the same time, multimedia technologies have also undergone an evolutionary phase over the last five years, as has the entire methodology of teaching information technology as a whole. Based on the latest research in the field of information technology by scholars from neighbouring and distant foreign countries, one can conclude that there is a need to develop new methodologies and technologies for the application of information technology and multimedia content in the educational process. The emergence and widespread adoption of generative artificial intelligence (GAI), including large language models, in 2022–2023 has led to large-scale transformations in many fields, thanks to new capabilities for working with text, images, video and audio, and multimedia in general. The academic community is undergoing a new phase of far-reaching changes in the field of education under the influence of GAI-based technologies [1].

When considering the use of AI in the learning process, one cannot fail to consider its strengths and weaknesses.

1. The use of AI as a technology in the creation of more extensive and high-quality multimedia content.

When considering the functions of AI in the educational process, it can be said that it acts as an assistant in the development of new teaching methods and technologies. Its ability to design personalized educational programmes and individualized learning pathways, as well as tailored learning content, can ensure greater effectiveness in students' knowledge acquisition, taking into account their abilities and needs.

It can also serve as a creator of virtual interactive educational environments for practical purposes, where students can practise, refine and improve their skills in professionally or socially oriented tasks. Thanks to this potential of the technology in question, access to education is increased for a wider range of people, whilst the cost of learning is reduced. Generative AI is capable of automating administrative, didactic and methodological functions. Generative AI models can participate in the development of highly specialized, subject-focused models. Therefore, many researchers and practitioners view the development of GPT as a base model for the development of EdGPT, which will be tailored to specific educational tasks. An example of such a model is EduChat, developed by East China Normal University. Or another language model, MathGPT from TAL Education Group, which solves maths problems and delivers lectures [2].

2. Using AI to monitor and assess the quality of knowledge. Generative AI can impartially assess the quality of students' knowledge.

3. Using AI as a personalized element of learning. Based on the research of B. Bloom, we know that traditional 'one-to-many' group teaching does not yield the same positive results as individualized learning. Innovations in generative artificial intelligence make personalized one-to-one teaching scalable and accessible to large groups of students. It is precisely this idea that underpins AI-tutoring [3]. The use of AI to analyze educational data can help teachers better understand their students' needs, identify strengths and weaknesses, and adapt teaching materials to improve learning effectiveness, as reflected in the research of Cotton [4], Mucharraz [5], Nikolopoulou, Baidu-Anu, Owusu-Ansa, Crompton, and Burke [6].

However, one cannot fail to mention the downside, namely the educational risks posed by innovative technologies, such as: a reduction in the level of interpersonal interaction and the socio-emotional component of learning, resulting in a decline in the socialization of the younger generation; a decline in the capacity and quality of critical thinking, its autonomy and heuristic nature; and the potential vulnerability of learners to cognitive and emotional manipulation.

2. Methods

Following a thorough review and analysis of the collected data, a study was conducted to examine the utilization of AI by students enrolled in medical universities in Uzbekistan and universities with medical programmes during the learning process. The study involved 150 students from Samarkand State Medical University and Tashkent State Technical University.

The study comprised a questionnaire survey investigating the methods and objectives of AI utilization by students in the learning process. The questionnaire comprised 10 questions, to which students were required to respond with a clear 'Yes', 'No' or 'Partially'.

The objective of the present study is twofold: firstly, to ascertain the extent of AI utilization within the educational sector; and secondly, to assess the feasibility of formulating novel methodologies, technologies and policies for the incorporation of AI in educational processes.

The students were provided with an Android version of the questionnaire, which enabled the automatic calculation of results based on the Google Cloud platform.

The response options are as follows: 'Yes' – 1, 'No' – 0, 'Partially' – 0.5.

Questions:

The utilization of artificial intelligence in educational settings raises pertinent questions regarding its appropriateness.

The utilization of artificial intelligence in the verification of the correctness of one's own solution to a given problem is a subject that merits consideration.

The present study explores the level of trust placed in artificial intelligence when selecting responses to queries.

The utilization of AI in the entirety of the assignment preparation process is a subject that merits consideration.

The present author is compelled to posit the question of whether contemporary education is capable of functioning in the absence of artificial intelligence.

The question of whether artificial intelligence can substitute for textbooks and other teaching materials in higher education is a complex one.

