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DIRECTING

THE TEACHER'S ACTIVITIES TO ICT TOOLS IN THE TEACHING OF ALGEBRA

ORIENTACIÓN DE LAS ACTIVIDADES DEL DOCENTE A LAS HERRAMIENTAS TIC EN LA ENSEÑANZA DEL ÁLGEBRA

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ABSTRACT

Algebra is one of the cornerstones of mathematics since it encompasses crucial concepts such as complex numbers, polynomials, equations, inequalities, group theory, matrices, and functional relations. Its exceptional importance lies in determining general solutions to problems across various scientific fields. Therefore, the teaching of algebra in higher education, rooted in the concept of generality, demands meticulous attention. However, while the significance of algebra in higher education is well-established, there is a need to explore more effective teaching methods, particularly leveraging modern technologies to enhance student understanding and motivation. Considering this, our objective is to analyze the use of ICT in the teaching of algebra, particularly focusing on how these technologies can enhance the acquisition of knowledge by students. There were identified the components of knowledge, skills, and habits essential for algebra education emphasizing the importance of practical skills in real-life applications. The study also demonstrates that utilizing these ICT tools may enable students to think freely and acquire knowledge through experience and activity rather than memorization. The findings suggest that the integration of ICT in algebra teaching represents a shift towards more interactive educational methodologies, potentially revolutionizing the way algebra is taught and learned in higher education institutions.

Keywords: Information and Communication Technologies, Mathematics teaching, Educational technology, Interactive learning, STEM education.

RESUMEN

El álgebra es una de las piedras angulares de las matemáticas, ya que abarca conceptos cruciales como números complejos, polinomios, ecuaciones, desigualdades, teoría de grupos, matrices y relaciones funcionales. Su importancia excepcional radica en la determinación de soluciones generales a problemas en varios campos científicos. Por lo tanto, la enseñanza del álgebra en la educación superior, arraigada en el concepto de generalidad, exige una atención meticulosa. Sin embargo, si bien la importancia del álgebra en la educación superior está bien establecida, existe la necesidad de explorar métodos de enseñanza más efectivos, en particular aprovechando las tecnologías modernas para mejorar la comprensión y la motivación de los estudiantes. Considerando esto, el objetivo es analizar el uso de las TIC en la enseñanza del álgebra, centrándose particularmente en cómo estas tecnologías pueden mejorar la adquisición de conocimientos por parte de los estudiantes. Se identificaron los componentes de conocimiento, habilidades y hábitos esenciales para la educación del álgebra, enfatizando la importancia de las habilidades prácticas en aplicaciones de la vida real. El estudio también demuestra que el uso de estas herramientas de TIC puede permitir a los estudiantes pensar libremente y adquirir conocimientos a través de la experiencia y la actividad en lugar de la memorización. Los hallazgos sugieren que la integración de las TIC en la enseñanza del álgebra representa un cambio hacia metodologías educativas más interactivas, revolucionando potencialmente la forma en que se enseña y aprende el álgebra en las instituciones de educación superior.

Palabras clave: Tecnologías de la información y la comunicación, Enseñanza de las matemáticas, Tecnología educativa, Aprendizaje interactivo, Educación STEM.

INTRODUCTION

Information and Communication Technologies (ICT) have transformed education by redefining both the teaching-learning process and the contemporary educational environment. This has occur as a consequence of the fact that Communication Technologies (such as radio, television and telephony) combined with Information Technologies (such as the digitalization of content) facilitate a more dynamic, accessible and personalized learning (Kumar & Priyanka, 2024). Among the main advantages of ICT in education we can highlight the immediate and efficient access to a large amount of information by students, which has notable didactic benefits since it allows students to acquire knowledge from different approaches. Furthermore, when used well, technological tools can increase the motivation and attention of students, facilitating the assimilation of concepts and enhancing learning (ALRikabi et al., 2024). The use of ICT has also promoted collaborative learning, allowing the interaction of students and teachers to share experiences in real time, eliminating geographical barriers. This interaction in turn encourages the development of digital and audiovisual skills essential for the professional future of students (Sergeeva et al., 2023).

