

DOI [https://doi.org/10.58442/3041-1831-2024-30\(59\)-76-92](https://doi.org/10.58442/3041-1831-2024-30(59)-76-92)
UDC 372.851

Khumar Novruzova,

PhD of Pedagogical Sciences, Associate Professor,
lecturer at Baku Slavic University.
Baku, Azerbaijan.

 <https://orcid.org/0009-0007-1415-8457>
novruzovaxumar@gmail.com

THE POSSIBILITIES OF USING ICT IN HIGHER PEDAGOGICAL EDUCATION

Abstract. Educational reforms implemented in Azerbaijan focus on establishing a new system by introducing changes in all areas. Defining the level of higher education accurately, as the key component of this system, plays a crucial role in determining an individual's position in society. In recent years, the development of ICT in our educational system and its alignment with global development standards have become one of the most significant aspects of the globalization process in Azerbaijan. During this period, thanks to the application of ICT in the education system, various projects were developed to restructure the infrastructure of educational institutions and specific efforts were made to utilize computers in the teaching of mathematics. Article 3 of the legislation of the Republic of Azerbaijan on education identifies efficiency as one of the key principles of state policy in the field of education. This principle involves organizing education and scientific creativity using modern methods that are constantly evolving, beneficial and directed toward achieving final outcomes. Naturally, this principle is both important and significant for higher education institutions. Since these institutions prepare the specialists of the future, structuring the instructional process based on the principle of efficiency is the most essential condition for acquiring knowledge. The Ministry of Science and Education of the Republic of Azerbaijan has identified the implementation of competency-based and student-centered education programs, lifelong learning, alignment of higher education with society and the economy, development of scientific research and innovations, and ensuring international competitiveness as key directions for higher education [8]. Guided by these directions, carrying out reforms in higher education, taking into account global experience, and ensuring an innovative approach to education make changes in the organization and content of education at pedagogical universities inevitable. The primary goal of the "State

Program on Increasing the International Competitiveness of the Higher Education System in the Republic of Azerbaijan for 2019–2023" approved by the Decree of the President of the Republic of Azerbaijan on November 16, 2018, is to utilize innovative teaching technologies and apply international experience in higher education institutions. The program emphasizes that the transnational education model established in countries such as the USA, Germany, Austria, the United Kingdom, France and Japan should also be implemented in the Republic of Azerbaijan. In many countries around the world, such programs have long been known to be used in the process of teaching algebra. However, this issue has not yet been resolved in the pedagogical universities of our republic. Conflicts have emerged between the high requirements set for mathematics teacher training and the traditional teaching of algebra in pedagogical universities. These contradictions are as follows: 1) The rapid increase in demand for ICT as society develops, yet the weak ICT provision in the teaching of algebra at pedagogical universities; 2) The lack of connection and alignment between the school mathematics curriculum and the algebra curriculum at pedagogical universities, along with the predominance of practical activities aligned with curriculum requirements in schools, while such topics are scarce in algebra courses at pedagogical universities; 3) Inconsistencies between modern pedagogical technologies used in the global education system for teaching algebra and the traditional teaching methods employed in the algebra courses at our pedagogical universities; 4) The shortage of lesson hours allocated to the algebra course, along with challenges in mastering the material, despite the inclusion of program content reflecting modern trends in the development of algebra. Resolving these contradictions requires the efficient organization of the algebra teaching process and the creation of a methodological system based on new instructional technologies, which involve the use of ICT capabilities, mathematical packages and computer programs.

Keywords: education system; mathematics course; ICT tools; instructional process; mathematics lessons; algebra course.

INTRODUCTION / ВСТУП

Statement of the problem / Постановка проблеми. Changes in the modern education system impose on students the task of drawing conclusions from practical knowledge obtained by them in the course of their own activities and to organize educational activities through an independent creative approach

to each subject, without relying on the experience of past years. Innovations imply the use of new forms, methods and skills in the field of education and science. The main requirement of the modern era is to organize the learning process in educational institutions using completely new, more dynamic and innovative methods.

Today, the formation of a democratic, civilized society in Azerbaijan is developing at a high level. This development is even more obvious in the field of education. Formation of the young generation, capable of keeping pace with these events and changes, is one of the main tasks facing education today. The basis of the Reform Program successfully implemented in our country is the preparation of creative and capable schoolchildren and students. Educational reform is the most important of economic, political and general reforms. Therefore, in the modern era, teachers must take into account the various and individual characteristics and potential capabilities of students, understand and evaluate the processes, problems and development directions occurring in the information society. The teacher must also build the educational process in such a way that students acquire practical skills and acquire knowledge useful in the conditions of a market economy.

