

The Use of Generative AI Technologies in the Teacher's Educational Process

Kintonova Aliya¹, Kismanova Aygerim², Karelkhan Nursaule³, BarlybayevAlibek⁴,
Toleutay Alibi⁵

^{1,2,3,4,5}L.N. Gumilyov Eurasian National University

ABSTRACT:One of the key areas of educational modernization is the integration of artificial intelligence (AI) into teachers' professional activities. AI provides wide opportunities to enhance the efficiency of preparation for the educational process: from automating routine tasks to deeply personalizing educational content. Such technologies transform the role of the teacher, allowing them to focus on the creative, methodological, and communicative aspects of teaching. The article presents examples of the use of AI technologies in the learning process. The development of artificial intelligence (AI) technologies in recent decades has radically changed the field of education. If earlier digitalization was limited to the introduction of electronic textbooks and distance learning systems, today AI enables the creation of personalized learning paths, intelligent tutors, systems of automatic assessment, and prediction of learning outcomes. These changes not only improve the quality of the educational process but also transform the very role of the teacher, emphasizing their function as a mentor, analyst, and curator of individual learning strategies.

Keywords: AI technologies, generative AI technologies, generation of learning materials, optimization of teaching work.

Introduction

Modern teachers, teacher-researchers, master's students, and doctoral candidates face the challenge of integrating AI into educational and research processes. They often experience difficulties in mastering these technologies due to the lack of effective training tools and programs that take into account individual needs and levels of preparation. Most existing platforms do not offer a personalized approach and do not contribute to the development of specialized skills necessary for the effective use of AI in education and science. This slows down the implementation of advanced technologies in academic activities and hampers the digital transformation of educational institutions.

By studying artificial intelligence technologies, a teacher can simplify lesson preparation through the generation of learning materials. Lectures, seminars, practical and laboratory classes, tests, and exam papers can be generated. For this purpose, generative AI tools such as ChatGPT, Gemini, and Claude can be used. ChatGPT allows the creation of both simple and complex texts (e.g., lectures, practical lessons, tests), generating code, and analyzing data. Gemini (an AI assistant from Google) is integrated with Google services and can analyze documents and spreadsheets. Claude helps teachers write texts in a natural style and works well with long documents. Gemini also supports text queries, code generation, data analysis, and integration with Google services. In addition, there is a Text-to-Speech (TTS) tool that helps convert text into audio. Teachers can voice their lecture presentations, which is also relevant for inclusive education—for visually impaired students and for creating audio lessons.

Related Work / Background

Many scholars have reflected in their research the challenges of using artificial intelligence technologies (AIT) in the educational and scientific fields. This is confirmed by the analysis of the publications listed below.

For example, the authors Rego G.E. and Rego E.V., in their work *"Enhancing English Listening Skills through Artificial Intelligence Technologies"*, *StudArctic Forum* (2024), described their experience in applying AIT to improve the effectiveness of learning English. They highlight their experience of introducing AI tools (speech recognition) to help students adapt to different accents and speech styles [1].

The authors An Yunjo, Yu Ji Hyun, and James Shadarra, in their article *"Investigating the higher education institutions' guidelines and policies regarding the use of generative AI in teaching, learning, research, and administration,"* write about the study of guidelines and policies of higher education institutions regarding the use of generative AI (GenAI) in teaching, learning, research, and administration. The authors analyzed the guidelines issued by 50 leading U.S. universities concerning

the use of GenAI in academic and administrative activities. They identified four key themes: integration of GenAI in learning and assessment, GenAI in visual and multimodal media, security and ethical considerations in GenAI, and GenAI in academic integrity. The study revealed positive attitudes toward GenAI across all types of institutions, with significant differences between guidelines targeting faculty and students. The authors emphasize the rapid evolution of GenAI guidelines in higher education and the need for flexible, stakeholder-oriented policies that address both opportunities and challenges associated with this technology [2].

