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Основные требования к научным статьям, представляемым в международном научно-методическом журнале «*Педагогическая акмеология*» являются научные труды, рекомендованные для публикации основных научных результатов докторских (PhD), (DSc) диссертаций в соответствии с международными стандартами и «Положением о Высшей аттестационной комиссии» при Кабинете Министров Республики Узбекистан, в частности требования к электронным научно-техническим журналам.

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The main requirements for scientific articles submitted to the international scientific-metodical journal "Pedagogical akmeology" are scientific publications recommended for the publication of the main scientific results of doctoral (PhD), (DSc) dissertations in accordance with international standards and the “Regulation on the Higher Attestation Commission” Under the Cabinet of Ministers of the Republic of Uzbekistan, including from templates in the system of requirements for electronic scientific and technical journals.

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MUNDARIJA

Raupova Mokhinur Haydar kizi,
Teacher of the Department of Algebra and Mathematical Analysis of
Chirchik State Pedagogical University
https://orcid.org/my-orcid?orcid=0000-0001-7401-5123

BENEFITS OF COMPUTERIZED LEARNING SYSTEMS IN MATHEMATICS

Annotation. *The article talks about the high social significance of distance learning in the process of professional training in economic specialties. Effective methods of distance learning for a student and measures for organizing this process, careful and detailed planning of professional training, and a clear setting of learning goals are outlined. The use of educational and information materials, methods, forms and means of teaching, the role of distance learning in mathematics in economic specialties are analyzed. The role of distance education in solving the problem of a qualitative increase in the level of mathematical and general professional training of future economists, in the successful development and functioning of the methodological component of teaching mathematics to students of higher educational institutions is shown.*

Keywords: *computerization, remote education, technique learning, maths, training process, student, efficiency, model learning, university, grade.*

MATEMATIKA FANIDA KOMPYUTERLASHTIRILGAN O‘QUV TIZIMLARINING AFZALLIKLARI

Raupova Mohinur Haydar qizi,
Chirchiq davlat pedagogika universiteti
algebra va matematik analiz kafedrasi o‘qituvchisi
https://orcid.org/my-orcid?orcid=0000-0001-7401-5123

Annotatsiya*. Maqolada iqtisodiy mutaxassisliklar bo‘yicha kasbiy tayyorlash jarayonida masofaviy ta'limning yuqori ijtimoiy ahamiyati haqida so‘z boradi. Talabani masofadan turib samarali o‘qitish usullari va bu jarayonni tashkil etish bilan bog‘liq kasbiy tayyorlashning muvaffaqiyati va sifati o‘rtasidagi bog‘liqlik, talabalar faoliyatini puxta va batafsil rejalashtirish, o‘quv maqsadlarini aniq belgilash chora-tadbirlari bayon etilgan. O‘quv va axborot materiallaridan foydalanish, ta'lim usullari, shakllari va vositalari, iqtisodiy mutaxassisliklar bo‘yicha matematikadan masofaviy ta'limning o‘rni tahlil qilinadi. Bo‘lajak iqtisodchilarning matematik va umumiy kasbiy tayyorgarligi darajasini sifat jihatidan yaxshilash muammosini hal etish, umuman olganda, oliy o‘quv yurtlari talabalariga matematika o‘qitishning metodik komponentining muvaffaqiyatli rivojlanishi va faoliyat ko‘rsatishida masofaviy ta'limning o‘rni ko‘rsatilgan.*

Kalit so‘zlar: *kompyuterlashtirish, masofaviy ta'lim, texnik tayyorgarlik, matematika, o‘quv jarayoni, talaba, samaradorlik, ta'lim modeli, universitet, daraja.*

ПРЕИМУЩЕСТВА КОМПЬЮТЕРИЗИРОВАННЫХ СИСТЕМ В МАТЕМАТИКЕ

Раупова Мохинур Хайдар кизи,
преподаватель кафедры алгебры и математического анализа
Чирчикского государственного педагогического университета
https://orcid.org/my-orcid?orcid=0000-0001-7401-5123

Аннотация. *В статье говорится о высокой социальной значимости дистанционного обучения в процессе профессиональной подготовки по экономическим специальностям. Излагаются эффективные методы дистанционного обучения обучающегося и мероприятия по организации этого процесса, тщательному и детальному планированию профессиональной подготовки, четкой постановке целей*

обучения. Анализируется использование учебно-информационных материалов, методов, форм и средств обучения, роль дистанционного обучения математике по экономическим специальностям. Показана роль дистанционного образования в решении проблемы качественного повышения уровня математической и общепрофессиональной подготовки будущих экономистов, в успешном развитии и функционировании методического компонента обучения математике студентов высших учебных заведений.