The flexibility and versatility offered by ICTs allow the implementation of innovative educational strategies such as flipped classrooms or gamification, among many others, which delocalize learning from the traditional physical environment and adapt it to the needs and rhythms of students (Dermentzi, 2024). That way tools such as YouTube are nowadays fundamental since they proivide a platforms for the consumption of educational content, making it more interactive and fun (Gayef & Çaylan, 2021). However, in spite of their numerous advantages, ICTs also present challenges, such as the risk of developing a compulsive relationship with technology, exposure to cybercrime, and/or the reduction of interpersonal interaction that could affect students' assertiveness and social skills. Therefore, it is important that teachers are well trained in the use of these technologies to maximize their benefits and mitigate the associated risks. However, when used well, the correct implementation of ICTs in education can not only enrich the educational experience, but also prepare students for an accelerated, connected and digitalized world, equipping them with the necessary skills to face future challenges (Qazi et al., 2021).

On the other hand, algebra is a foundational branch of mathematics, whic plays a relevant part when it is requiered to solve practical problems and/or to address complex issues across different aspects of science. Group theory, also known as abstract algebra, represents a key area of modern algebra, characterized by its emphasis on generality and abstraction. In this framework, the elements of a set—whether they are numbers, matrices, functions, or even objects as diverse as humans or plants—are not defined by their specific identities. Instead, the focus is on the shared properties and operations that unify these elements within the set (Al Subaiei & Al Nuwairan, 2023). By employing symbolic notation, algebra reveals underlying structures and patterns across seemingly disparate objects, enabling the formulation of universal principles that lead to effective problem-solving techniques. This abstract approach is not limited to theoretical mathematics; but it has profound implications in a wide array of disciplines. For esample, in fields such as medicine, algebraic models it can helped to predict disease spread or to optimize treatment plans. In economics, algebraic methods are used to analyze markets and develop economic theories. Psychology benefits from algebra in modeling cognitive processes and behavior patterns, while finance relies on it for risk assessment and portfolio management. Even in space exploration, algebra is indispensable for trajectory planning and satellite communication. Beyond the sciences, algebra influences creative fields like painting and architecture, where it helps in understanding proportions, symmetry, and design principles. Thus, it is accepted that algebra's power make it an indispensable tool across both scientific and artistic domains (Ario & Zawidzki, 2024).

As stated above and because of the complexity of the subject, improving algebra teaching requires a combination of innovative methods and electronic resources, without discarding effective traditional techniques. The integration of digital tools such as computer algebra software (CAS), interactive platforms and mobile applications can make learning more dynamic, allowing students to visualize abstract concepts and/or receive immediate feedback. This would be astep forward to create a collaborative environment where teachers and students work together, encouraging active participation for the development of critical skills (Osei & Agyei, 2024). To accomplish this goal the teaching process must be well structured, including methodologies such as problem-based learning and flipped classroom, so that students master both theoretical knowledge and practical skills. But despite the recognition of these needs there is still a need to move forward in the integration of Information and Communication Technologies (ICT) in algebra instruction to enhence education, and there is a gap in our understanding about the best ways to utilize these tools. Taking this into account, the objective of this study is to analyze the use of ICT in the teaching of algebra, particularly focusing on how these technologies can support students

in acquiring knowledge through active engagement and practical experience.

In the research work, methods such as comparison, generalization, and the analysis of pedagogical, psychological, and methodological literature were used. These methods were employed to demonstrate strategies for integrating ICT tools into algebra teaching. In particular, the methods of comparative study of teacher activity in algebra instruction using ICT tools are highly relevant to modern pedagogical science. The application of comparison, mathematical-statistical analysis, and generalization methods in the research article underscores the significance of the topic.