The authors Öncü S., Torun F., and Ülkü H.H., in their article *"AI-powered standardized patients: evaluating ChatGPT-4o's impact on clinical case management in intern physicians,"* discuss the use of ChatGPT-4o for standardized patients and its impact on clinical case management by intern physicians. They describe the use of AI in healthcare for diagnostics, decision-making, and education. The authors argue that ChatGPT-4o, with its advanced language and problem-solving capabilities, offers an innovative alternative as a virtual standardized patient in clinical training. The study aimed to assess intern physicians' competencies in clinical case management, problem-solving, clinical reasoning, crisis management, and to evaluate the potential of ChatGPT-4o as a viable tool for such assessments [3].

The authors Ahmed A., Kerr E., and O'Malley A., in their article *"Quality assurance and validity of AI-generated single best answer questions,"* address the quality assurance and validity of single best answer (SBA) questions generated by AI. They report that they used commercially available large language models (LLMs), specifically OpenAI GPT-4, to generate 220 SBA questions, following the recommendations of the Alliance for Medical Schools Assessment and the learning outcomes (LO) of the ScotGEM graduate entry medicine program in Scotland. This approach offers a viable solution for rapidly expanding and diversifying assessment resources in medical education programs, marking a step forward in bridging AI and education [4].

The authors Safarzadeh S., Ardabili N.S., Farashah M.V., Roozbeh N., and Darsareh F., in their article *"Predicting mother and newborn skin-to-skin contact using a machine learning approach,"* discuss predicting mother–newborn skin-to-skin contact using a machine learning (ML) approach. The study was designed to apply ML to identify predictors of skin-to-skin contact (SSC). They implemented predictive SSC models based on data obtained from the "Iranian Mothers and Newborns Network (IMaNet)" from January 2020 to January 2022 [5].

The authors G.E. Rego and E.V. Rego, in their article *"Enhancing English Listening Skills through Artificial Intelligence Technologies" (StudArctic Forum),* also wrote about English listening comprehension, their experience in applying interactive voice assistants, and personalized language learning [6].

From the presented analysis, it can be concluded that scholars are actively integrating artificial intelligence technologies into their research. They also highlight the results of successful implementation of AI technologies in various fields of the economy, demonstrating their effectiveness. Many scholars have reflected in their research the challenges of using artificial intelligence technologies (AIT) in the educational and scientific fields.

Methods

This study employs a qualitative research methodology based on content analysis of scientific publications, case studies, and practical applications of artificial intelligence (AI) technologies in education. The methodological framework consists of the following stages: *Literature Review and Analysis*. A systematic review of recent research papers, conference proceedings, and journal articles (2018–2024) addressing the use of AI in education and science. Identification of trends, benefits, and challenges in implementing AI technologies such as generative AI, intelligent tutoring systems, and machine learning applications. Comparative analysis of national and international practices in AI integration into educational processes. *Synthesis and Evaluation*. The findings were synthesized to evaluate the effectiveness of AI technologies in addressing challenges faced by teachers, researchers, and students. Emphasis was placed on the pedagogical value, ethical aspects, and potential for digital transformation of academic institutions. This methodological approach allowed us to critically evaluate existing practices, highlight successful experiences, and outline promising directions for the integration of AI technologies in education.

Results

Generative AI technologies: text generators (alternatives to ChatGPT); image generation; video generation; music and sound generation; code generation. *Examples of using generative AI technologies*

in the teacher's educational process: Generation of learning materials; Development of intelligent assistants; Personalization of learning; Visualization and modeling; Creative activities; Organization of the educational process.

Below are examples of how AI technologies can be applied in the above-mentioned aspects. For instance, in preparing educational materials, a variety of tools can be used. Figure 1 shows the categories of ChatGPT tools (Featured, Trending, DALL·E, etc.).