Ключевые слова: *компьютеризация, дистанционное обучение, обучение технике, математика, тренировочный процесс, ученик, эффективность, модель обучения, университет, оценка.*

INTRODUCTION

The success and quality of training of a future specialist in the field of economics, studying remotely, depends on an effective teaching methodology and organization of this process: careful and detailed planning of students' activities, a clear setting of learning objectives and goals, the use of educational and information materials, methods, forms and means of distance learning mathematics in relation to economic specialties. Significant learning efficiency is determined by the use of computer mathematical systems, which significantly simplify and automate calculations, thereby opening up great opportunities for direct economic analysis, solving economic problems, contributing to the deepening of professional knowledge and skills of students of economic specialties.

Thus, the solution to the problem of a qualitative increase in the level of mathematical and general professional training of future economists as a whole depends on the successful development and functioning of the methodological component of teaching mathematics to university students.

The use of computer mathematical systems is most optimal in teaching mathematics for students of economic specialties, because:

- firstly, mathematics is one of the fundamental disciplines in universities that train specialists in the field of economics; many economic laws are formulated in the language of mathematics, many mathematical concepts have economic meaning
- secondly, mathematics is most adapted to the use of information and communication technologies in education, since there is special software - computer mathematical systems.

METHODS

The methodological component of teaching mathematics includes computer mathematical systems, which are special integrated software products that have the means to perform various numerical and analytical mathematical calculations, from simple arithmetic calculations to solving systems of partial differential equations, solving optimization problems, testing statistical hypotheses, design tools economic and mathematical models and other necessary tools.

Among the most commonly used computer mathematical systems of a universal type, used not only in engineering, construction and other industries, but also in the field of economics, the following can be distinguished: Mathematica, Maple, MatLab, MathCAD. These computer mathematical systems make it possible to optimize the processes of teaching university students and, as a combination of theoretical, methodological and software and hardware tools, allow mathematical calculations to be performed with a high degree of accuracy and efficiency. One of the most important properties of computer mathematical systems is the possibility of symbolic calculations without programming, based on the use of built-in functions, with visualization of processes and data obtained during processing [1].

Among the computer mathematical systems, two stand out - Mathematica and Maple, which differ from others in the presence of a developed built-in programming language, which greatly increases the possibilities of their application both in scientific research and in education.

We believe that the most optimal choice for teaching mathematics using computer

mathematical systems in higher educational institutions in economic specialties is Mathematica computer mathematical systems:

- firstly, because this product contains all the algorithms studied in the course of higher mathematics, not only in economics, but also in technical specialties in higher educational institutions, and, therefore, the completeness of coverage of didactic units is maximum;
- secondly, and this is important in the light of the integration of teaching and scientific research between countries, in the EU and the USA, computer mathematical systems Mathematica are fully included in the higher education system;
- thirdly, this system has become very widespread today not only in scientific but also in applied research.

The development of a methodological component of teaching mathematics to students of economic specialties using computer mathematical systems for distance learning is necessary and relevant. Thus, the goals of teaching mathematics to students at the university in economic specialties are as follows:

- providing fundamental training for applied activities;
- formation of skills, skills of mathematical modeling and analysis, necessary in the professional activity of an economist.

However, there are certain difficulties in teaching mathematics by distance learning. This is due to the specifics of the content of the theoretical material and the methodology of teaching mathematical disciplines. Theoretical material in mathematical disciplines is replete with formulas and calculations that are difficult for independent study and assimilation even in the presence of a high-quality educational and empirical base in the form of school courses in algebra and geometry.

