



The Role Of Digital Technologies In Modern Mathematical Education

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OPEN ACCESS

SUBMITTED 10 September 2025

ACCEPTED 01 October 2025

PUBLISHED 05 November 2025

VOLUME Vol.05 Issue11 2025

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Abstract: This article highlights the importance of digital technologies in the modern mathematical education process, their positive impact on students' knowledge quality, and their role in improving teachers' activities. Furthermore, the practical significance of software tools such as GeoGebra, Desmos, and MatLab in the teaching process is analyzed.

Keywords: Digital technologies, mathematics education, interactive platform, artificial intelligence, distance learning.

Introduction: The 21st century is the age of information technologies and digital development. The education system is not lagging behind these changes and is introducing new approaches. Especially, the role of digital technologies in teaching mathematics is extremely important. This is because mathematics is rich in abstract concepts, and visualization, interactive tools, and modeling approaches yield effective results in explaining them. With the help of digital technologies, the student learns the subject more deeply, not only theoretically but also practically. For example, the GeoGebra software provides the opportunity to change geometric shapes in real-time and dynamically plot graphs. This develops students' skills in observation, analysis, and drawing conclusions.

Analysis of the education systems in developed countries shows that:

- In a rapidly developing environment of science and technology;
- Where modern information and communication technologies are widely introduced into daily life;
- And where knowledge in various fields of science is quickly updated in society, it is required that students and employees in all fields constantly possess the skills

to independently enhance their knowledge. In this regard, utilizing the collections of graphic, textual, spoken, musical, video, audio, photo, and other information found in electronic educational resources created based on digital technologies is crucial.

Modern mathematical education is an educational system based on the use of innovative pedagogical approaches, digital technologies, interactive methods, and practically oriented assignments in the teaching of mathematics.

The main features of modern mathematical education are:

1. Interactivity - Using digital software, online platforms, and virtual laboratories such as GeoGebra, Desmos, and PhET in lessons.
2. Integration - Linking mathematics with informatics, physics, economics, biology, and technologies.
3. Practical Problem-Solving - Studying real-life problems through mathematical modeling.
4. Student-Centered Approach - Selecting assignments tailored to the abilities and interests of each student.
5. Digital Learning Environment - Teaching based on electronic textbooks, online tests, video lessons, and artificial intelligence.
6. STEAM Education - (Science, Technology, Engineering, Art, Mathematics) - Teaching mathematics in harmony with technology and art.

Modern mathematical education is an educational system that integrates traditional teaching methods with new technologies, cultivating students as active thinkers and individuals inclined toward research. This approach serves to train specialists who are competitive in the digital economy and scientific fields in the future. Furthermore, platforms such as Desmos and MatLab provide great convenience in mathematical modeling, function analysis, and automating complex calculation processes. In this way, the teacher encourages students' independent thinking and guides them toward technological thinking. Digital technologies are especially important in distance learning. During the pandemic, online lessons, electronic tests, video tutorials, and virtual laboratories ensured the continuity of mathematical education. Through this, teachers developed skills in effectively using digital tools. In addition, Artificial Intelligence (AI) based educational platforms (such as Khan Academy, Coursera, ChatGPT) provide an individual approach to students, giving them assignments tailored to their knowledge level. This further enhances the quality of education.

In modern mathematical education, digital technologies have become an integral part of the

teaching process. They develop students' logical thinking and problem-solving skills, making the learning process interactive, effective, and engaging. In the future, the deep integration of digital technologies into mathematics education will serve to further increase the quality of education.

Digital technologies perform several key functions in the process of teaching and learning mathematics:

1. Visualization and Modeling

O Software like GeoGebra, Desmos, and MatLab visually represent mathematical formulas, graphs, and geometric shapes clearly and interactively.

O This enables the student to understand complex concepts visually.

2. Interactive Teaching

O Through electronic tests, gamified exercises, and virtual laboratories, the student participates actively in the lesson.

O For example, through platforms like Kahoot or Quizizz, the teacher assesses knowledge in real-time.

3. Support for Distance Learning

O With the help of online platforms (Zoom, Google Classroom, Moodle), mathematics lessons can be taught anywhere.

O This ensures the continuity of education.

4. Individual Teaching with the help of Artificial Intelligence

O Platforms like Khan Academy, Coursera, and ChatGPT provide exercises tailored to the student's level, identify their mistakes, and offer recommendations.

5. Automation of Analysis and Calculation Processes

O Computer algebra systems (Maple, WolframAlpha) automatically solve complex formulas, easing the teacher's workload.

In today's digital age, mathematics is viewed not only as a system of theoretical knowledge but also as a crucial discipline that shapes human thought, analytical thinking, and an innovative approach. Modern mathematics is no longer just a collection of formulas and calculations; it is evolving as a science closely linked with technology, informatics, economics, and even art. Modern mathematical education is the main tool that implements this process into practice. With the help of digital technologies, interactive programs, Artificial Intelligence, and online platforms, the lesson process has become more effective, understandable, and engaging. Students do not just memorize the subject; they analyze it, model it, and connect it to real life. Furthermore, by increasing the digital literacy of teachers, applying new pedagogical technologies in

lessons, and using software like GeoGebra, Desmos, and MatLab, students develop skills in independent thinking, problem-solving, and creative approaches.

CONCLUSION

In conclusion, digital technologies update the content of mathematical education, bring teaching methods up to the demands of the time, and serve to make the educational process innovative, effective, and globally competitive.

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