DEVELOPMENT

We can group the system of knowledge, skills, and habits that future mathematics teachers should acquire in the teaching of algebra as follows:

Knowledge: Students will learn the main ideas of individual sections of algebra, the essence and meaning of the results obtained in these sections, the technique of judgments and proofs, the systematic structure of algebra at the level of rigor accepted in modern mathematics, the methods of approaching algebraic problems, and the mathematical language corresponding to the current level of algebra. They should know the relations between the separate sections of algebra and the interaction of algebra with other mathematical subjects. It would be appropriate to add the interaction of algebra with other fields of science to this list.

The skills and abilities students need in algebra are:

- To understand the main ideas in the separate sections of the algebra course;
- To use the results in solving practical problems;
- To be able to apply logical judgments and proof methods to solving practical problems;
- To develop an algebraic culture that clearly understands the meaning and essence of separate sections of the mathematics subject taught in high school.
- Future specialist:
- The ability to build and rigorously solve mathematical models of issues encountered while working in scientific or scientific-production enterprises;
- The ability to solve non-standard problems that require a creative approach and intuition based on knowledge;
- The ability to speak in logical and fundamental mathematical language in educational processes.
- It should also be noted that modern algebra is quite abstract. It should be assumed that the future specialist will acquire the habits of abstract thinking.

It is important to use ICT tools to comprehensively master the intended system of knowledge, skills, and habits. In accordance with the requirements of the modern era, the application of NLT (New Learning Technologies) in the most efficient form will lead to more efficient mastering of algebra topics. Starting from the middle of the 20th century, computer mathematics or symbolic mathematics, which arose from the intersection of mathematics and informatics, began to spread rapidly to all areas of our lives. Mathematical packages used in symbolic mathematics not only facilitate the work of users but also require them to have excellent skills and abilities related to the use of computer technology (Goryushkin, 2022). From this point of view, it is important to ensure the effective use of mathematical packages in mastering the algebra course and to consider this issue in educational programs.

In connection with the transfer of the training process to the virtual environment, the concept of electronic education has become particularly important. Due to a number of subjective reasons - for example, the teaching staff of higher schools can teach many students at the same time and work in different places, reducing the financial costs per student, guided by the motto “Education anywhere, anytime”, and using micro-learning methods - interest in this education is increasing. However, the emergence and application of electronic education also creates the need to use electronic classes in higher education institutions. This process uses professional learning management systems (LMS/CMS) such as Blackboard, Moodle, and Desire 2 Learn, as well as social networks and media tools. Mammadov and Y. Mammadli, in their relationship to this issue, state that the aspect often overlooked in this process is the neglect of the training and education function, even when done electronically (Mammadov & Mammadli, 2015).

According to Hilbert the theory of classical sets and the theory of algebraic systems based on this theory can be considered as a construction consisting of (abstract) words that do not exist in reality. The books, which consist of 40 volumes called “Fundamentals of Mathematics”, written at the beginning of the last century, contain information on elements of set theory, algebra, topology, theory of functions with real variables, etc (Guliyev, 2009).

In mathematics, the generalization method and its application have always been in the center of attention. In a broad sense, concepts such as sets, algebraic structures,

and in particular, plane figures, spatial figures, and numerical sets (N, Z, Q, R, C) are learned through this method. Algebraic systems are the area where generalization manifests itself most prominently.

If we have to answer the question ***"What does algebra study?"***, we should take into account that the object of modern mathematics is sets given by actions and relations. A set in which actions and relations are given is called an algebraic system. If only one action or actions are given in the set, this system is called algebra. If relations are also given in the set, this system is called a model. The concept of an algebraic system has a general, even philosophical meaning because every branch of science, including mathematics, studies algebraic systems. The whole material world and man himself are made up of certain elements - cells, atoms, molecules, etc., and these particles have certain relationships among themselves. If we consider elementary particles as elements of a set, and relations as functional relations, we can come to the idea that all sciences study algebraic structures. Russian scientist Goryushkin (2022) writes that there is nothing in the world except algebraic systems. The modern level of development of mathematics and the application of ICT in education show that it will be important to use various mathematical packages in the teaching of algebra topics in secondary schools in the future.

