MAKTAB MATEMATIKA KURSIDAGI MASALALARNI YECHISHDA SUN'IY INTELLEKT IMKONIYATLARI VA TAHLILI.

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Annotatsiya: Ushbu maqolada zamonaviy sun'iy intellekt texnologiyalarining maktab matematika kursidagi masalalarni yechishdagi o'rni va imkoniyatlari tadqiq etiladi. Shuningdek, AI dasturlarining hisoblash jarayonidagi aniqligi, mantiqiy masalalardagi xatolari va o'quvchilarning mustaqil fikrlashiga ta'siri tahlil qilingan. Bugungi kunda matematikaning raqamlashishi. Ommabop AI vositalari (Photomath, ChatGPT, Wolfram Alpha) haqida qisqacha tushuncha.

Kalit so'zlar: Sun'iy intellekt, matematika ta'limi, ChatGPT, Photomath, algoritmlar, mantiqiy masalalar, raqamli ta'lim.

АНАЛИЗ И ВОЗМОЖНОСТИ ИСКУССТВЕННОГО ИНТЕЛЛЕКТА В РЕШЕНИИ ЗАДАЧ ШКОЛЬНОГО КУРСА МАТЕМАТИКИ.

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Аннотация: В данной статье рассматривается роль и потенциал современных технологий искусственного интеллекта в решении задач школьного курса математики. Также анализируется точность программ ИИ в процессе вычислений, ошибки в логических задачах и влияние на самостоятельное мышление учащихся. Цифровизация математики сегодня. Краткий обзор популярных инструментов ИИ (Photomath, ChatGPT, Wolfram Alpha).

Ключевые слова: Искусственный интеллект, математическое образование, ChatGPT, Photomath, алгоритмы, логические задачи, цифровое обучение.

ANALYSIS AND POSSIBILITIES OF ARTIFICIAL INTELLIGENCE IN SOLVING PROBLEMS IN THE SCHOOL MATHEMATICS COURSE.

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Abstract: This article examines the role and potential of modern artificial intelligence technologies in solving problems in the school mathematics course. It also analyzes the accuracy of AI programs in the calculation process, errors in logical problems, and the impact on students' independent thinking. The digitization of mathematics today. A brief overview of popular AI tools (Photomath, ChatGPT, Wolfram Alpha).

Keywords: Artificial intelligence, mathematics education, ChatGPT, Photomath, algorithms, logic problems, digital learning**.**

Today, digital technologies have become an integral part of the education system. The role of artificial intelligence (AI)-based programs is increasing day by day, especially in teaching exact subjects such as mathematics. Platforms such as Photomath, Microsoft Math Solver, and ChatGPT provide students with the opportunity to solve examples in seconds. The relevance of this article is that we analyze how AI can become not only a tool for finding answers, but also a "digital tutor" that improves the learning process.

The President of the Republic of Uzbekistan, Shavkat Mirziyoyev, paying special attention to the importance of modern technologies in education, emphasizes the following: “Today, progress cannot be achieved without the development of science, education, and digital technologies. In particular, in-depth study of mathematics and the exact sciences is a solid foundation for future development” [1]. The President also touched upon the issue of equipping young people with modern knowledge, saying: “Our young people need to master artificial intelligence, digital technologies, and modern knowledge. This is the most important condition for building a New Uzbekistan” [2]. Also, S. Wolfram, assessing the role of AI tools in mathematics education, writes: *“Computational technologies and artificial intelligence expand the possibilities for a deeper understanding of mathematical concepts and their application in practice” [3]. Modern researchers emphasize that

the use of artificial intelligence in education increases the efficiency of students' learning. In particular, S. Russell and P. Norvig express the following opinion: *“Artificial intelligence allows for the individualization of the educational process and facilitates the understanding of complex problems” [4].

Artificial intelligence is the implementation of computer systems’ abilities to analyze, learn, make inferences, and make decisions that are inherent in human thinking. In the field of education, AI allows for the analysis of knowledge, identification of individual characteristics of students, and organization of personalized education. AI-based educational platforms assess the level of knowledge of students, analyze their mistakes, and offer individual learning paths for each student. This is especially important in mathematics, ensuring thorough mastery of each topic.