These issues from various aspects were studied in research works on the introduction of ICT in pedagogical universities and improvement of teaching of the course of mathematics. These works consider the use of ICT in teaching mathematical subjects in secondary and higher educational institutions, the use of innovative teaching methods in the classroom, the use of various sections of the course of mathematics in higher education – mathematical analysis, algebra, functional analysis, analytical geometry, and issues related to the methodology of teaching subjects were also considered. However, at present, due to the above factors, there are practically no scientific studies on the use of ICT in teaching algebra.

With the correct application of new pedagogical technologies, they will lead to an increase in the quality of higher education and, at the same time, the formation of intellectual abilities and information culture of students. Since the education systems in different countries of the world are different, the technologies used in higher education institutions are also different. Educational technologies used in universities in our country support the methods of forming students' worldviews. Students of higher education institutions, receiving information from the Internet and electronic resources, direct their activities, and this creates conditions for their independence. As a result of the use of technologies in the educational process, joint assimilation of educational material and cooperation between student and teacher, teacher and student are formed and developed [10].

Each pedagogical technology must be based on a certain scientific-philosophical, psychological, didactic and socio-pedagogical concept. The corresponding pedagogical process must be designed at the scientific-methodical level based on a specific goal. For this, the specific activity of the teacher and the student must be accurately predicted, and the content of the technology and the professional part must be adequate to each other.

ICT is an important tool that can potentially positively influence the development of society. In addition to government agencies, civil society institutions, the economy, business and the social sphere, it also affects science, education, culture and people's daily lives. Many developed and developing countries have made great strides as a result of using ICT, and therefore there is no doubt that the path to the future of world culture lies through the widespread use of ICT in society. For high-quality education in the country for 2007–2013, the "Program of Informatics and Communication Technologies" was developed. When preparing the program, the opinions of pupils, students and parents were studied and what they want was determined. The most important task of this Program is to develop ICT skills among the entire population [9].

Analysis of (major) recent research and publications / Аналіз (основних) останніх досліджень і публікацій. When reviewing scientific and methodological literature on the use of ICT in teaching algebra, it becomes clear that, despite the fact that large-scale research is being conducted in this area worldwide, this topic has been little studied in Azerbaijan in recent years. There are enough research works and methodological resources related to the use of ICT in algebra and its teaching in universities, in the process of teaching mathematics, but to what extent computer technologies should be used in teaching algebra in higher pedagogical education, and which computer programs are more targeted and effective in Azerbaijan have not been sufficiently studied. Among the Azerbaijani scientists who prepared textbooks and methodological materials and conducted scientific research related to the teaching of algebra, we can highlight Sh. Abdullayev [1], R. Aliyev [2], Yu. Bakhshaliyev [3], I. Jabbarov [4], M. Akbarov [5], R. Mamedov [8], N. Neymetov [11], Kh. Orujeva [13], A. Soltanov [15] and others.

Unfortunately, dissertations related to the teaching of algebra in higher pedagogical education in our republic have practically not been written in recent years. We would like to mention two such dissertations written in 1993. The first of them is "Methodology of teaching the section "System of linear equations and inequalities" in the course of algebra and number theory of pedagogical universities" by Aidyn Soltanov, and the second is "Formation of algebraic knowledge of students of the pedagogical institute (polynomial)" by Shamseddin

Abdullaev [1]. From the first mentioned work, it is clear that the program of the subject of algebra and number theory of that time included solving a system of linear inequalities. The current inclusion of this topic in the program is also mentioned in our research work. The innovations in the research consisted in [15]:

- inclusion of combinations, Newton's binomial theorem and Pascal's triangle in the section on set theory and logical elements in the algebra program;
- the topic of substitutions is separated from the theory of determinants and is given after the topic of inikas;
- addition of polynomials to the algebra program after studying complex numbers;
- inclusion of methods for finding the boundaries of real roots of polynomials, the Sturm system, Sturm's theorem, and approximate calculation of roots in the program;
- teaching number theory in the new semester after studying linear algebra and polynomial algebra.

In the second dissertation I am reviewing, the author notes as pedagogical requirements for a system of problems from algebra for practical classes:

- purposefulness of problems;
- increasing the complexity of questions and clearly setting a goal in the process of solving them;
- this is teaching methods for solving problems in practical classes so that they can find their application in non-standard problems, as well as developing the student's thinking.

