



Pedagogical Possibilities Of Creating And Evaluating Mathematical Tests Based On Artificial Intelligence

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Abstract: This article explores the role of artificial intelligence (AI) technologies in mathematics education, focusing on the use of the iSpring platform for creating and assessing tests. It analyzes how AI can assist in automatically generating test questions, evaluating student performance, and providing personalized learning recommendations. In addition to highlighting the benefits of AI integration in education, the paper also discusses its limitations and necessary precautions.

Keywords: artificial intelligence, mathematics education, test creation, iSpring, personalization, formative assessment, AI assistant

Sun'iy Intellect Asosida Matematik Testlarni Yaratish Va Baholashning Pedagogik Imkoniyatlari

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Anotatsiya: Ushbu maqolada matematika ta'limida sun'iy intellekt (SI) texnologiyalarining, xususan iSpring dasturi misolida, testlarni yaratish va baholashdagi o'rni yoritilgan. SI yordamida test savollarini avtomatik generatsiya qilish, talabalar natijalarini baholash, shuningdek, individual ta'lim tavsiyalarini shakllantirish kabi imkoniyatlar tahlil qilinadi. Maqolada sun'iy intellektning afzalliklari bilan birga, uni ta'limga integratsiya qilishdagi cheklov va ehtiyoj choralari ham ko'rib chiqiladi.

Kalit so'zlar: sun'iy intellekt, matematika ta'limi, test yaratish, iSpring, personalizatsiya, formativ baholash, AI yordamchisi.



Аннотация: В данной статье рассматривается роль технологий искусственного интеллекта (ИИ) в преподавании математики, в частности на примере платформы iSpring. Анализируются возможности ИИ в автоматической генерации тестовых заданий, оценке результатов студентов и предоставлении индивидуальных рекомендаций. Наряду с преимуществами использования ИИ, обсуждаются ограничения и меры предосторожности при его интеграции в образовательный процесс.

Ключевые слова: искусственный интеллект, обучение математике, создание тестов, iSpring, персонализация, формативное оценивание, AI-ассистент

Currently, artificial intelligence (AI) technologies are widely used in the education system. The use of AI in education is expected to not only enrich the learning process, but also make it more effective and individualized [1]. In mathematics, tests created in the iSpring program are electronic test tasks created for university students and distributed through the iSpring platform. iSpring is a program designed for e-learning, with the help of which educators can develop interactive courses and tests. In recent years, artificial intelligence capabilities have also begun to be integrated into the iSpring platform, for example, the iSpring AI assistant helps to automatically create test questions [1]. This article examines the role and importance of artificial intelligence in the process of creating and evaluating tests in mathematics education. First, the general role and theoretical foundations of artificial intelligence technologies in the educational process are highlighted. Next, the possibilities of creating test tasks using artificial intelligence (for example, generating mathematical questions), automatically evaluating test results, and providing personalized recommendations to students based on their results are analyzed. In each direction, the advantages and limitations of advanced approaches are discussed. Finally, the conclusion summarizes how the presented methods affect the effectiveness of mathematics education and the aspects that should be paid attention to when implementing them.

Artificial intelligence technologies have wide-ranging opportunities for improving the educational process, and their application requires specific approaches in theory and practice. The role of artificial intelligence in education is seen in several main areas:



Content creation and diversification. Educational materials and questions can be generated using AI. For example, Large Language Models (LLMs) can create explanations or questions that explain mathematical concepts in different ways for audiences of different levels. This helps teachers explain the same topic in several different ways, including by creating questions of varying difficulty levels that stimulate student thinking.

Formative assessment and rapid feedback. AI can analyze students' answers in real time and provide them with immediate feedback. This approach enhances formative assessment: for example, virtual assistants can identify the wrong step in a student's solution and offer appropriate advice or guidance. As a result, students can immediately understand their mistakes and strengthen their knowledge. Personalized learning. Artificial intelligence can analyze large amounts of educational process data (e.g., student solutions, test results, etc.) to identify the strengths and weaknesses of each student and create special learning plans based on this. For example, Intelligent Tutoring Systems (Intelligent Tutoring Systems) use artificial intelligence to model the knowledge state of each student and predict which concepts they are ready for, and select the next task or explanation accordingly. This personalized approach allows students to learn at their own pace and in their own way, which is especially important for learning mathematics.

