

# *Innovation In Teaching Mathematics In Higher Education*

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**Abstract** – The article discusses one of the sides of the process of informatization of education. The method of using information technology in the educational process. Teaching higher mathematics in universities through the creation and use in practice of new forms of pedagogical, software products using new information technologies, a computer textbook, a computerized textbook, as well as the forms of organization and features of educational activities of university students in the presence of computer textbooks (for example, computer textbooks on the course of higher mathematics).

**Keywords** – Higher Mathematics, Applied Problems, Mathematical Competence, Innovative Teaching, Methodology.

Previously, a specialist had to correspond only to the workplace and the possession of narrow information that is necessary in a certain area. And the training of students was reduced to standard knowledge, skills and abilities, then "competence" implies the mastery of knowledge not only of a general kind, but also in a certain wide area, the ability and willingness to successfully implement their skills, while increasing the quality and efficiency of their activities.

In the modern period of development of society, characterized by fundamental changes in the socio-economic, political and other spheres, the goal of higher education is the formation of creatively thinking high-level specialists, which requires the creation of a new model of higher education, the development of creative abilities, cooperation of teachers and students in the educational process.

The need to develop new approaches to teaching is dictated by society's dissatisfaction with its quality. Changes in the living conditions of society inevitably lead to the improvement of educational concepts. The current stage of education development is characterized by qualitative changes in its content, structure, and the introduction of new pedagogical technologies into the educational process. At the same time, an important role in the reform of education is assigned to the developing process of informatization, which makes it possible to widely use information technologies.

The use of new information technologies in teaching mathematics involves providing students with methodological and educational materials of a new type - computer textbooks and computerized textbooks and problem books. In this regard, it is necessary to develop new methodological techniques and update the methodological system of teaching mathematics.

This article discusses the methods of teaching mathematics in terms of using the computer mathematical system Mathematics. This computer system, in addition to the colossal capabilities of numerical, symbolic, graphic calculations and an embedded ultra-high-level programming language, contains all the elements of the shell for creating a computer textbook.

The definition of the topic of the article is due to the following significant contradictions:

- Between the social order of society for highly qualified specialists and the insufficient level of information culture of university graduates;
- Between the traditional methodology and technology of education and modern requirements for the level of knowledge, integrative skills, information culture of specialists (engineers, technologists);
- Between the current availability of computer mathematical systems that have the broadest possibilities for solving mathematically formulated problems, combined with the simplicity and accessibility of the user's work with them, and their low demand for educational purposes;
- Between the need for the development and use of computer textbooks (and other pedagogical software products) in teaching mathematics and their lack of availability;
- Between the need of mathematics teachers for applied knowledge on the use of computers in teaching and the lack of development of the methodological foundations of computerization;
- Between the potential diversity of new forms of student learning and the continuation of their training according to the traditional methodology.

University students need to be taught not only according to the traditional methodology, since a future engineer or economist, in addition to knowledge of specialization subjects, must have an information culture and knowledge in the field of using new information technologies in their future professional activities.

The relevance of the article is confirmed by the following factors:

- Insufficient knowledge of the capabilities of computer mathematical systems available to university students;
- Low efficiency of independent work of students in the traditional form of education and the ability to change this situation by organizing student training using computer textbooks.
- The need to equip university graduates with the skills to apply information technologies in their professional activities and to be modern, highly qualified specialists.

The relevance and lack of development of the above problems determine the choice of the topic of the article: "Methods of teaching mathematics with the use of new information technologies (in a technical university)".

The nature of the scientific and pedagogical problem, the degree of elaboration of its various aspects largely predetermined the goals and objectives of the article.

The purpose of the article is to develop and scientifically substantiate the methods of teaching mathematics in a technical university using new information technologies.

This goal led to the allocation of the following tasks facing the author of the article:

1. Analyze the pedagogical and methodological features of the use of information technologies in the process of teaching mathematics to university students.
2. On the basis of theoretical analysis and empirical experience, develop new forms of educational work of students using a computer system.
3. To develop new forms of presentation of educational material in mathematics through the creation of computer textbooks in several sections of the mathematics course of universities and describe the methodology of their application in the educational process.
4. Develop and describe the technology for creating computer textbooks in mathematics using the computer mathematical system Mathematica.

The methodological basis of the article is:

- Psychological and pedagogical aspects of the philosophical concepts of activity (its general structure, psychological structure, the ratio of collective and individual activity), consciousness, categories of the abstract and the concrete, phenomenon and essence, principles of the empirical and theoretical;

- Modern psychological and pedagogical concepts of educational activities, student-centered learning, technological approach to learning;

- the leading principles of the modern education system, including - humanization, humanization, taking into account the level of development and individual psychological characteristics of the individual.

The scientific novelty of the article is as follows: forms and methods of using new information technologies in teaching mathematics at a university have been developed and theoretically substantiated; the elements of the technology for creating computer simulators as part of a computer textbook in the Mathematics environment have been developed and scientifically substantiated.

The theoretical significance of the article is as follows:

- 1) methods of creating and using pedagogical software products based on the Mathematica system are proposed and substantiated within the framework of an integrated approach to informatization of the process of teaching mathematics in technical universities;

- 2) developed a methodology for the application of new information technologies in teaching mathematics at a university based on the integrated use of the Mathematica computer system in the educational process.

The practical significance is as follows: a methodology for creating and using computer textbooks as multifunctional pedagogical software products based on the Mathematica environment has been developed and introduced into the educational process of the university, which can be applied both in classroom lessons and in organizing students' independent work, as well as in remote learning.

### CONCLUSION.

Currently, there is a steady tendency for mathematics education in universities to lag behind the development of science itself. This happens due to various objective reasons (first of all - the ramification of the "tree" of mathematics). Overcoming this crisis is possible with a change in goals: from the goal of acquiring knowledge, skills and abilities in material form, that is, in the form of the scientific and theoretical content of science, to the goal of developing a student as a person, his abilities, and creative potential. The specified view of the goals also requires an appropriate attitude to the content of training, respectively - to the means of new information technologies.

The goals of developing the personality of a university student, his abilities and creative potential require a different approach to the selection of training content than the existing one. The systems of knowledge, abilities, skills are not enough for the content of teaching mathematics at a university. In this content, along with the assimilation of information, facts, the search itself, the process of forming knowledge, rules, formulas, algorithms, and the like should be present. Computer mathematics systems are ideal for providing conditions for such a search process, as they lead to a dramatic expansion of mathematical practice.

The intensive improvement of computer algebra systems and the emergence of computer mathematical systems entails an expansion of the scope of their application in scientific, engineering research and education. Currently, it is possible to single out the successfully developing (so far, unfortunately, almost exclusively abroad) direction of using the computer mathematical system Mathematica as a means of new information technologies for teaching and as an environment for the creation and use of educational software products.

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