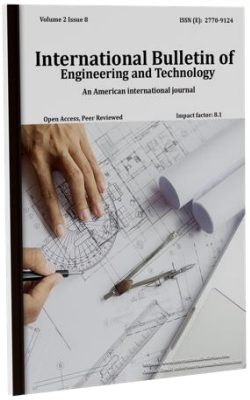


TRANSFORMING EXACT SCIENCES TEACHING THROUGH ARTIFICIAL INTELLIGENCE TECHNOLOGIES

Kalandarov Utkir Namozovich
Tashkent University Of Information
Texnologies Named After Muhammad Al-Khwarizmi
Faculty of Software Engineering, Department of Higher Mathematics
Candidate of Sciences in Physics and Mathematics, Associate Professor
https://doi.org/10.5281/zenodo.18241546

Annotatsiya

Ushbu ilmiy maqolada matematika fanini sun'iy intelekt texnologiyalari asosida tashkil etish orqali talabalarni dars mashg'ulotlarida kreativ fikrlashga undash orqali raqobatbardosh kadrlar tayyorlashga erishish metodikasi keltirilgan. Bundan tashqari sun'iy intelekt yordamida ta'lim jarayonini primitiv ta'limdan kreativ ta'lim jarayonini yuzaga keltirish uchun foydalanish imkoniyati haqida ma'lumotlar berilgan.

Kalit so'zlar: Sun'iy intelekt (SI), Machine Learning, Duolingo, VR/AR, Mathway, Symbolab, Julius AI, Wolfram Alpha, Photomath, GeoGebra AI, Desmos, Runway ML.

Аннотация

В данной научной статье представлена методика подготовки конкурентоспособных кадров путем стимулирования творческого мышления студентов на занятиях с использованием технологий искусственного интеллекта. Кроме того, предоставлена информация о возможностях применения искусственного интеллекта для трансформации образовательного процесса из традиционного в креативный.

Ключевые слова: искусственный интеллект (ИИ), машинное обучение, Duolingo, VR/AR, Mathway, Symbolab, Julius AI, Wolfram Alpha, Photomath, GeoGebra AI, Desmos, Runway ML.

Abstract

This scientific article presents a methodology for training competitive personnel by fostering students' creative thinking during classes through the use of artificial intelligence technologies. Additionally, it provides information on the possibilities of using artificial intelligence to transform the educational process from traditional to creative.

Keywords: artificial intelligence (AI), machine learning, Duolingo, VR/AR, Mathway, Symbolab, Julius AI, Wolfram Alpha, Photomath, GeoGebra AI, Desmos, Runway ML.

Pursuant to Presidential Decree No. UP-6079 of October 5, 2020, approving the "Digital Uzbekistan – 2030" strategy, and Presidential Resolution No. PQ-358 dated October 14, 2024, "On Approving the Strategy for the Development of Artificial Intelligence Technologies until 2030 and Measures for its Effective Implementation", the "Digital Uzbekistan-2030" strategy establishes targeted measures aimed at developing digital competencies across all strata of the population[1].

Furthermore, the "Digital Uzbekistan-2030" strategy envisages ensuring the rapid digital development of economic sectors, the social sphere, and the public administration system,

[1] "Raqamli O'zbekiston-2010" strategiyasini tasdiqlash va uni samarali amalga oshirish chora-tadbirlari to'g'risida. O'zR Prezidentining Farmoni PF-6079. 05.10.2020 y.

including further improvement of the mechanisms for providing electronic government services.

Artificial intelligence is based on the creation and application of algorithms in a high-speed computing environment that imitate human cognitive processes. In simple terms, artificial intelligence is a technology that enables computers to think and find solutions in a manner similar to humans.

Various artificial intelligence systems can be effectively utilized for solving problems and generating visualizations in the fields of exact and natural sciences. Moreover, the efficient use of educational tools during lessons — in particular, through the organization of activities based on artificial intelligence technologies — will strongly encourage students to engage in creative thinking during classes and lay a solid foundation for preparing competitive personnel.