Figure 1. Categories of ChatGPT Tools

There is a division of tools according to technical and humanities-oriented subjects and disciplines. Figure 2 shows some of the ChatGPT tools, such as a mathematics tool, the creation of educational summaries from long videos in different languages, and a humanities tutor.

By using the capabilities of generative AI tools, a teacher can quickly create educational materials. Figure 3 presents a fragment showing an example of using ChatGPT for language learning, for instance, English.



Figure 3. Response to the request to list English irregular verbs in Russian

It is also possible to make a request such as: "Write a text using English irregular verbs with translation." Figure 4 shows a request in which ChatGPT generated a text using irregular verbs.

Write a text using English irregular verbs with translation.

Here's a short story with English irregular verbs in the **Past Simple**, with their translation into Russian in parentheses:

Text with Irregular Verbs

Yesterday I **went** (пошёл) to the park. I **saw** (увидел) my friend there, and we **spoke** (поговорили) for a long time. Then we **took** (взяли) some sandwiches and **ate** (съели) them under a tree. Suddenly, it **began** (началось) to rain, so we **ran** (побежали) to a café nearby. In the café we **drank** (выпили) hot tea and **sat** (сидели) by the window. Later, I **came** (пришёл) home, **wrote** (написал) a message to my friend, and **went** (лег спать/пошёл) to bed early because I **felt** (чувствовал себя) very tired.

Key Irregular Verbs List

- go → **went** – идти (пошёл)
- see → **saw** – видеть (увидел)
- speak → **spoke** – говорить (поговорил)
- take → **took** – брать (взял)

Figure 4. Response to the request to write a text with English irregular verbs and translation into Russian

Teachers can also generate examination materials as part of their lectures and practical classes. For example, Figure 5 shows the generation of examination questions in psychology.

сгенерируй билеты по психологии для 1 курса бакалавриата по специальности педагог-психолог

Вот пример экзаменационных билетов по психологии для 1 курса бакалавриата по специальности педагог-психолог. Каждый билет состоит из трёх вопросов: теоретического, прикладного и аналитического.

БИЛЕТ №1

1. Дайте определение психологии как науки. Основные цели и задачи.
2. Психологические особенности восприятия у младших школьников.
3. Проанализируйте роль эксперимента в психологических исследованиях. Приведите пример.

БИЛЕТ №2

1. Основные направления в психологии: психоанализ, бихевиоризм, гуманистическая психология.
2. Практическое применение метода наблюдения в школьной среде.
3. Проведите сравнительный анализ кратковременной и долговременной памяти.

Figure 5. Generation of Examination Questions

When preparing a syllabus, it is also possible to make requests for sources by specifying the exact number of sources and the time period required for the selected discipline, as shown in Figure 6. This undoubtedly automates the routine work of searching for references.