The requirements established can be considered relevant today, provided that certain additions are made. The study notes that mathematical education cannot find its application if it is separated from the problems arising from the requirements of practice. Therefore, practical issues should be given priority in teaching mathematics. From this point of view, this idea in the article also acts as the main vector in my research. It is clear that both research works were aimed at solving a problem that was relevant for that period and are considered a positive step in teaching algebra.

As for software packages used in mathematics, it is worth mentioning the textbook by I. Gurbanov and A. Gurbanov "Mathematical Software Packages", written in 2005. The resource provides information on working with the programs MathCad 12 Professional, MatLab 7 and Scientific Work Place 5.0. The basic concepts of the programs, working with graphs, symbolic calculations, solving ordinary and special differential equations, programming tools, etc. are addressed in the funds. Also, the preparation of electronic tests is shown in the

program "Scientific Work Place" [7].

The pros and cons of computer technologies, their role in education, their importance, possibilities of use, their influence on the formation of motivation of students and pupils, their influence on the relationship between teacher and pupil are taken into account. The analysis of scientific and methodological literature shows that information technologies used in the learning process can be divided into two groups: 1) electronic textbooks, educational programs, computer models of various processes, presentations, didactic materials; 2) network technologies, audio and video conferences.

AIM AND TASKS / МЕТА ТА ЗАВДАННЯ

The **purpose** of the article is to develop an effective methodological system of student-oriented education by defining scientific and methodological features, possibilities and methods of using ICT tools in the process of teaching algebra in higher pedagogical education.

To achieve the goal, the following **tasks** were set for scientific research:

- analysis of state documents, programs, programs, textbooks and scientific and methodological literature related to the problem;
- study of the experience of higher educational institutions and analysis of the results;
- determination of the possibilities and methods of using ICT tools in the subject of algebra in higher pedagogical education;
- organization of a pedagogical experiment and objective assessment of the results in order to assess the potential that the proposed methodological system brings to the educational process.

THEORETICAL FRAMEWORK / ТЕОРЕТИЧНІ ОСНОВИ

Organizing the educational process in accordance with the requirements of a rapidly changing society, taking into account the interests and trends of the new generation of people is one of the priority tasks of the modern education system. In fact, to select from the abundance of information what is useful and important for learning, as well as to sort the large volume of information that we encounter in the global information environment, is in fact a difficult task. The activities of the teacher and the student should be coordinated in this direction in such a way that he develops such qualities as the ability to make a choice, to distinguish good from bad, to determine what is important not only in his future work.

The main indicator of the modern information society is the abundance of information. This has a direct impact on the educational process, and also leads to the informatization of the educational process. Teachers must collect and analyze the most important and necessary information from the abundance of information and convey it to students. The computer is the most effective means for quickly obtaining the necessary information by students. One of the main tasks facing the modern education system is the use of ICT in education.

Thus, when using a computer in the educational process [12]:

- it becomes easier for the teacher to control the students' work;
- favorable conditions are created for students to carry out independent activities;
- conditions are created to strengthen the motives for learning and the development of thinking;
- it is possible to visualize educational information, etc.

The use of multimedia, the visibility of the process of working with a computer increases the interest in learning and the quality of the lesson among students, makes the teacher's communication with students more personal and creative.

It should also be noted the following advantages of using computer technology in mathematics lessons:

- in the learning process, numbers, text, pictures and other components are generally understood;
- computer training allows the teacher to devote more time to creative activities, show various video files and films on the topic;
- the use of a computer in mathematics creates an interactive learning environment, individualization of training is carried out, allows you to effectively organize the individual work of each student on the computer;
- increases visibility, which is a very important principle in teaching and especially in teaching mathematics;
- increases the cognitive activity of the student, helps to acquire more knowledge and skills in less time, increases the effectiveness of training, increases interest in learning [12].

The infrastructure of educational institutions is changing and updating every day, modern teaching technologies are being used. Classroom boards used several years ago have been replaced by interactive boards. The teacher must know and use electronic boards and the rules for their operation, how to activate electronic boards during the teaching process and what functions they have. Teachers using electronic boards in training must know the rules of

operation and the main features of these boards, as well as use other technical means, such as visual aids [7].

With the correct use of ICT tools, the learning process can be organized dynamically, interestingly and flexibly. First of all, the use of interactive boards provides visualization of the learning process and makes it possible to present information in a more convenient form. The touch surface of the interactive board allows you to perform operations possible on the computer with a light touch of the board's pen. A smart board or smart board allows you to connect other devices to the computer – a scanner, video camera, digital camera, etc. can reflect images by connecting. At the same time, it is possible to work on a dynamic, color, even audio and video screen.