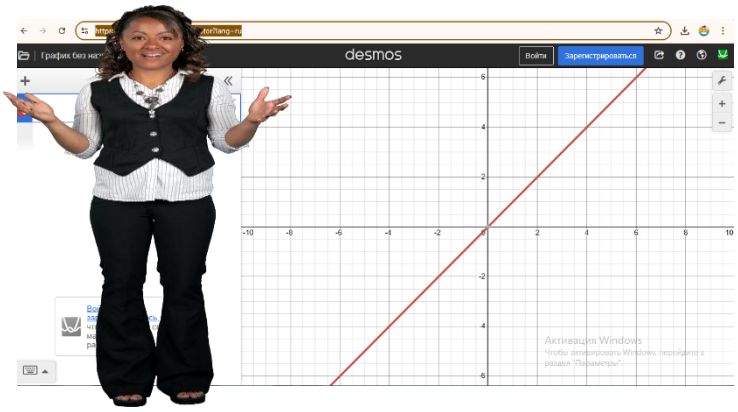
Artificial intelligence has made it possible to move mathematics lessons beyond the traditional "Teacher → Textbook → Blackboard" model, transforming them into an entirely new level of experience. As we all know, mathematics requires logical thinking, deep reasoning, and the ability to visualize abstract concepts. Mathematical visualization plays a crucial role in solving problems and examples. Digital technologies and artificial intelligence tools provide significant support in developing such visualizations in all students, as well as in fostering mathematical literacy and creative thinking competencies.

Below is a brief overview of the most popular artificial intelligence tools currently used to enhance the effectiveness of mathematics lessons, along with methods for their practical application:

In recent years, artificial intelligence (AI)-based tools for solving mathematical problems and generating their visualizations have seen significant advancements. These tools enable students, teachers, and mathematics enthusiasts to solve complex problems quickly and accurately, while also simplifying understanding through visualization.

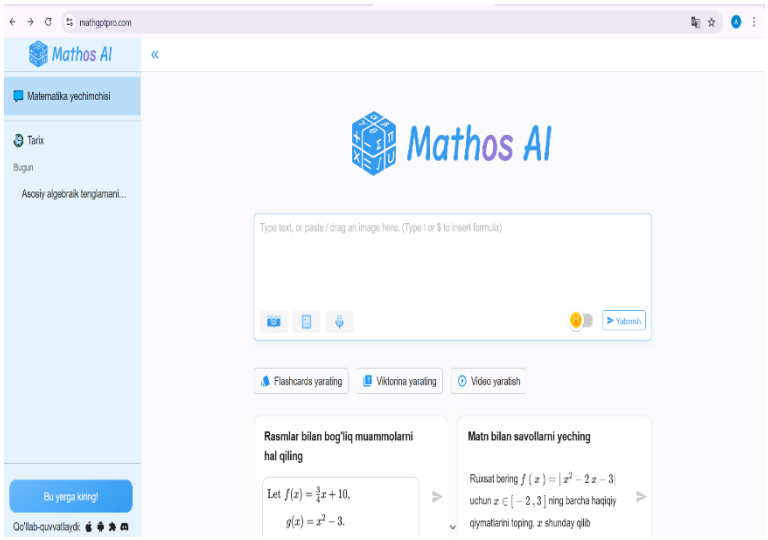
Below, we can highlight the most effective artificial intelligence tools in this field and the methods for using them.

https://www.desmos.com/calculator-

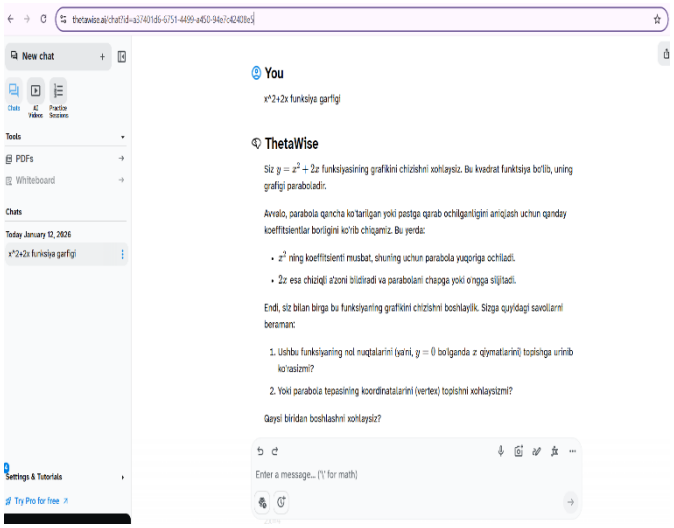


Using these artificial intelligence technologies, it is possible to generate examples, problems, and corresponding visualizations in lessons of various exact and natural sciences, tailored to the specific task or assignment provided by the user.

https://www.mathgptpro.com/ - This AI enables fast and accurate solving of mathematics problems (algebra, geometry, calculus, fractions, graphs, physics, chemistry, and engineering problems), while providing detailed step-by-step explanations to make understanding easier for students.