Taking into account the practical direction in teaching algebra in pedagogical universities, the system of problems can be grouped as follows:

- A system of problems solved in the set of complex numbers;
- A system of problems with the application of the concepts of function and perception;
- A system of issues related to teaching the concepts of group, ring, and field;
- A system of problems solved by a system of linear algebraic equations;
- A system of problems related to learning linear spaces;
- A system of problems related to the teaching of matrices and operations on them.

Although the idea of building a modern mathematical theory on the basis of set theory initially caused sharp objections from mathematicians, it can now be considered a success of mathematics. This theory, proposed by Cantor, led to the strong development of mathematics in the 19th century and created opportunities for the creation of many new fields of science. Since ancient times, people have gone through a long historical development by observing the individual characteristics, colors, sizes, and animate and inanimate objects. For ancient people, the concept of set was replaced by concepts such as group, mass, and collection. Starting from a certain historical stage, people began to develop the habit of discerning the individual characteristics of objects, being able to separate them from a set of objects, and also to combine them again in a unified and complete way of thinking according to their characteristics. The development of such a thinking process made it possible to study sets from a mathematical point of view at the beginning of the 19th century. The famous German mathematician Cantor (1845-1918) interpreted the concept of a set as follows: A set is an arbitrary collection of definite and distinct objects that can be thought of as a whole (Aghayev, 1979).

In Cantor's understanding, taking the set as a whole object is of great importance and reflects the power of human thinking, its ability to take and combine various objects into one unity. Thus, the theory of independent sets, which is the basis of mathematics, was born in the 19th century. A number of Cantor's ideas about set theory were not received unambiguously by his contemporaries at that time. But over time, it became clear that Cantor's theory is of great importance for mathematical science. It was accepted and developed by Dedekind, Hilbert, Bernstein, Lebesgue, Klein, Luzin, and other outstanding mathematicians.

From the interpretation of the concept of a set, it is clear that no restrictions are placed on the nature of the objects included in the set. A set can consist of objects of any nature. In everyday life, we often encounter the concept of sets. For example, a set of cars in a parking lot, a set of trees in a garden, a set of birds swimming in a lake, a set of two-digit numbers, etc. In all these examples, the word "set" can be used, i.e., set of cars, set of trees, set of birds, set of letters of the alphabet, set of two-digit numbers, etc. Therefore, a set can be created from objects of an arbitrary nature that can be unified in human thinking due to the properties it carries.Thus, the study of mathematics based on set theory is the result of applying the generalization method.

Guliyev (2009), in his work entitled "Generalization in the teaching of mathematics", deeply examines these issues and concludes that there are not one, but two types of mathematics: that which is understood and that which is formalized. In the school mathematics course, formalized mathematics is used, but mainly the first type of mathematics is preferred: students are given problem and example solutions, assignments related to the facts and events they see in reality, and mathematical models

of processes. However, the second type of mathematics is also important in the mathematical subjects taught in higher education. Thus, the use of formulas in the form of symbolic calculations, which do not express any meaning, and then bringing them to meaningful judgments belongs to a special science, which Hilbert called mathematics. In mathematics, the concept of infinity has a special meaning: it is primarily related to the idea that the real world is infinite. Bourbaki's studies show that mathematics can be viewed as a science of structures and their models: every element in the surrounding world is an element of some set or structure, and the relationships between these elements create various mathematical models. Then, Bourbaki's idea that "Mathematics is unified, one" ensures that all mathematical sciences are brought to a common course through generalization (Guliyev, 2009).