The practice of teaching mathematics has shown that the identified difficulties in the perception and independent assimilation of theoretical material require the definition of scientifically based methods, forms and means of distance learning. As a result, the development of a methodological component of teaching mathematics to students of economic specialties with the use of computer mathematical systems in distance learning, which ensures high quality of professional training of students, comes to the fore.

As a result of insufficient theoretical development of methodological aspects of teaching mathematics to students of economic specialties using computer mathematical systems in distance learning, the following contradictions have developed:

- between the need for highly qualified specialists in economics, who are able to competently use modern information and communication technologies in their professional activities, and the lack of theoretical and methodological foundations that specify the methods, means and organization of their mathematical training in distance learning;
- between the significant didactic potential of computer mathematical systems and distance technologies, which allow raising mathematical training to a qualitatively new level, and the insufficient development of the methodological component of teaching mathematics using these systems and technologies at the university.

The professional education of a future economist involves a very serious mathematical background. Mathematical methods, basic concepts and elements of analysis are in demand in various economic disciplines, from management to general and particular sections of economic theory. Almost all studied general, social and special economic disciplines are interconnected with one or another key section of mathematics, therefore, high-quality and thorough fundamental training of students of economic specialties of universities is impossible without effective methodological support and the use of modern information and communication technologies. Here, either traditional teacher lectures in the classroom, used as part of part-time education, or multimedia interactive lecture courses that can be broadcast remotely are needed. The latter serve as a means of teaching mathematics in higher educational institutions in economic specialties, including using distance technologies, since modern education is unthinkable without the use of the latest information and communication technologies [3].

The issues of teaching in the system of distance education are devoted to the works of many studies. It can be noted that the considered methodological concepts of teaching

mathematical disciplines using information and communication technologies make it possible to implement any one function of teaching mathematics. But, despite the existence of scientific research in the field of distance learning, the problem of modeling the methodological component of teaching mathematics to university students of economic specialties using computer mathematical systems in distance learning has been little studied.

We have identified specific principles that regulate the functioning of the methodological component of teaching mathematics to students using computer mathematical systems in distance learning. The principle of understanding the need for students to master special integrated software products is necessary for the formation of professional competence, the level of which allows you to successfully solve professional problems in the field of economics. The principle of ensuring the requirements of educational standards and the quality of education guarantees success in the professional activities of university graduates. The principle of individualization of teaching mathematics to students of economic specialties in the system of distance education is considered as continuous interaction and cooperation between the teacher and students, it is aimed at meeting the needs of students in obtaining knowledge both in special disciplines and in general education.

Much attention was paid to identifying the pedagogical conditions for implementing the model of the methodological component of teaching mathematics to students of economic specialties using computer mathematical systems in distance learning. Within the framework of the developed model, teaching mathematics to students of economic specialties should take place under the following conditions: professionalization of knowledge and skills in the field of mathematical and economic disciplines; professional and economic orientation of the content of teaching mathematics (including mathematical analysis and differential equations; economic and mathematical modeling; probability theory and mathematical statistics); mastering a set of methodological techniques for solving problems in the Mathematica environment; inclusion in the educational process of computer mathematical systems and distance technologies that contribute to the formation of professional competencies of future specialists in the field of economics. The use of computer-oriented tasks in the formation of didactic units makes it possible to form new approaches to the organization of the educational process.

The structuring of didactic units and educational tasks, which are computer-oriented in nature, shows that the existing functionality of the computer mathematical system Mathematica meets the requirements of the State Educational Standard to a minimum of the content of the educational program. The functionality of Mathematica computer mathematical systems allows not only to organize the educational activities of students more effectively, but also deepens their mathematical knowledge, and the ability to visualize operations and calculations allows you to perceive educational material at a qualitatively new level [2].

The introduction of economic computer mathematical systems Mathematica into the process of teaching mathematics to students allows students to focus on building and studying mathematical models, analyzing their transformation when conditions change, by reducing the complexity of calculations usually carried out in the traditional way. In addition, the use of computer mathematical systems Mathematica allows you to visualize educational information, which makes it possible to strengthen the assimilation of material in mathematical disciplines.