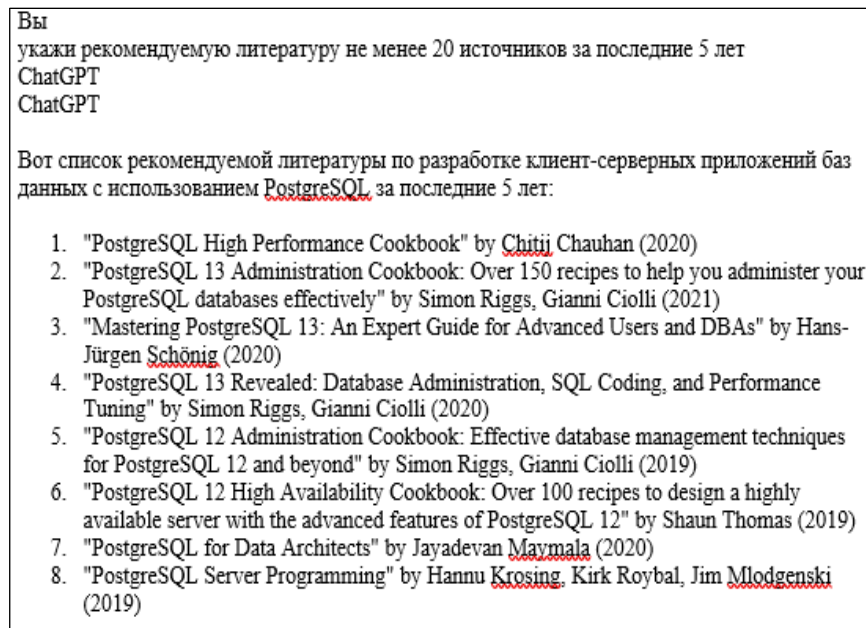


Figure 6. Creating References for a Subject for a Specific Period

Figure 7 shows an example of a practical task for creating exam questions from lectures given to students in a subject. It is better to generate questions from a lecture file in order to avoid generating questions from the internet that were not covered in the lectures.



Figure 7. Uploading a Lecture File

You will receive a response to your request in which questions are generated based on the materials of this lecture, as shown in Figure 8.

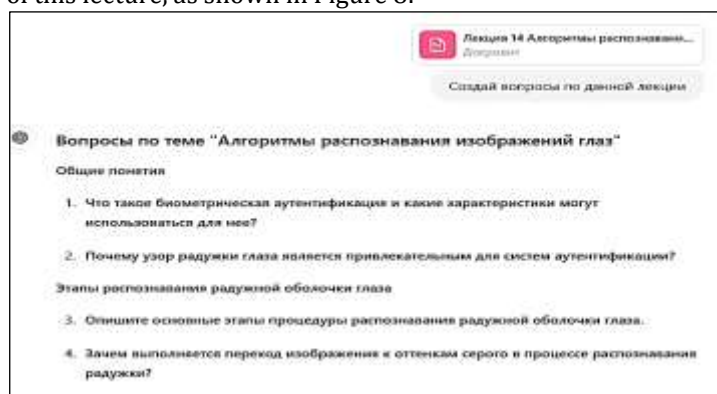


Figure 8. Generated Questions from the Uploaded File

When examination questions have been prepared for all lectures, the file with questions should be uploaded to the chat, and a request should be made: "Form examination tickets from this file according

to the rule: tickets must consist of two questions — the first and the last, the second and the second-to-last, and so on.” Figure 9 shows how the request is written next to the attached file.

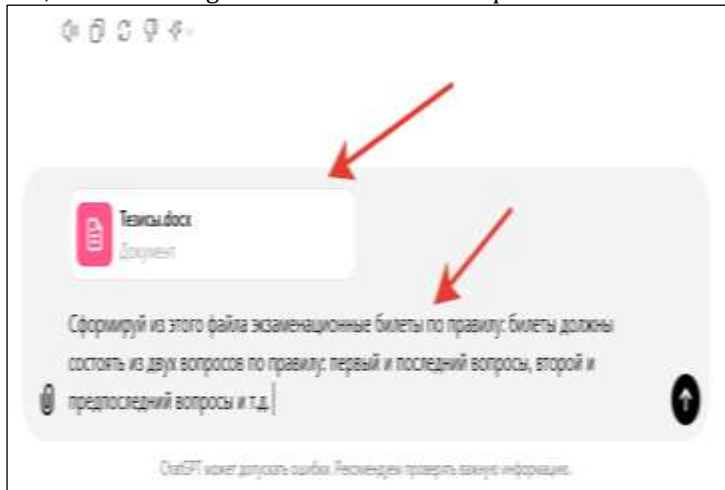


Figure 9. Uploading a File and Writing a Request

Figure 10 shows the process of generating a cross-sectional view of a centrifugal pump with its main components indicated: the impeller is highlighted in red, and the fluid flow is shown with blue arrows. Figure 10 also presents an enlarged fragment of the centrifugal pump.