In the book "What is Mathematics" by Akbarov (2003), the great role of generalization in mathematics is mentioned as one of the main aspects that distinguish it from other sciences. When characterizing mathematics as a science, the author mentions its four main features. These features are abstractness, precision, having a wide range of applications, and using symbols. But later, clarifying these ideas, he notes that in fact, other sciences, for example, biology and geography, also have abstraction, precision, application fields, and the use of symbols. So what is mathematics? What is its difference from other fields of science? The point is that very different events and processes can have the same mathematical model. This, in turn, makes it possible for the fields of application of mathematics to be wider than for other sciences and for the process of "mathematicization" to take place in the sciences. For example, three different processes are given by the following equations (Akbarov, 2003):

1. The process of oscillation of a material point near the bottom of a smooth curve;
2. The movement of a moving object whose path is at the tip of a bow.

Use of ICT in modern times and its application to algebra

Today, the use of ICT is an innovative, new direction in the teaching of mathematics courses in higher education, and when applied correctly, it addresses important tasks such as increasing student motivation, preparing them for the information society, and forming information culture in them. Regarding its application to algebra teaching, let's give an example.

Group, ring, field, and algebraic structures are the main topics of the algebra course. For a first-year student, mastering such topics is accompanied by considerable difficulties - as these abstract concepts are not taught in high school. Therefore, it would be appropriate to teach these concepts not only in lecture or oral form but by effectively using illustrative and ICT tools, which help students overcome these difficulties. According to G. K. Selevko, ICT can be used in three ways (Lavrentieva et al., 2019):

- For solving individual topics, sections, or didactic issues;
- As the main pedagogical technology;
- As a monotechnology, i.e., when the implementation, diagnosis, control, and monitoring of teaching as a whole is performed by a computer.

Accoding to Namazov (2012) it would be appropriate to effectively use ICT tools in the following topics of the higher algebra course:

- Training of groups, rings, and fields with ICT tools. Review of different groups, rings, and fields with visualization.
- Solving systems of linear algebraic equations. Solving systems of equations with 2 and 3 variables.
- Calculation of determinants of 2nd and 3rd order. Constructing the inverse of a given matrix.
- Solving systems of linear equations of n^{th} order (n>3) by different methods. Checking the solution. Comparative analysis of solutions.

There are the following types of electronic resources according to their public purpose: scientific, educational, leisure, artistic, scientific and technical information, announcements, advertising and propaganda, e-commerce, production, technological, financial, etc. Experts distinguish online (located in local or global computer networks, including the Internet) and offline (not located in computer networks) types of electronic document-information resources depending on their placement in computer networks (Almaz, 2016). In general they have become a requirement of the modern era to organize the educational process in accordance with modern requirements and innovative methods to inspire young people who receive higher education to pursue future scientific research activities and to strengthen their scientific potential. Therefore, it is necessary for students studying in higher education today to learn in a way that meets the requirements of our time and acquire creative thinking in different directions. Questions such as "Why are we studying this subject, this material?" and "How will we apply what we have learned in our future activities?" must be explained to students.

In the modern teaching process, the importance of motivation in learning is paramount. Setting the right motivation leads to quality teaching. The motivations present in educational activities can be formally divided into two groups: motivation related to learning and social motivation. In each of these groups, two factors exist: internal and external. Both internal and external factors arise and are determined by the individual characteristics of any person. If gaining new knowledge, becoming a highly qualified specialist, wanting to fulfill one's duties and professional obligations, considering oneself to be educated and knowledgeable, etc., are important for a person, these are determined by internal factors. However, if a person always wants to be the first in society, to strengthen their social position by making innovations, to be recognized by the public, etc., these are more often determined by external factors.

In higher education, when students are given assignments, it would be beneficial to offer them a choice between two options of varying degrees of difficulty:

- More difficult, but fewer tasks;
- Simpler and more numerous tasks.

In this case, the student will have the opportunity to choose tasks according to their level of knowledge, and both internal and external motivation will be provided. According to psychologists Yerkes and Dodson's law, the best result can be obtained with moderate motivation. As motivation increases, it may reach a point where the action becomes ineffective. Therefore, the optimal level of motivation should be set correctly. According to this law, on a 10-point scale, 2-3 points for complex problems, about 5 points for medium-level problems, and 7-8 or more points for simple problems should be provided. One can get a better result in solving a complex mathematical problem with less motivation, and in solving a simple problem with high motivation. It can be concluded from this that the teacher should be able to create motivation according to the degree of difficulty of each problem.