Of course, working on such a screen or board is more effective than working on regular boards and can lead to better results in the learning process and a deeper understanding of the material. Another advantage in this process is that during a lesson with interactive boards, an individual approach to students can be provided, their activity, independence, activity can be increased, and, in a special case, interest in mathematical subjects can be increased.

The teacher can display the necessary video file, picture, presentation slides. In particular, electronic diaries and study journals are used instead of paper diaries. It is assumed that in the near future, with the help of 3D gadgets, students will be able to print 3D models to solve various problems. A school in Minneapolis, USA, is equipped with a Dimension BST printer. With this printer, students can create designer prototypes. Scientists are already starting to develop OLED displays – these are displays that are easy to fold, take up less space and can be stored in a roll. Such displays are practical and environmentally friendly compared to paper. In the USA, Germany and many other countries, student notebooks, exercise books and pens are being replaced by personal electronic learning tools – iPads with pens, and the educational process is being organized in a more modern and effective way [9].

Online education has also become an integral part of the modern education system. The educational process organized using Zoom and MS Teams programs is convenient for students and teachers both in terms of space and existing conditions. The creation of online education in Azerbaijan during the pandemic has proven the effectiveness of these programs. Currently, the Teams program is used for specific purposes in higher education – issuing test assignments and checking results, posting and discussing curricula, independent work of students, etc. is used for its intended purpose. In particular, the system of preparing tests and automatically assessing students by completing them within the specified time frame remains relevant today. Regular application and

use of this system is effective in higher education and teaching algebra.

At present, attention is paid to the application of information and communication technologies in all areas and the ability to use them. The path to obtaining this knowledge begins with secondary school. Building an ICT-based education system, starting from elementary school, teaching children computer skills, and instilling basic knowledge in the field of computer science means preparing talented and educated personnel in the future. In general, one of the most important features of the information society is the creation and improvement of an ICT-based education system.

World experience shows that even a modern ICT-based teaching model places certain challenges and demands on the teaching staff. To overcome them, it is necessary to thoroughly master the curriculum, be able to correctly use new teaching methods and modern teaching technologies. As a result of using ICT in education, talented young people can individualize their creative activities and learning results. Another sign of improving the quality of education is the preparation by the teacher of presentations on issues that are not included in textbooks, capable of attracting the attention of pupils and students, as well as the use of various types of logical games and teaching technologies in teaching. If we see the main goals and objectives of future teachers not only in the transfer of knowledge, but also in the development of students, and therefore in mastering the technologies of developmental learning, let us not forget that the knowledge and skills of these teachers must be formed in the pedagogical universities operating today. Until recently, the terms pedagogical technology and teaching technology were used almost as synonyms. However, in the last decade, in scientific literature, teaching technology has a broader meaning, and pedagogical technology is used as its subspecies. Thus, if pedagogical technology means the educational process, then educational technologies, in addition to educational technology, include forms of organizing the educational process.

Information and communication technologies are a type of educational technology that ensures the informatization of the educational process, the organization and management of education (free use of the Internet, search engines, programs used in education, electronic gadgets, etc.) using the most modern technologies [6].

Today, the use of computer technologies in the educational process is very relevant all over the world, including in our country. In this regard, the information base is constantly replenished every day. The natural need of modern scientific and technological progress has created a serious need and a wide opportunity to use computers in education. On the one hand, this is the need of the new information society, and on the other hand, an important

condition for building education according to the interests and motives of the new generation. Pedagogical technology is a new approach to the learning process, and the learning process based on modern technologies is considered the most controlled process, in contrast to traditional learning. Pedagogical technology is understood as an optimal didactic process developed for computer training according to specified features [9].

J. Mamedov and Yu. Mamedli, speaking about the responsibilities of teachers conducting electronic classes, in their attitude to this issue state that the issue that is often ignored in this process is that the educational and upbringing function of this process is ignored [8].