Figure 10. Screenshot of a Generated Cross-Section of a Centrifugal Pump with Indication of Main Components

An example of implementing an educational dashboard is shown, demonstrating the use of a method of intelligent data processing and visualization. Figure 11 illustrates the visual result of applying the method of intelligent educational data analysis — classification. The histogram shows 11 grades A, 9 grades B, 1 grade D, and no results for grade C. The outcome of the method — classification — is visualized in the form of a histogram, as shown in Figure 11.

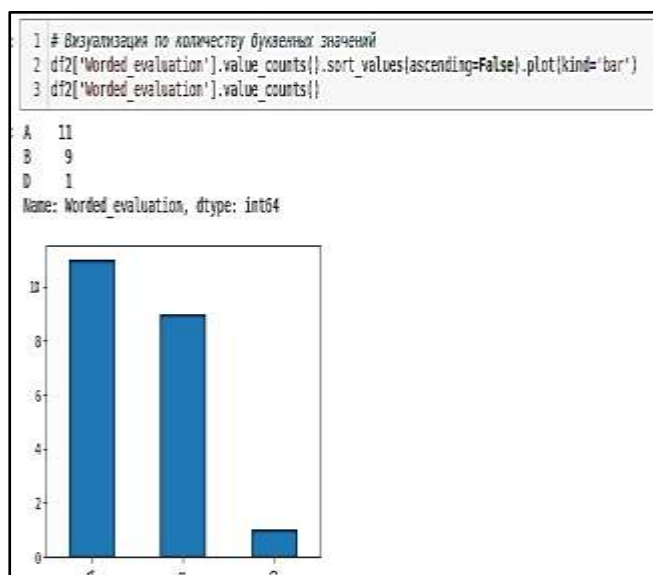


Figure 11. Result of the Grade Classification Method

The use of artificial intelligence technologies significantly increases the efficiency of teachers' preparation for the educational process. AI helps to automate routine tasks, accelerates the creation of learning materials, and provides personalized solutions for each student. This allows the teacher to focus on the key aspects of teaching and improve the quality of interaction with students. As a result, the productivity, flexibility, and adaptability of the educational environment are enhanced.

Discussion

This article is devoted to the issues of using artificial intelligence (AI) technologies in the field of education. The aim of this article was to demonstrate the opportunities provided by AI technologies. These opportunities make it possible to increase the efficiency of teachers' work in preparing materials for classes and examinations, as well as to help automate many routine tasks of the teacher. Examples are presented to show how to improve work efficiency and automate routine tasks. This will allow teachers to devote more attention to creative tasks in both the educational process and research activities.

In this article, a review of scholarly publications devoted to this topic is also provided, which corresponds to the theme of my monograph.

Conclusion

The article presents the results of research on the application and implementation of AI technologies and tools in the educational process. We believe that our article will help many teachers in their educational activities and assist them in improving the efficiency of their work. In this article, we have attempted to present specific examples of automating teachers' work with the help of generative technologies. Teachers can generate lectures, practical classes, handouts, visual materials (illustrations, charts, etc.), tests, and examination papers. Tests and examination papers can be generated within the framework of lectures and practical classes, while it is necessary to attach the lecture file when making the request. By applying these examples in their practice, teachers will be able to partially automate their work and generate visual didactic materials (illustrations, charts).

This research was funded by the Ministry of Science and Higher Education, the Science Committee, and carried out within the framework of the project AP26195651 "Development of an adaptive learning system based on artificial intelligence for the integration of AI technologies into the teaching and research activities of educators."