Mathematical subjects are taught in many faculties of higher educational institutions. Mathematical analysis, algebra, functional analysis, differential geometry, and other branches of mathematics usually involve long, sometimes tedious calculations. This, on the one hand, reduces the motivation of students, and on the other hand, takes up class time. For this reason, it is necessary to use ICT in the teaching of mathematical subjects. This allows students to deal with solving various problems in class and to determine solution algorithms. Albert Einstein said: "I never try to teach my students anything. I create conditions for them so that they can learn by themselves". These words, which sound very relevant in our modern times, require the creation of an environment and conditions in the teaching of mathematical subjects in which students can think freely and acquire knowledge not by memorization, but by experience and action. This can be achieved with ICT tools. In this case, the main task of the teacher is to guide the students in the right direction and create strong motivation in them.

Some interesting softwares to teach algebra

Effective use of ICT and mathematical packages in the teaching of algebra in higher pedagogical schools will lead to positive results in teaching the course. Such packages include GeoGebra, Mathcad, MATLAB, Mathematica, etc., and their use is appropriate. The application of mathematical packages will allow students to master only the necessary algebraic knowledge, and to solve the rest of the problems with the help of these packages. The use of mathematical software packages on computers will lighten the work of teachers and students, allowing them to master the subject material in a faster and more efficient manner.

The study of the history of the creation and development of algebra shows that this science allows solving problems on a large scale and developing general solution methods for problems related to other fields of science. This, in turn, leads to the realization of those issues through ICT. "New (modern) mathematics" is applied not only in almost all mathematical sciences - mathematical analysis, functional analysis, topology, analytical geometry, differential geometry, etc., but also in linguistics, biology, solving economic problems, molecular physics, engineering, and in many areas of our life.

The MATLAB program is very convenient for performing operations on matrices. This program is most famous with the motto "think with vectors". MATLAB, a programming language close to C, C++, and Java programming languages, is used for the visualization of functions, matrices, differential equations, and 2- and 3-dimensional graphs, along with the integration capabilities of MS Word and MS Excel programs. It was first created as a programming language by Cleve Moler at the University of New Mexico, USA. The program can be downloaded from http://www.mathworks.com.

This software product is considered intermediate among symbolic math packages. MATLAB is considered a time-tested, convenient program for performing operations on matrices and mathematical calculations in general. It is clear from the name of the program that MATrix LABoratory is designed to perform operations in a matrix laboratory.

The programming syntax has been carefully thought out and presented in a user-friendly form. Thanks to the C Math compiler, any procedure developed in MATLAB can be loaded into ready-made applications. In addition to all this, the working speed of the MATLAB program is quite high, which is one of the factors that make the program more convenient. Considering that currently matrices are used not only in algebra but in all fields of science, in solving economic and technical problems, and in building mathematical models of dynamic systems, this makes the program more universal and useful.

Along with the positive aspects of the program, there are also some negative aspects. One of them is the need to work with many windows at the same time in the program. For this reason, sometimes two monitors are used simultaneously while working in the program. Another disadvantage is the presence of a large volume (about 5 thousand pages) of the information system. This makes it difficult to understand the program. Alternative systems close to this program include Octave (www.octave.org), Koctave (https://sourceforge.net/projects/koctave/) and Genius (www.jirka.org/genius.html).

Octave is a mathematical package compatible with MATLAB, mainly for numerical calculations. Although it does not have as many functions as MATLAB, the program is distinguished by its limited system requirements and simplicity. Octave, which is an open-source program, can be used in educational institutions due to its availability. The Koctave program has more features than Octave. Genius is a simple math package, very similar to MATLAB and Maple. This program is also open source. The program has a special language called Gel, instrumentation called Genius Math Tool, and a working system with documents designed for publishing. The graphical interface is very simple and understandable.