With the help of computer technologies, it is possible to achieve more effective results and avoid time losses caused by tedious calculations in the process of teaching algebra. In order to organize the teaching of algebra more effectively, it is advisable to choose the following sections of algebra:

- calculate the determinant of the matrix of the n -form (MS Excel, MatLab, Maple, GeoGebra programs);
- construct the inverse matrix of a given matrix (MS Excel, MatLab, Maple, GeoGebra programs);
- transpose a matrix, find its rank, sum, difference, product of numbers and product of matrices (MS Excel, MatLab, Maple, GeoGebra programs);
- check the conformity of the given structures with the properties of a group, ring and square, view their examples on a computer (FGB, GAP, ISETL, Maple programs) and prepare their presentations (MS Power Point);
- find an orthogonal basis of vectors, check for the absence of a linear dependence of vectors when using the Gram-Schmidt method, calculate a scalar product (MatLab, Mathematica, Maple programs);
- solve a system of linear algebraic equations – investigate the solution, effectively perform calculations using computer programs for calculating the minors of the existence of a solution (MatLab program);
- solving the problem of finding the roots of a polynomial: graphically (MatLab, Mathematica, Maple, MS Excel programs), analytically (the roots command in MatLab, Mathematica, Maple programs), etc.

RESEARCH METHODS / МЕТОДИ ДОСЛІДЖЕННЯ

To solve the questions posed in the article, the following research methods were used: observation, comparison, generalization, analysis and synthesis, survey, mathematical statistics and pedagogical experiment.

RESEARCH RESULTS / РЕЗУЛЬТАТИ ДОСЛІДЖЕННЯ

The teaching of algebra in higher pedagogical schools is still based on theoretical material, while the science of algebra, since its inception, has been formed and developed as a science closely connected with life and practice. This leads to an imbalance between the level of development of science and its teaching in higher education. This problem requires a new approach to teaching algebra at the level of higher education, a new methodological approach, changes in educational programs and textbooks.

Effective use of ICT and mathematical packages in teaching algebra in higher pedagogical schools will lead to positive results in teaching the course. Such packages include GeoGebra, Mathcad, MatLab, Mathematica, etc. its use is appropriate. The use of mathematical packages will allow students to master only the necessary algebraic knowledge, and solve the remaining problems using packages. As a result of the study, it became clear that the use of mathematical software packages on a computer will facilitate the work of the teacher and student, will allow for faster and more effective assimilation of software material [8].

The study revealed that students have difficulties understanding the problems of modern algebra, especially with the ability to apply the knowledge they have acquired. It would be good to develop new programs and teaching aids for lectures and exercises in the algebra course, including supplementing them with ICT-based teaching aids – compact discs, electronic learning tools.

An analysis of the existing literature on the subject of algebra in higher pedagogical schools showed that it would be appropriate to add the following subjects to the program of the subject of algebra:

- a) a system of linear inequalities with a variable and their solution,
- b) solving some algebra problems using mathematical packages,
- c) a function of several variables.

It was found effective to use the comparison method to improve understanding of all the issues raised in the article, to introduce concepts using this method, to determine their similarities and differences, and to clarify definitions and axiomatics based on this. In other words, presenting definitions and axiomatics in the order given in textbooks initially makes it difficult for students to understand the subject; it is more appropriate to first create motivation with practical life situations (you can also use ICT), and then explain serious scientific concepts, give definitions and theorems.

Studying the history of the creation and development of algebra shows that this science allows solving problems on a mass scale, developing general methods

for solving problems related to other areas of science. This, in turn, leads to the implementation of these problems through ICT. "New (modern) mathematics" is used in almost all mathematical sciences – mathematical analysis, functional analysis, topology, analytical geometry, differential geometry, etc. areas, but is also used in linguistics, biology, solving economic issues, molecular physics, engineering work and in general in many areas of our life.

In teaching algebra, preference is given to the so-called "abstract algebra" section of modern mathematics. However, an analysis of existing programs and textbooks and a study of historical facts have shown that students are taught these concepts without taking into account the historical direction in teaching algebra, without clarifying why group theory arose and how this theory is related to solving the problem. equations. To instill this in students, it is very important to take into account the importance of abstract algebra, i.e. the nature of elements, the use of algebraic structures as a mathematical model and its application in all areas of our lives. For this purpose, providing information on Galois theory, which gave impetus to the creation of modern algebra, explaining the role and significance of substitutions and symmetry, which are the "key" to this theory, and finally presenting group theory as the most general, fundamental theory, as well as audio and video files for this purpose would be good.

CONCLUSIONS / ВИСНОВКИ

Lectures and seminars on algebra usually include a theoretical part – definitions of concepts, theorems, propositions, etc. are taught, the theoretical part is supported by solutions to practical work. However, students still do not understand how important what they have learned is in their future activities and where it will be applied. The study proposed to apply a new methodology in this area. Thus, having considered practical solutions to problems, specific life situations and intuitively mastered the concepts, students can master the theoretical material independently.