References

- [1] Rego, G. E., & Rego, E. V. (2024). Improving English listening skills using artificial intelligence. StudArctic Forum, 9(2), 100–110.<https://saf.petsru.ru/>

- [2] Rego, G. E., & Rego, E. V. (2024). Improving English listening skills using artificial intelligence. *StudArctic Forum*, 9(2), 100–110. <https://saf.petrstu.ru/>
- [3] An, Y., Yu, J. H., & James, S. (2025). Investigating the higher education institutions' guidelines and policies regarding the use of generative AI in teaching, learning, research, and administration. *International Journal of Educational Technology in Higher Education*, 22(1), 10. <https://doi.org/10.1186/s41239-025-00507-3>
- [4] Öncü, S., Torun, F., & Ülkü, H. H. AI-powered standardised patients: Evaluating ChatGPT-4o's impact on clinical case management in intern physicians. *BMC Medical Education*, 25(1), (2025). Article 11843762. <https://pmc.ncbi.nlm.nih.gov/articles/PMC11843762/>
- [5] Ahmed, A., Kerr, E., & O'Malley, A. Quality assurance and validity of AI-generated single best answer questions. *BMC Medical Education*, 25(1), (2025). Article 300. <https://doi.org/10.1186/s12909-025-06881-w>
- [6] Safarzadeh, S., Ardabili, N. S., Farashah, M. V., Roozbeh, N., & Darsareh, F. Predicting mother and newborn skin-to-skin contact using a machine learning approach. *BMC Pregnancy and Childbirth*, 25(1), (2025). Article 182. <https://doi.org/10.1186/s12884-025-07313-9>
- [7] Pero, Г. Э., Pero, E. B. Enhancing English Listening Skills through Artificial Intelligence Technologies // Вестник цифровых технологий в образовании. – 2024. – Т. 12, № 3. – С. 45–56.
- [8] Kintonova A.Zh., Glazyrina N.S., Yermaganbetova M.A., Maykibayeva E.K. Technologies of Adaptive Learning. Scientific Center "Orca", Omsk, Bulletin of Modern Research. Issue No. 11-3 (26) (November 2018), pp. 22–27.
- [9] Kintonova A.Zh., Tanabayeva A. Prospects for the Development of Educational Technologies. Bulletin. Taldykorgan, 2018. Bulletin of Zhetysu State University named after I. Zhansugurov, No. 2, 2018.
- [10] Kintonova A.Zh., Suleimenova B.B., Shanytbaeva A.K. Artificial Intelligence in Education. Open Science. 2024. URL: <https://cyberleninka.ru/article/n/iskusstvennyy-intellekt-v-obrazovanii-2>
- [11] Kintonova A.Zh., Serik M., Yermagambetova M.A. The Influence of a Proctoring Chatbot on the Quality of Specialist Training. Scientific electronic journal Matrix of Scientific Knowledge, ISSN 2541-8084. Proceedings of the International Scientific and Practical Conference, November 7, 2023, pp. 81–84.
- [12] Kintonova A.Zh., Serik M., Yermagambetova M.A. The Use of Robots in the Educational Process in the Training of Specialists. Bulletin of Scientific Conferences. 2024. No. 2-1 (102). Science, Education, Society: Proceedings of the International Scientific and Practical Conference. ISSN 2412-8988. February 29, 2024, p. 110.
- [13] Kintonova A.Zh., Uspanova N.S. Implementation of Distance Learning for Entrepreneurship in Kazakhstan. *International Journal of Engineering Sciences & Management*. The journal is indexed by Jour Informatics, Index Copernicus, DOAJ, and others (J-Stage, Pro-Quest, Google Scholar, etc. indexing in progress). ISSN 2277–5528. Impact Factor: 5.085. Vol. 8(1), January–March 2018, pp. 23–34. Web of Science Impact Factor: 2.805.
- [14] Kintonova A.Zh., Gabdreshov G., Abyzbek A., Musayf M., Khaimulina D. Online Learning Technologies. *Norwegian Journal of Development of the International Science*. ISSN 3453-9875. No. 108/2023, pp. 84–86.
- [18] Kintonova A.Zh., Povkhan I.F., Sabitov A., Tokkuliyeveva A., Demidchik N. Online Learning Technologies. ENERGYCON 2022 – 2022 IEEE 7th International Energy Conference, Proceedings. Riga, May 9–12, 2022. Code 181231.