Students find it difficult to understand the problems of modern algebra, and especially to apply what they have learned. It would be beneficial to develop new programs and teaching aids for the lectures and exercises of the algebra course, including the addition of ICT-based aids such as CDs. Due to the lack of teaching hours allocated to the subject of algebra, additional counseling hours and different forms of events should be organized for this subject. This will lead to future mathematics teachers acquiring not only mathematical knowledge but also more complete and objective knowledge in other subjects, increasing their professionalism. Also, I consider it necessary to hold joint lectures and seminars on subjects such as “algebra + geometry,” “algebra + physics,” and “algebra + computer technologies,” which are successfully applied in modern educational technologies.

The topic of using ICT in the training process is already frequently discussed in our lives and in the educational process. In recent years, this topic has been investigated in both research works and electronic resources. Even in the 1980s, Mashbits was one of the experts who researched this topic the most. In his book “Problems of school computerization,” he wrote that it is not necessary to consider the computer as a magic wand that solves all the problems in the educational process because many of these problems are social rather than pedagogical. In addition to this, the great role of the computer cannot be underestimated - until now, no teacher has had such a powerful teaching tool as the computer. Indeed, no technical tool used until today has had greater power in the didactic sense than the computer (Mashbits, 1989).

Today the didactic importance of the computer has increased, and it has become the main technology used by teachers in the training process. The changes occurring in the modern education system impose on students the task of drawing conclusions from the practical knowledge they have acquired through their own activity, and establishing educational activities through an independent creative approach to each subject, rather than based on the experience of past years. Innovation involves the use of new forms, methods, and skills in the field of teaching and science. The main requirement of the modern era is to establish the teaching process in schools with completely new, more dynamic, and innovative methods.

As positive factors in the use of new information technologies and technical capabilities of computers in the educational process, access to the largest information resources and two-way feedback can be indicated. With the help of the computer, students can immerse themselves in diverse environments where all the information they need is located. As a result of studying the role of educational computer programs in the educational system, it has been determined that many different situations arise, including dominant (pleasant, clear, interesting, cheerful), neutral (calm, stable, attentive), negative (apathy, passive, bored), and active (emotional stress, tension, irritation, sense of danger) states in a person. According to the results of a pedagogical experiment conducted among students between 18-25 years of age studying at humanities faculties, positive results cannot be obtained if their emotional state is not taken into account during the use of computers in the educational process, and if favorable and comfortable working conditions are not provided.

CONCLUSIONS

The proper application of new pedagogical technologies, especially in the teaching of algebra, promises to

significantly improve the quality of higher education. These tools not only strengthen students' intellectual abilities, but also foster the development of a strong information culture. Although educational systems vary globally, the integration of ICTs in higher education is a universal trend that supports the formation of broad and modern perspectives in students. In our educational context, the implementation of technologies in higher education institutions is aligned with methods that seek to shape students' worldviews. Access to electronic resources and the Internet provides students with greater autonomy in directing their academic activities, thus fostering their independence and self-management capacity. In addition, the application of these technologies in the educational process promotes collaborative learning preparing students for today's challenges.

The effective use of ICTs in the educational process, especially in the teaching of algebra, demands teachers with specific skills. These include a thorough knowledge of the relevant scientific theories and the ability to apply them flexibly in practical situations. It is important to note that, contrary to some opinions, the role of the teacher in the teaching of algebra is not diminished by the introduction of ICTs, but rather evolves. The teacher becomes a facilitator and guide, taking advantage of technological tools to enrich the learning experience. This implies a change in teaching dynamics, where the teacher must be prepared to effectively integrate ICTs into his/her strategies, while maintaining his/her fundamental role in the educational process. Therefore, the orientation of the teacher's activities towards ICT tools in the teaching of algebra represents a paradigm shift in higher education.

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