As a result of writing the article, we came to the conclusion that when teaching algebra in higher pedagogical schools, the direction of teaching should be chosen towards depth, not expansion. That is, in order to learn concepts in a deeper content, in detail, to understand them more clearly, it is necessary to create the right motivation and use interactive teaching methods.

Prospects for further research in this direction / Перспективи подальших досліджень у цьому напрямі. Thus, based on all of the above, it follows that algebra should be considered not as a separate section of mathematics, but as an integral, important component of the system of sciences, a single scientific space. From this point of view, the role and place of algebra in

the system of sciences, as well as the topics that should be taught to students and how to take into account in educational programs, should be correctly determined. For students receiving pedagogical education, the most modern, most effective technologies for teaching algebra should be determined in order to improve their professional competencies necessary for their future pedagogical activity.

REFERENCES / СПИСОК ВИКОРИСТАНИХ ДЖЕРЕЛ

- [1] Ş. S. Abdullayev, «Pedaqoji institut tələbələrinin cəbri biliklərinin formalaşdırılması (Çoxhədlilər cəbri üzrə)», elmlər namizədi dis. Bakı, 1993.
- [2] R. B. Aliyev, *Xətti cəbr və riyazi analiz kursu*. Bakı, Azərbaycan : ADPU, 2019.
- [3] Y. R. Baxşəliyev, L. S. Əbdülkərimli, *Cəbr və ədədlər nəzəriyyəsi kursu*. Bakı, Azərbaycan : Nurlan, 2008. [Online]. Available: https://e-library.adpu.edu.az/doc/info?url=https%3A%2F%2Fazpedagogy-my.sharepoint.com%2F%3Ab%3A%2Fg%2Fpersonal%2Fkitabxana_adpu.edu.az%2FES8d6wFZz_xArIN2-Wnb9V0BLwh1MHKZuXBJbctYQFMeXA%3Fe%3D034gtI Application date: October, 05, 2024.
- [4] I. Ş. Cabbarov, M. M. Hümmətov, *Ali cəbr kursu*. Bakı, Azərbaycan : Mütərcim, 2018.
- [5] M. S. Əkbərov, *Ədədlər və fiqurlar aləmində*. Bakı, Azərbaycan : Nurlan, 2011.
- [6] A. A. Kərimova, «Kompüter ibtidai siniflərin riyaziyyat dərslərində şagirdlərin idrak fəallığının yüksəldilməsi vasitəsi kimi», *Müəllim hazırlama siyasəti və problemləri beynəlxalq simpoziumu*. Bakı, 2013, s. 151.
- [7] I. Ə. Qurbanov, A. S. Qurbanov, *Riyazi proqram paketləri*. Bakı, Azərbaycan, 2005.
- [8] C. Məmmədov, Y. Məmmədli, «Elektron dərsləri tədris edən müəllimlərin vəzifələri», *Müəllim hazırlama siyasəti və problemləri V beynəlxalq konfrans*. Bakı : Qafqaz Universiteti, 2015, s. 89–92.
- [9] Ş. A. Musayeva, «Təlimdə kompüterləşmənin inkişafı xüsusiyyətləri», *Pedaqoji Universitet Xəbərləri, Pedaqoji-psixoloji elmlər bölməsi*, № 1, s. 173–176, 2010.
- [10] Q. M. Namazov, *Ali riyaziyyat: 2 cildə*. Bakı, Azərbaycan : Bakı Biznes Universiteti, 2012, c. 2.
- [11] N. Ə. Neymətov, *Xətti cəbr və riyazi analiz*. Gəncə, Azərbaycan : Gəncə Dövlət Universiteti, 2019.
- [12] X. T. Novruzova, «Ali məktəblərdə cəbr elementlərinin öyrədilməsində riyazi paket proqramlarından istifadə metodikası», *Pedaqoji Universitetin Xəbərləri, Riyaziyyat və təbiət elmləri seriyası*, c. 72, № 1, s. 17–25, 2024.