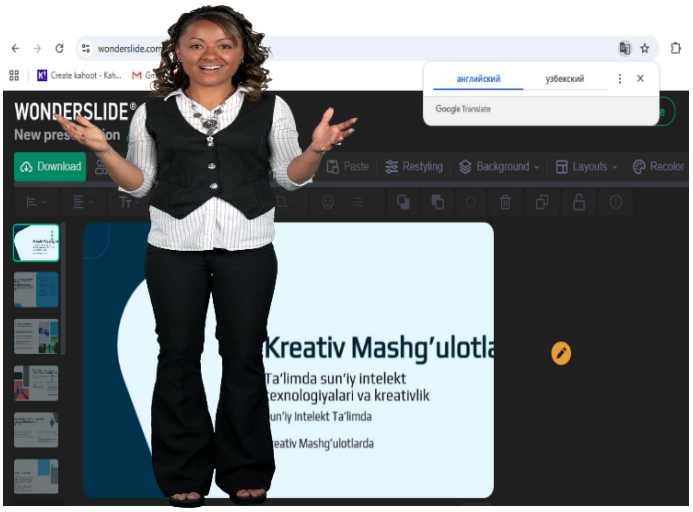
Input methods include photo/screenshot, voice input, PDF upload, drawing, or text entry. Additionally, it offers real-time graphing and analysis (advanced graphing calculator), a personalized AI tutor that adapts to the student's learning style and pace, the ability to create flashcards, quizzes, and video explanations, as well as superior accuracy in benchmark tests compared to Photomath, Symbolab, Mathway, and even some GPT-based models.



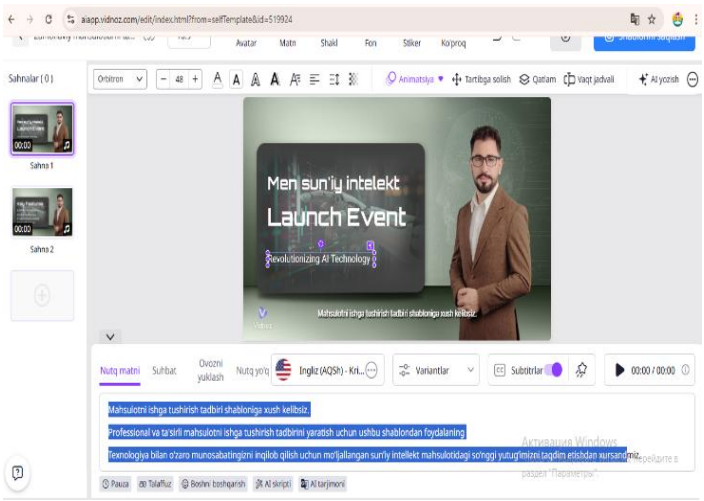
https://thetawise.ai/ - Fast and accurate solving of mathematics problems (algebra, geometry, trigonometry, calculus, differential equations, statistics, and other advanced topics), accompanied by detailed step-by-step explanations to ensure students gain a deep understanding.

https://Wonderslides.com This is a technology based on artificial intelligence that enables the creation of presentations on any topic provided by the user, as well as the transformation of pre-prepared presentations into more interactive formats.

It provides today's learners with the opportunity to enrich their attention and thinking processes with engaging and interactive materials.



https://aiapp.vidnoz.com/- This artificial intelligence-based technology enables the conversion of text in a given presentation into spoken narration using an avatar.



It allows information presented during educational sessions to be explained orally to the audience, while also providing the opportunity to illustrate complex processes through visualizations or to present their solutions in visual form.

https://grok.com This artificial intelligence-based technology enables the presentation of provided information through animations.

With the help of these artificial intelligence technologies, it becomes possible in various exact and natural sciences lessons to generate examples, problems, and corresponding visualizations tailored to the specific task or assignment provided by the user.

In conclusion, it can be emphasized that, as a result of the rapid development of technology today, humanity's need for technology is sharply increasing. It is essential to cultivate in teachers and students a culture of effective and purposeful use of technology, to explore new fields of knowledge, and to analyze information critically.

At the same time, the need for innovative teaching approaches in educational institutions is growing day by day among 21st-century learners. This, in turn, makes it highly appropriate for professors and teachers to organize the educational process based on modern technological approaches in line with contemporary requirements.

The artificial intelligence technologies mentioned above provide significant assistance in effectively addressing these very challenges..

Literature and Internet Resources Used:

1.“Raqamli O‘zbekiston-2010” strategiyasini tasdiqlash va uni samarali amalga oshirish chora-tadbirlari to‘g‘risida. O‘zR Prezidentining Farmoni PF-6079. 05.10.2020 y.

2.M.P.Masharipov “Sun’iy intelekt va ta’lim”.:T-2024 yil Metodik qo’llanma/152 bet.