Professional competencies that a student develops in the process of solving computer-oriented problems using Mathematica computer mathematical systems, information and communication technologies and Internet simulators consist of: 1) educational and cognitive competencies that allow them to master various methods of mathematical analysis, synthesis, logical thinking necessary for a comprehensive assessment of economic phenomena; 2) information competencies that allow you to independently work with general and special information, structuring and analyzing it using the mastered conceptual mathematical apparatus and specialized software; 3) communicative competencies that allow them to master the ways of building effective interactive communications (both synchronously and asynchronously), to expand the skills of intragroup and extragroup interaction.

RESULTS

The methodology for teaching problem solving (“Economic and Mathematical Methods”) in the Mathematica environment is based on the electronic textbook developed by

the author of the study. The methodology for teaching mathematics to students was tested as part of a pedagogical experiment to test the model of the methodological component of teaching mathematics to students of economic specialties using computer mathematical systems in distance learning. Before the start of the experiment, information was structured about the level of mathematical training of students of economic specialties in the conditions of using computer mathematical systems Mathematica. In the course of the pedagogical experiment, such research methods as questioning, interviewing, testing students on Internet simulators were used.

The main organizational forms of distance learning of mathematics for students of economic specialties were lectures, seminars, consultations, workshops, laboratory and independent work. Lectures in distance learning were conducted both on-line and off-line, frontally or individually. Off-line lectures were presented with multimedia materials (graphics, text, sound, video, united by a single information environment), which helped students choose the optimal trajectory for studying the material, a convenient pace of work on the course and a way of studying. On-line lectures were virtual lectures, webinars, teleconferences held in real time through information and communication technologies, telematics.

In the course of the ascertaining experiment, the state of distance learning in mathematics was studied and the objective possibilities of using computer mathematical systems in teaching mathematics to university students of economic specialties were studied.

Verification of the model of the methodological component of teaching mathematics to students of economic specialties using computer mathematical systems in distance learning was carried out in the course of a formative experiment. The results of the forming experiment made it possible to prove the validity of the statement about the high efficiency of the developed model. The experimental technique was carried out on the basis of the use of the author's electronic textbook in the Mathematica environment, as well as through remote technologies (Internet simulators, remote communication environments, etc.).

The effectiveness of the implementation of the model of the methodological component of teaching mathematics to students of economic specialties using computer mathematical systems was evaluated according to the method of S. Kullback by comparing the control data of the ascertaining and the data of the forming experiments. The evaluation was carried out in two directions:

- testing of knowledge, skills and abilities;
- assessment of semester examinations containing mathematical computer-oriented tasks in relation to economic specialties (data of ascertaining and forming stages).

As a result of theoretical and experimental studies, it was proved that the purposeful implementation of the provisions formulated in the hypothesis leads to a significant increase in the effectiveness of teaching mathematics to students of economic specialties using computer mathematical systems in distance learning, allows you to raise mathematical training to a new, higher, quality level.

REFERENCES

1. Abdukadyrov A.A. Theory and practice of intensifying the training of teachers of physical and mathematical disciplines: the aspect of using computer tools in the educational process: Abstract of the thesis. dis. . Dr. ped. Sciences. Tashkent, 1990. -32 p.

2. Baula V.G., Lokshin B.Ya., Rozov N.Kh., Sushko V.G. Control of students' knowledge using a computer // Computer aspects in scientific research and educational process. M.: Publishing House of Moscow State University, 1996. 62-66 pp

3. Ainley, J., & Pratt, D. (1995). Planning for portability: Integrating mathematics and technology in the primary curriculum. In L. Burton & B. Jaworski (Eds.), Technology in mathematics teaching: A bridge between teaching and learning (pp. 435-448). Bromley, UK: Chartwell-Bratt.

4. Kaput, J. (1992). Technology and mathematics education. In D. Grouws (Ed.), Ha'ndbook of research on mathematics teaching and learning (pp. 515-556). Reston, VA: National Council of Teachers of Mathematics.