- [Online]. Available: https://adpu.edu.az/images/adpu_files/elm/elmi-jurnallar/01rtes/rtes-1-2024.pdf Application date: October, 05, 2024.
- [13] S. S. Orucova, «Riyaziyyatın informatika ilə əlaqəli tədrisində yeni informasiya texnologiyalarından istifadənin imkan və yolları (III–IV siniflər üzrə)», üzrə fəlsəfə doktoru dis. Gəncə, 2021.
- [14] Ə. Q. Pələngov, «Tədris prosesində informasiya texnologiyalarının istifadəsinin konseptual əsasları və mahiyyəti», *Riyaziyyatın fundamental problemləri və intellektual texnologiyaların təhsildə tətbiqi, II Respublika Elmi konfransı*. Sumqayıt : SDU, 2022, s. 11–12.
- [15] A. H. Soltanov, «Pedaqoji universitetlərin cəbr və ədədlər nəzəriyyəsi kursunda «Xətti tənliklər və bərabərsizliklər sistemi» bölmələrinin tədrisi metodikası», elmlər namizədi dis. Bakı, 1993.
- [16] F. S. Uçak, «Soyut cebir dersi veren öğretim elemanlarının öğretim uygulamaları», yüksek lisans tezi. Konya, 2019.

МОЖЛИВОСТІ ВИКОРИСТАННЯ ІКТ У ВИЩІЙ ПЕДАГОГІЧНІЙ ОСВІТІ

Новрузова Хумар Тофіг гизи,

(PhD), кандидат педагогічних наук, доцент,
викладач Бакинського славістичного університету.
Баку, Азербайджан.

 <https://orcid.org/0009-0007-1415-8457>
novruzovaxumar@gmail.com

Анотація. Освітні реформи, які здійснюються в Азербайджані, зосереджені на створенні нової системи шляхом запровадження змін в усіх сферах освіти. Точне визначення рівня вищої освіти, як ключової складової цієї системи, відіграє вирішальну роль у визначенні позиції особистості в суспільстві. За останні роки розвиток ІКТ у нашій освітній системі та її узгодження зі світовими стандартами розвитку стали одним із найважливіших аспектів процесу глобалізації в Азербайджані. Продовж цього періоду, завдяки застосуванню ІКТ в системі освіти, було розроблено різноманітні проекти щодо реструктуризації інфраструктури закладів освіти та докладено конкретних зусиль щодо використання комп'ютерів під час викладання математики. Стаття 3 Закону Азербайджанської Республіки «Про освіту» визначає ефективність як один із основних принципів державної політики в галузі освіти. Цей принцип передбачає організацію навчання та наукової творчості з використанням сучасних методів, які постійно розвиваються, є

корисними та спрямованими на досягнення кінцевих результатів. Природно, що цей принцип є важливим і значущим для закладів вищої освіти. Оскільки ці заклади готують спеціалістів майбутнього, побудова освітнього процесу за принципом ефективності є найважливішою умовою здобуття знань. Міністерство науки і освіти Азербайджанської Республіки визначило реалізацію освітніх програм, орієнтованих на компетентності та студента, навчання впродовж усього життя, узгодження вищої освіти з суспільством та економікою, розвиток наукових досліджень та інновацій, забезпечення міжнародної конкурентоспроможності як ключових напрямів вищої освіти [8]. Керуючись цими напрямками, проведення реформ вищої освіти з урахуванням світового досвіду, забезпечення інноваційного підходу до навчання роблять невідворотними зміни в організації та змісті навчання у педагогічних університетах. Основною метою «Державної програми підвищення міжнародної конкурентоспроможності системи вищої освіти Азербайджанської Республіки на 2019–2023 роки», затвердженої Указом Президента Азербайджанської Республіки 16 листопада 2018 року, є використання інноваційних технологій навчання та застосування світового досвіду у закладах вищої освіти. У програмі підкреслюється, що модель транснаціональної освіти, створена в таких країнах, як США, Німеччина, Австрія, Велика Британія, Франція та Японія, також має бути реалізована в Азербайджанській Республіці. У багатьох країнах світу давно відомі такі програми, які використовуються у процесі навчання алгебри. Проте у педагогічних вузах нашої республіки це питання ще не вирішено. Виникли суперечності між високими вимогами до підготовки вчителів математики та традиційним викладанням алгебри в педагогічних університетах. Ці протиріччя полягають у наступному: 1) стрімке зростання попиту на ІКТ у міру розвитку суспільства, але слабе забезпечення ІКТ у викладанні алгебри в педагогічних університетах; 2) відсутність зв'язку та узгодженості шкільної програми математики з програмою алгебри педагогічного університету, переважання практичних занять, узгоджених з вимогами навчальної програми в школі, а в курсах алгебри педагогічних вузів таких тем мало; 3) невідповідність сучасних педагогічних технологій, які використовуються в системі глобальної освіти для викладання алгебри, і традиційних методів викладання алгебри в наших педагогічних університетах; 4) дефіцит годин,

відведених на курс алгебри, і труднощі в засвоєнні матеріалу, незважаючи на включення в програму змісту, що відображає сучасні тенденції розвитку алгебри. Вирішення цих протиріч потребує ефективної організації процесу навчання алгебри та створення методичної системи на основі нових технологій навчання, які передбачають використання можливостей ІКТ, математичних пакетів та комп'ютерних програм.