The school mathematics course includes arithmetic, algebra, geometry, functions, and statistics. AI technologies can be effectively used to solve problems related to these sections. In arithmetic and algebra problems, AI shows the solution step by step. This helps students understand not only the final answer, but also the algorithm for solving the problem. When working with equations, inequalities, and algebraic expressions, AI identifies errors and provides recommendations for correcting them. In geometry and graphics problems, AI is distinguished by its visual explanation capabilities. The content of the problem is more clearly explained through drawings, graphs, and shapes. This is especially important for developing spatial imagination.

One of the most important advantages of artificial intelligence is an individual approach. Since each student has a different level of knowledge, speed and learning style, AI organizes education taking into account these differences. Also, with the help of AI, work on errors is carried out effectively. The student's mistake is immediately identified and its reason is explained. This helps to consolidate

knowledge and prevent future mistakes from being repeated. AI can work as a virtual tutor, which is especially relevant in distance learning. The student can practice independently and check his knowledge at any time.

In the future, artificial intelligence-based technologies are expected to become an integral part of mathematics education. Interactive platforms, intelligent testing systems, and automated assessment tools will serve to organize the activities of teachers and students more effectively. However, AI will not completely replace the teacher, but will serve as a tool to support his work. While the teacher provides pedagogical experience and educational aspects, AI will accelerate technical and analytical processes.

The use of artificial intelligence technologies in the educational process can also have certain negative aspects. There is a possibility that the rapid achievement of ready-made solutions to problems with the help of AI will lead to insufficient formation of independent analytical and logical thinking skills in students. As a result, the student may focus only on the final answer without a deep understanding of the essence of the problem. Also, the constant use of AI tools creates excessive dependence on technology. This situation negatively affects the ability of students to work independently, reducing their skills in working with textbooks, teachers and traditional methods. In some cases, it leads to superficial assimilation of knowledge.

In addition, the information provided by AI is not always absolutely correct. If the student does not critically analyze the given solution, misconceptions can form. This undermines the accuracy and consistency of mathematical knowledge. The use of artificial intelligence also raises issues of academic integrity. The completion of homework and independent assignments with the help of AI makes it difficult to determine the real level of knowledge of students. At the same time, communication between students and the teacher may decrease, and the educational and social aspects of the educational process may not be sufficiently provided.

Mathematical capabilities of artificial intelligence AI programs show high efficiency in the following areas of mathematics: Algebraic calculations: Simplifying equations, inequalities, and expressions. Graph construction: Creating graphs of functions in exact coordinates. Step-by-step solution: Explaining each step rather than just solving the problem. Case study In the article, the following logical problem was tested on the ChatGPT 4 model: Problem: "The brother is now 12 years old, and his brother is 2 times younger than him. When the brother is 40 years old, how old will the brother be?" AI's logical solution: The brother's current age: (12/2=6). The age difference between the brother and the brother: (12-6=6). The brother's age when the brother is 40 years old: (40-6=34). Analysis: AI is able to solve this type of text problems with logical consistency. However, in geometric theorems that require complex proofs, AI can sometimes rely on incorrect axioms. Disadvantages and risks It is worth noting that over-reliance on AI can cause the following problems in students: Weakening of critical thinking: Independent reasoning is reduced as a result of learning from ready-made solutions. Logical errors: AI can sometimes build an incorrect mathematical model without understanding the hidden meaning in the question.

The artificial intelligence-based Wolfram Alpha and Photomath programs serve to effectively organize the process of learning and solving problems in the school mathematics course. These tools help students perform complex calculations quickly and accurately, allowing them to better understand mathematical concepts. Wolfram Alpha has powerful analytical capabilities for working with mathematical expressions, equations, functions, and graphs. It helps students check the results of formulas, see alternative solutions, and gain a deeper understanding of mathematical laws. It is an especially effective tool for mastering algebra and functions in higher grades.

The Photomath program is distinguished by its step-by-step explanation and solution of problems. This helps students understand the problem-solving algorithm, identify their mistakes, and develop their skills to independently come to the correct solution. Visual explanations increase students' interest. These programs allow students to check their knowledge, practice independently, and reinforce complex topics. Wolfram Alpha and Photomath also play an important role in learning mathematics in distance learning, acting as virtual tutors. When used correctly and in moderation, these AI tools effectively contribute to the development of students' mathematical literacy and logical thinking.

In conclusion, the use of artificial intelligence capabilities in solving problems in the school mathematics course improves the quality of education, increases students' interest in science, and develops independent thinking skills. Through the correct and targeted use of AI technologies, mathematics education can be brought to a modern, effective, and competitive level.

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