**Латыпова А.Р., старший преподаватель**

Преимущества использования прикладных программ в преподавании математики

*Ташкентский государственный педагогический университет имени Низами кафедра «Высшая математика», Республика Узбекистан, город Ташкент, almira-latipova@rambler.ru*

**Latipova A. R., Senior Lecturer**

ADVANTAGES OF USING APPLICATIONS IN TEACHING MATH

*Tashkent State Pedagogical University named after Nizami, Department of Higher Mathematics, Republic of Uzbekistan, Tashkent city, almira-latipova@rambler.ru*

Аннотация. Вопрос об использовании информационных технологий в вузовском обучении математике не нов. Однако в последнее время он приобретает новые черты. Интеграция информационных технологий и обучения высшей математике является естественной и востребованной. В статье приводятся преимущества использования математических пакетов прикладных программ, показано как правильно организовать работу с такими программами, с какими программами можно работать при изучении предмет «Высшая математика»

Abstract. The question of the use of information technology in mathematics teaching in higher education is not new. Recently, however, it has acquired new features. The integration of information technology and teaching higher mathematics is natural and in demand. The article describes the advantages of using mathematical packages of applied programs, shows how to properly organize work with such programs, with which programs you can work when studying the subject “Higher Mathematics”

Ключевые слова: математические методы, самостоятельная работа, информационные технологии, использование прикладных программ, математические пакеты

Keywords: mathematical methods, independent work, information technology, the use of applied programs, mathematical packages

Globalization and the complication of economic and social processes require a high level of logical and mathematical culture of society as a whole. The study of mathematics forms such qualities as economy in thinking, order in work, the ability to analyze, plan, calculate.

Mathematical ideas and methods are applied by economists, engineers, biologists, even linguists. The widespread use of computers and telecommunications, the automation of production and management, the high rate of transformations in all spheres of human activity leads to an increase in society's need for mathematical education of specialists, who are required to master the mathematical apparatus that makes it possible to model, analyze and solve professional problems arising in scientific and practical activities; the formation of self-education skills, the upbringing of the need to improve professional and applied skills in the field of mathematics and its applications.

Taking into account the achievements of science and technology, teaching technology is constantly being improved. A necessary condition for improving the activities of a higher educational institution is the use of information technologies in organizing classes, independent work and monitoring students' knowledge, which contributes to an increase in the efficiency of the educational process and the quality of personnel training. The technical equipment of educational institutions is growing, computer technology is improving, therefore the possibilities of using information technologies are increasing. Teaching mathematics in a higher education institution should be based on a methodology that integrates traditional and innovative approaches. The use of information technologies in the process of teaching mathematics will introduce students to innovations in the field of science and technology, and will accelerate the process of integrating young specialists into the educational and pedagogical process.

In the regulatory documents, the expediency of introducing modern information and communication technologies (SICT) into the educational process is quite obvious in order to form and develop a personality. Social demand for the creation and implementation of SICT in the educational process involves the active use of computer technology in education.

Computer technologies undoubtedly fit into the education system and even largely determine its future development. The modern teacher must be proficient in new pedagogical technologies, respond flexibly to their changes and social conditions. Today we need teaching methods that would facilitate and accelerate the transfer of knowledge to students, activate the process of assimilating knowledge, teach them the techniques of independent work with educational material, and increase the productivity of educational work.

The question of the use of information technology in mathematics teaching in higher education is not new. Recently, however, it has acquired new features. It is difficult to imagine a modern student without a computer, laptop, tablet, smartphone. Using information technology, young people get new information, read news, watch movies, listen to music, play games, communicate. In this regard, the methods of teaching at the university often look like an atavism in the "information" life of students. Therefore, the integration of information technology and teaching higher mathematics is natural and in demand.

Another aspect enhances the use of information technology in teaching mathematics to students of non-mathematical specialties of universities. If in their professional activities graduates of such specialties will use mathematical methods, then this use in most cases involves the use of special mathematical software packages. Therefore, a university graduate should have an understanding of computer methods for solving mathematical problems and the ability to independently master new software products for use in professional activities. In this regard, there is a need to apply information technology for these purposes already in the university course of higher mathematics. Moreover, in modern conditions, in our opinion, “the teacher's task is not so much to teach to study the properties of functions, to build their graphs, to find the limit, derivative, integral, etc., as to define the concept of a function, to designate what properties one or another function, to give a definition of the limit, derivative, integral, etc., to teach students to calculate them in the simplest cases, so that students can solve more complex (computational) problems in the software packages Maple, MathCad, MatLab.

There are numerous studies devoted to the teaching of higher mathematics using information technology. The course of higher mathematics for students of non-mathematical specialties is not easy. In addition, there has recently been a significant reduction in hours in higher mathematics for most non-mathematics specialties in universities. In these conditions, it is difficult to sacrifice even a few lessons per semester in order to transfer them from a regular classroom to a computer class. At the same time, the use of information technologies should be, albeit systematic, but auxiliary.

With a properly organized control system, students' independent study and application of mathematical software packages will “work”. This requires:

1. Selection of mathematical packages with a simple and intuitive interface.

2. Reference materials for initial and quick acquaintance with the interface of packages, with working in windows, with presenting data in the form of formulas, with displaying graphs, with basic commands.

3. Examples of the use of basic commands for solving typical problems of the course of higher mathematics.

4. Specially designed individual tasks for the possible use of mathematical packages [2].

Maple, MathCad, MatLab, Wolfram can be equally used by such packages. There is no difference in which package of programs the tasks of students will be completed, but it is necessary to provide them with at least minimal instructions.

A feature of the educational process with the use of applied programs is that the student becomes the center of activity, who, based on his individual abilities and interests, builds the cognition process. The teacher often acts as an assistant, a consultant, encouraging original discoveries, stimulating activity, initiative, and independence. Conducting mathematics classes using information technology is a powerful incentive in learning. Through such classes, students' mental processes are activated: perception, attention, memory, thinking; the excitement of cognitive interest is much more active and faster.

Thus, the use of applied programs in mathematics classes has a number of advantages, as it helps:

1. to rationalize the forms of presenting information: information conveyed to the student in several forms at the same time - through text, images, sound - is perceived much more efficiently. Most people remember 15% of what they hear and 25% of what they see. The simultaneous use of audio and video information increases memorability up to 65%;

2. to increase the degree of visibility: with the help of effects, which are the main part of application programs, you can show what in normal conditions you cannot see or hear;

3. get quick feedback: the interactivity of the application programs drives the sequence of the demonstration; receiving additional information in the form of tips that pop-up at different points on the screen; the ability to conduct a dialogue, placing control questions, etc., which largely simulates the teacher's work and contributes to the development of students' communication skills;

4. to meet the scientific and cultural interests and requests of students;

5. to create an emotional attitude to educational information, since students are attracted by the novelty of conducting such moments in the classroom;

6. to implement the principles of individualization and differentiation of the educational process.

The use of mathematical software packages helps to expand students' knowledge of mathematics and demonstrate to them the possibilities of using specialized packages in the study of mathematics and related disciplines.

A computer practice allows students to better understand their own capabilities in solving certain problems, to clearly see the connection of mathematics with other disciplines and a real connection with professional activity (which is very important for students, especially in the first years), as well as to evaluate the significant advantages of using applied programs in solving mathematical and professional problems.

In the course of completing assignments, students gain experience in research work; planning, forecasting, building analytical models; processing the results of experiments. All this leads to an increase in students' interest in both mathematics and general professional and special disciplines, which ultimately has a positive effect on the formation of the professional competence of a future specialist.

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