Supporting teachers. Artificial intelligence can help not only students, but also teachers. Numerous studies show that innovators are interested in using AI as a "digital assistant" that can reduce the workload of teachers and allow them to focus more on didactic tasks. For example, AI can be used to get ideas for lesson plans, simplify complex data, or help check the work of large groups of students. According to a study conducted by the Digital Promise organization in 2024, 25.3% of new projects in the field of education were aimed at AI solutions that support teachers, and 21.9% were aimed at creating personalized content for students [2].

The above areas indicate the wide range of applications of artificial intelligence in education. In particular, in mathematics education, AI technologies play an important role by conveying complex concepts in different ways, accurately assessing students' knowledge, and selecting appropriate tasks for them. At the same time, there are issues that need to be resolved when using AI - for example, explaining model decisions (transparency), data properties, and preventing model errors. The following sections of this article will discuss in



detail the practical application of AI technologies in the processes of test creation, assessment, and personal recommendations, as well as their advantages and limitations.

Creating test questions in mathematics is a very responsible and labor-intensive process. The teacher must prepare a set of questions that fully test students' knowledge on each topic, with varying levels of difficulty, and in accordance with didactic goals. Artificial intelligence can serve as an auxiliary tool for the teacher in this process. In particular, large language models (e.g. OpenAI ChatGPT, Anthropic Claude, etc.) can generate various forms of mathematical questions and their answers based on text commands.

Research shows that LLM models can generate questions of different styles and content, but the quality and correctness of their answers need to be verified. For example, in a study conducted in 2024, three different language models (Copilot, Claude, ChatGPT-3.5) were given the task of creating questions on a geometric topic (the face of a regular rectangle) and their evaluation criteria. As a result, the questions obtained from all models were close in content to pedagogical expectations, but the degree to which they provided mathematically correct solutions varied. In particular, the Claude model gave the highest percentage of correct answers (with only one incorrect solution), while the Copilot model was the only model that could work with the presented diagrams, but made some errors in cases where these diagrams were presented. In some cases, the ChatGPT model did not produce diagrams in tasks where diagrams were required (i.e., did not follow the instructions). These results show that questions generated using SI, especially in cases where complex visual components are required, may not be completely reliable without human control.

However, with the right approach, artificial intelligence can provide great speed and variety in the question creation process. For example, the iSpring AI assistant, which is part of the iSpring platform, can write questions for the test along with options based on a brief instruction from the teacher. This allows teachers to form a large bank of questions in a short time, adjusting them to the content of the course. According to iSpring, such an AI assistant speeds up the process of creating courses and tests, helps maintain the quality and uniform style of content. That is, by automating tasks such as editing, formatting, placing lists and headings of the SI-based auxiliary text, the final test materials will be more thorough and didactically rich.



The use of artificial intelligence technologies in mathematics education, in particular in the process of creating and analyzing tests for university students, has great prospects. As discussed in this article, AI can:

Speed up and enrich the test question generation process – teachers can use AI to generate a diverse and didactically valuable set of questions in a short time. This reduces the teacher's workload and allows them to focus more on creativity.

The scoring and analysis of test results is automated, allowing for high-quality and rapid feedback to large groups of students. AI systems operate on the basis of consistent and fair assessment criteria, which reduces the variability caused by the human factor. Especially for open-ended tasks, AI assistants (such as scoring text answers) can greatly assist teachers.

Personalized recommendations and adaptive teaching ensure that each student receives education that meets their needs. This approach expands the capabilities of advanced students and helps those who are struggling to overcome their weaknesses. As a result, the groundwork is laid for the maximum development of all students in the group. At the same time, when it comes to the introduction of artificial intelligence, one should not forget about its limitations and risks, along with its advantages. It is necessary to check the accuracy and relevance of the content created by AI, to ensure human intervention in cases of uncertain model performance, and to adhere to ethical standards. The role of artificial intelligence in education is an auxiliary and integrative role, which complements, but does not replace, the work of the teacher. To achieve successful results, the pedagogical goal should always be in the center of attention when using the capabilities of AI on platforms such as iSpring.

In the era of high technology, the rational use of artificial intelligence tools is of great importance for improving the quality of mathematics education. Analysis of scientific sources shows that, if applied with the right approach and under control, artificial intelligence technologies can improve the process of creating and evaluating mathematical tests, and as a result, improve student learning. In the future, as research and practical experience in this area increase, clear methodologies and recommendations for using AI in the educational process will be formed. If teachers and educational institutions correctly integrate these innovative tools into their activities, the quality and efficiency of teaching mathematics will undoubtedly rise to a new level.



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