

METHODS OF USING INFORMATION TECHNOLOGY IN THE PROCESS OF TEACHING MATHEMATICS IN HIGHER EDUCATION INSTITUTIONS

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ABSTRACT

This article presents classifications of information technologies used in teaching mathematics in higher educational institutions according to the types of processed information and methods of their application.

Keywords: mathematics, software tool, virtual laboratory, information technologies, tools, computer mathematical systems.

OLIV TA'LIM MUASSASALARIDA MATEMATIKANI O'QITISH JARAYONIDA AXBOROT TEXNOLOGIYALARINI QO'LLASH USULLARI

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ANNOTATSIYA

Ushbu maqolada oliy ta'lim muassasalarida matematikani o'qitishda foydalaniladigan axborot texnologiyalarining ishlov beriladigan axborot turlariga ko'ra tasniflari va ularni qo'llanish usullari keltirilgan.

Kalit so'zlar: matematika, dasturiy vosita, virtual laboratoriya, axborot texnologiyalari, vositalari, kompyuterli matematik tizimlar.

INTRODUCTION

In the conditions of the modernization of education, the higher education system is directed to training a new generation of specialists who are independent, have a creative approach to solving problems, and are proactive. Today's modern specialist trained in higher education institutions should be able to think systematically, make the right decisions in non-standard situations, and be ready to constantly work independently. This, in turn, requires that in the process of training specialists, the main attention should be paid to the development of professional culture, which allows them to quickly adapt to new working conditions, to manage technological changes in professional activity. Naturally, this requires fundamental changes in the organization of the teaching process of subjects that will ensure the quality of teaching. Today, high-quality professional education is a means of social protection and a guarantee of professional stability at various stages of life. One of the important components of the training of competitive specialists in higher education institutions is their mathematical training, and many years of research to find a solution to the problem of improving the quality of mathematical training has not yet yielded sufficiently satisfactory results.

RESEARCH MATERIALS AND METHODOLOGY

Currently, information technologies are widely used in the teaching of all subjects in higher education institutions. However, according to researchers, it is mathematics that can be taught fully and purposefully with the help of information technologies. It is no coincidence that the first means of information were used to solve mathematical problems.

The use of new information technologies in the process of teaching mathematics to future engineers in technical institutions of higher education helps them to effectively ensure the process of continuous learning at the expense of:

- thinking about the visualization created with the help of a computer, that is, the abstraction of the studied educational material;
- availability of specific formulas and strict algorithms for solving mathematical problems;
 - introduction of problem teaching methodology;
 - control of study results and automation of self-control. As a result, each student will have objective information about his/her achievements during the lesson and will monitor the final result of his/her acquired knowledge;
- the possibility of carrying out developmental training;
 - identification of students' creative abilities;
- formation of psychological preparation for self-awareness.

In the process of teaching mathematics in higher educational institutions, it is envisaged to harmonize the interests of the individual and society. Person-oriented education is the basis of this idea, which envisages the formation of mathematical culture in every learner as part of the universally important culture of humanity. Information and communication technologies today are able to solve practical problems of mathematics much more widely than half a century ago. The creation of modern information and communication technologies is directly related to mathematical activity. Interaction of participants in the educational process of organization using the information environment is ensured.

RESEARCH RESULTS

Information and communication technologies individualize the learning process of students as much as possible and provide teachers with the opportunity to manage this process optimally. With the help of information and communication technologies, various images are easily used in the teaching process, which makes it possible to explain complex concepts more clearly, make lessons more interesting, and create an opportunity to organize interactive lessons. Information and communication technologies is a general concept, however, it is used in a real subject, technical and software environment. As a device, information and communication technologies are used by users with different levels of competence, and the types of information used by them in different educational subjects are also of different nature. The information and communication technologies used in the teaching of mathematics in higher education institutions can be described according to the types of information being processed as follows:

- a) Text processing technologies. It helps to carry out the following processes: processing texts, using scanning devices and character recognition systems to automate data entry, entering text into a computer;

b) Graph processing technologies. Allows you to modify and create graphic images using specific software tools.

c) Data processing technologies. Software packages are used for data processing, as a result of which spreadsheets are created, stored, edited, processed and printed. These software tools are also called table processors, and with their help, budget and statistical tasks are solved, databases that are convenient to work with are created.

d) Hypertext technology. It consists in organizing the text on the computer screen in the form of a non-linear hierarchical structure divided into parts. Each section can be linked to others by using keywords, phrases, cross-references or hyperlinks in the text. This allows you to fill in information about the studied object and select a link to the information that interests the student. Such a text has the property of openness and the possibility of introducing new parts connected to existing parts.

e) Multimedia technology. Allows you to work with animated images, video images, text and sound. Media objects include: video clips; media lectures; animated maps and charts; interactive maps and schemes (users can independently control the appearance of sound, text or graphic explanations by pressing buttons). Effective game simulators and multimedia tools are being developed that allow organizing the educational process at a modern level.

j) Hypermedia technology. It combines the following two concepts: multimedia and hypertext. This technology paved the way for the development of hypertext technologies, while hypermedia software allows working with non-linear objects that emit not only text, but also two- and three-dimensional graphics, video and sound.

z) Computer teaching systems. Systems that help to learn new material, control the amount of knowledge, prepare educational material. They are used in the process of modeling the educational process, in choosing a reasonable educational strategy for each student, and provide automated accounting of new information entering the database.

i) Network information technologies. Network information technologies allow to combine the technologies of data collection, transmission, storage and processing on a computer with the help of communication and telecommunication equipment. The local networks that appeared with the beginning of mass use of modern computers increase the efficiency of using computer technologies, the quality of data processing, and serve as the basis for the emergence of new information and communication technologies that raise the management of the production process to a new level.

The combination of local and global networks provides access to the world's resources, the most popular of which is the WWW (World Wide Web). WWW-technology is a certain system of hypermedia documents, distinguished by the attractiveness of its appearance and the possibility of organizing cross-references to each other.

Any document posted on the WWW network can be viewed on any computer connected to the network using a special WWW document viewer (browser). Each user of the network has the ability to travel on the Internet by forwarding quick documents from one computer to another. The spread of communication technologies in computer networks has led to the development of a method of sending and processing information from computer to computer, which provides effective communication between email users. Any information (documents, drawings, graphic images, voice recordings, etc.) can be transmitted by e-mail.

Blogs are a forum in which the right to publish information on the network belongs to one person or a group of people, and blog readers can often comment on the posts posted by the author.

A teleconference is a networking forum that allows you to discuss topics of interest and share news on a particular topic. Teleconferencing allows you to publish messages on the network, which can be read by all interested parties and leave their messages. A network discussion created in this way will have the character of novelty, because all messages will be stored for a limited time. Connecting audio and video equipment (microphone, digital video camera, etc.) to a computer serves to organize computer audio and video conferences.

Wikipedia is a free-to-use, multilingual encyclopedia hosted on the Internet using wiki technology, where users can directly participate in editing articles and adding new material to it.

Chat is a network communication of users in real time. The forum provides communication between participants on a specific topic. For your convenience, the forums will be open and closed.

Information technologies traditionally include hardware and software, while new information technologies are hardware and software tools and devices that provide actions for collecting, storing, processing and transmitting information, modern means and systems of telecommunication information exchange, audio , includes video equipment and others (Table 1).