Ключові слова: система освіти; курс математики; засоби ІКТ; освітній процес; уроки математики; курс алгебри.

TRANSLATED AND TRANSLITERATED / ПЕРЕКЛАД, ТРАНСЛІТЕРАЦІЯ

- [1] Sh. S. Abdullaev, "Formation of algebraic knowledge of students of the pedagogical institute (on the algebra of polynomials)", candidate of sciences dis. Baku, 1993 (in Azerbaijani).
- [2] R. B. Aliyev, Course of linear algebra and mathematical analysis. Baku, Azerbaijan : ASPU, 2019. (in Azerbaijani).
- [3] Yu. R. Bakhshaliev, L. S. Abdulkarimli, Course of algebra and number theory. Baku, Azerbaijan : Nurlan, 2008. [Online]. Available: https://e-library.adpu.edu.az/doc/info?url=https%3A%2F%2Fazpedagogy-my.sharepoint.com%2F%3Ab%3A%2Fg%2Fpersonal%2Fkitabxana_adpu.edu.az%2FES8d6wFZz_xArLN2-Wnb9V0BLwh1MHKZuXBJbctYQFMeXA%3Fe%3D034gtI Application date: October, 05, 2024. (in Azerbaijani).
- [4] I. Sh. Jabbarov, M. M. Gummetov, Advanced course of algebra. Baku, Azerbaijan : Mutarjim, 2018. (in Azerbaijani).
- [5] M. S. Akbarov, In the world of numbers and figures. Baku, Azerbaijan : Nurlan, 2011. (in Azerbaijani).
- [6] A. A. Karimova, "Computer as a means of increasing the cognitive activity of students in primary school mathematics lessons", International Symposium on Policy and Problems of Teacher Training. Baku, 2013, p. 151. (in Azerbaijani).
- [7] I. A. Gurbanov, A. S. Gurbanov, Mathematical software packages. Baku, Azerbaijan, 2005. (in Azerbaijani).
- [8] J. Mamedov, Yu. Mamedli, "Responsibilities of teachers leading electronic classes", Policy and Problems of Teacher Training V International Conference. Baku: Caucasus University, 2015, p. 89–92. (in Azerbaijani).
- [9] Sh. A. Musayeva, "Features of the development of computerization in training", Bulletin of the Pedagogical University, Department of

- Pedagogical and Psychological Sciences, No. 1, p.173–176, 2010. (in Azerbaijani).
- [10] G. M. Namazov, Higher Mathematics: in 2 volumes. Baku, Azerbaijan : Baku Business University, 2012, c. 2. (in Azerbaijani).
- [11] N. A. Neymatov, Linear Algebra and Mathematical Analysis. Ganja, Azerbaijan : Ganja State University, 2019. (in Azerbaijani).
- [12] H. T. Novruzova, "Methodology of using a mathematical software package in teaching elements of algebra in universities", News of the Pedagogical University, Mathematics and Natural Science series, vol. 72, No. 1, p. 17–25, 2024. [Online]. Available: https://adpu.edu.az/images/adpu_files/elm/elmi-jurnallar/01rtes/rtes-1-2024.pdf Application date: October, 05, 2024. (in Azerbaijani).
- [13] S. S. Orujeva, «Possibilities and ways of using new information technologies in teaching mathematics related to computer science (for grades III–IV)», doctor of diss. Ganja, 2021. (in Azerbaijani)
- [14] A. K. Palangov, «Conceptual foundations and essence of using information technologies in the educational process», Fundamental problems of mathematics and application of intelligent technologies in education. II Republican scientific conference. Sumgait: SSU, 2022, pp.11–12. (in Azerbaijani).
- [15] A. Kh. Soltanov, «Methods of teaching the section "System of linear equations and inequalities" in the course of algebra and number theory of pedagogical universities», Candidate of Sciences dis. Baki, 1993. (in Azerbaijani).
- [16] F. S. Uchak, «Teaching practices of teachers teaching abstract algebra», master's thesis. Konya, 2019. (in Turkish).

Стаття надійшла до редакції
16 жовтня 2024 року