The necessity of technology incorporating artificial intelligence (AI) within educational settings is a contentious issue.

The question under consideration is whether multimedia created by AI is more accurate.

The question under consideration is whether it is possible to learn in the modern world without recourse to artificial intelligence.

In your opinion, can AI be considered impartial in this regard?

3. Results

The survey results, presented in the form of a table and a diagram, show that the overwhelming majority of students consider the use of AI to be appropriate and have some degree of trust in it (Table 1). However, the results also indicate that students have reservations about AI completely replacing traditional textbooks and about the impartiality of AI-generated assessments (Fig. 1). The study confirms the relevance of developing new methodologies and policies for the use of AI in the modern educational process.

The results of the survey.

Table 1

Answers	1	2	3	4	5	6	7	8	9	10
‘Yes’	150	97	85	78	95	86	85	89	79	95
‘No’	0	50	30	25	20	48	29	29	35	32
'Partly'	0	3	35	47	35	16	36	32	36	23

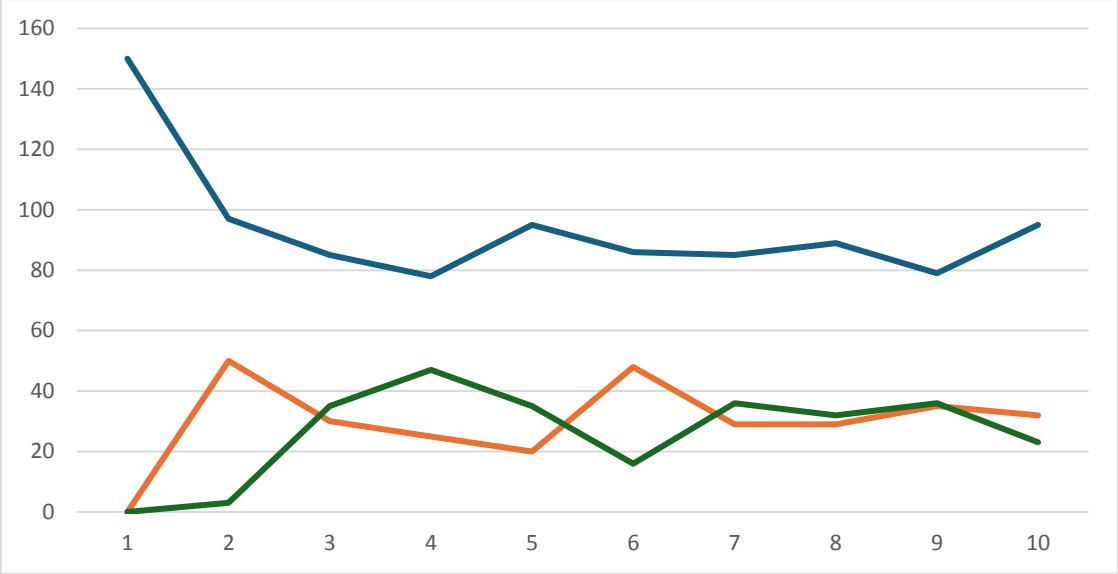

Fig. 1 Graphical analysis of the survey results

4. Discussion

The evolution of information technology, and generative artificial intelligence (GAI) in particular, is having a profound and inevitable impact on modern education. The advent of tools such as large language models has engendered novel opportunities for personalized learning, the creation of interactive multimedia content, and the automation of knowledge assessment. As demonstrated in this study, this can engender greater accessibility and efficacy in the field of education. Nevertheless, the implementation of these technologies is not without risk, including the potential decline in critical thinking and interpersonal communication skills. A survey administered to medical students in Uzbekistan corroborates the prevailing sentiment that, while students recognize the value of artificial intelligence as a tool, they are not yet willing to fully entrust the learning process to it. The prevailing sentiment is that AI cannot yet replace traditional educational materials.

5. Conclusion

The successful integration of AI into the educational process is contingent upon two factors. Firstly, the harnessing of its potential, and secondly, the development of clear methodologies and policies that will help minimize risks and strike a balance between the use of new technologies and traditional approaches. It is recommended that future research in this area concentrate on the creation of adapted educational models. The purpose of these models would be to allow the strengths of AI to be utilized to the full, whilst preserving the fundamental principles of quality education.

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