1-jadval New information technology tools

Name	Information technology tools
Technical tools and systems	<ul style="list-style-type: none"> • computer and computer network; • television and radio; • telephone network; • facsimile communication
Computer network services	<ul style="list-style-type: none"> • Internet network - WWW; • e-mail; • video conferences; • file transfer service (FTR); • Google, Yandex and other search engines; • Internet telephony; • Internet paging
Universal software tools (general purpose software tools)	<ul style="list-style-type: none"> • programs for working with text (word processors, translators, hypertext editors); • programs for working with graphics; • presentation preparation programs; • tables; • database management systems; • expert systems
Software tools for the educational process	<ul style="list-style-type: none"> • general purpose service tools; • software designed to monitor and measure students' knowledge, skills and abilities; • electronic training simulators; • mathematical and simulation modeling software tools; • software of virtual laboratories; • information search systems; • automated training systems; • electronic textbooks; • intelligent educational systems, tools for automating professional activities with certain interactivity (industrial systems or their educational analogues)

DISCUSSION

It allows to determine the types of educational software tools, the methods of their use in teaching mathematics in higher education institutions based on methodical goals and the advantages of their practical application.

1. Electronic encyclopedias, almanacs, multimedia display packages provide the educational process with the necessary educational materials and visual aids. They contain references, a navigation system, videos and various animations and are accompanied by sound. In addition to visually changing the presented object or process, there are also software tools that allow changing their parameters, i.e., have an interactive feature, and they are mainly used for explaining educational materials during lectures, It is used in the interpretation of riffs and the organization of independent work of students.

2. Virtual laboratories. Such software tools can be used to study the properties of geometric objects in detail. They make it possible to create interactive drawings and perform various measurements, to organize students' activities on constructing geometric objects and analyzing their properties, solving problems of proving assertions. It can also be used to construct polygons, their sections, and cylindrical bodies. It is advisable to use animation rollers when drawing drawings in space and editing them. Edit created objects, that is, change the transparency of planes, line thickness, direction, position, object color and size, and can also create three-dimensional and two-dimensional pictures in separate windows . It is possible to depict objects that are not visible in the background of the drawings, that is, it is possible to rotate the drawing around the axis of symmetry and view it from different angles. The use of virtual laboratories in the teaching of mathematics in higher educational institutions helps to study the properties of geometric figures, to formulate theorems and their proofs. Virtual laboratories can be used by students as a tool for solving practical problems, and teachers as a tool for presenting educational tasks. This, in turn, leads to the individualization of mathematics education.

3. The electronic educational-methodological complex implements the application of information and communication technologies in the process of teaching mathematics. A number of modules included in the complex provide clearly structured educational information, including demonstrations, construction of graphic objects, and conducting controls on a specific topic. The results are recorded and can be analyzed by the teacher at any time.

4. Game educational programs are a means of learning educational subjects in a playful way. The purpose of these programs is to identify students' interest in the subject.

5. Software that provides for the availability of information culture at a sufficiently high level for teachers and students. These include: computer mathematical systems (Maple, Maxima, Mathematica, Mathcad, UMS - Mathematics (www.umsolver.com) and others); spreadsheet processors (QuattroPro, MS Excel, etc.); statistical data processing packages (Statistica, StatGraphics, etc.). One of the means of increasing information culture is the use of computer mathematical systems. The use of computer mathematical systems makes it possible to increase the scope of the use of information and communication technologies in the educational process, to expand the methodological possibilities of teaching mathematics, and to solve some problems that arise in traditional teaching. Nevertheless, today computer mathematical systems are widely used in teaching mathematics in higher education institutions. Many

computer math systems use special instructions and options to guide the solution in the desired direction. The user himself determines the direction of the process, as a result, he has the necessary mathematical knowledge and skills to check the reliability of the obtained result.

CONCLUSION

Computerized mathematical systems can be used to perform complex mathematical calculations, create electronic textbooks using hyperlinks, animations and graphics. These computerized mathematical systems can be used to solve various problems in mathematics (performing simple calculations, calculating integrals, optimization problems, etc.), performing statistical calculations, computer modeling, etc.

Despite the fact that there are many information technology tools, the pace of new methodological developments in the field of electronic educational tools is very slow.

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