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# Principles Based On The Teaching Of Mathematics Using Application Programs In Higher Education Institutions

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**Abstract:** Digitization and PPs are effective in the proper organization of students' learning activities in mathematics. Students are given the opportunity to independently solve examples and problems related to the topic and analyze their results. At the same time, it serves to master mathematics and increase interest in science. It also helps to form motivation in relation to the activity.
**Key words:** Practical program (PP), digitalization, educational activities, analytical teaching methods, teaching methods.

# Oliy Ta’lim Muassasalarida Matematikani Amaliy Dasturlar Yordamida O‘Qitishda Tayaniladigan Tamoyillar

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**Annotatsiya:** Talabalarning matematika fanidan o‘quv faoliyatini to‘g‘ri tashkil etishda raqamlashtirish va ADlar samarali hisoblanadi. Bunda talabalar mavzuga oid misol va masalalarni mustaqil yechish, uning natijalarini tahlil qilish imkoniyati yaratiladi. Shu bilan birga, matematika fanini o‘zlashtirishga, fanga nisbatan qiziqishni oshirishga xizmat qiladi. Shuningdek, faoliyatga nisbatan motivatsiyani shakllantirishga yordam beradi.Oliy ta’limda raqamlashtirish metodikasining muhim ahamiyatga ega ekanligi bayon etilgan.
**Kalit so‘zlar:** Amaliy dastur (AD), raqamlashtirish, amaliy dasturlar,o‘qitishning taxliliy usullari, o‘qitish metodikasi.

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**Аннотация:** Цифровизация и ПП эффективны при правильной организации учебной деятельности учащихся по математике. Студентам предоставляется возможность самостоятельно решать примеры и задачи по теме и анализировать их результаты. В то же время оно служит для освоения математики и повышения интереса к науке. Это также помогает сформировать мотивацию по отношению к деятельности.

**Ключевые слова:** Практическая программа (ПП), цифровизация, образовательная деятельность, аналитические методы обучения, методика преподавания.

In order to create ADs intended for teaching mathematics in higher education institutions, and to teach using them, teachers should first of all clarify the general didactic principles that they rely on in the organization and management of classes. Secondly, it is necessary to know how to apply the following teaching tools of the computer to the educational process: organization and management of the educational process; theory of formalization and coding of information; choosing the most important in providing information; transfer of students' educational activities to the management of computer-aided automated systems.

The main ideas of the principles of education depend on the basis of any elementary theory, law, concept of education. A set of principles constitutes a conceptual system with a certain methodological or ideological basis. Different pedagogical systems (technologies) may differ from the system of educational views and principles that apply to practice. Therefore, on the one hand, the principles describe some methodological bases of the theory of education, on the other hand, they perform tasks such as normative requirements for the organization of practical activities.

But depending on the content of the subjects, the psychological characteristics of the students, and the availability of instructional manuals, the content of the principles relied on varies. For example, the principle of demonstrability is useful in the process of teaching mathematics when showing graphs, spheres and geometric shapes, while in language teaching it can be useful to use such things as showing grammar tables, writing on the blackboard, and drawing drawings.

In the development and implementation of ADs related to mathematics, based on the general didactic principles of the theory of education, based on the

existing approaches and requirements, the principles of the development of education with the help of computer teaching tools are relied on:

- control theory (algorithmic action of the student, formalization, transmission, continuous management and control of a number of tasks by the mathematics teacher);
- psychological (in the organization of the teaching process of mathematics, a person-oriented approach taking into account the individual characteristics of the student, the formation of mental activity with the help of the external environment, etc.);
- didactic (main principles of traditional didactics, preparation and presentation of material related to mathematics, general principles of teaching with the help of ADs, management of student activity, preparation and presentation of material, review of modern didactic possibilities of computer technology and using telecommunication tools , changing the teacher function);
- methods (organization of teaching on the basis of collective forms of organization of individual study in mathematics, provision of modification of communication between teacher and student, use of person-oriented approach in education).

The principles used in the teaching of mathematics in higher education institutions with the help of ADs designed for the Internet can be divided into 4 groups: didactic, pedagogical and psychological, technological, organizational-communicative.

1 – group. Didactic principles.

1. Scientific principle. In the development of educational content, modern scientific technologies are adapted to the level of development and world civilization.

The scientific principle requires the introduction of clearly formalized educational materials in science into the content of higher education education (this requirement is taken into account when comparing higher education programs and textbooks, and the teacher chooses materials for each lesson), to prepare students for scientific studies suitable for their age. requires arming with concepts. Programs and literature describe the procedure for mastering such concepts. It is advisable to strictly follow this order and to include in the educational process only the definitions accepted in the sciences.

2. The principle of integrity. The main components of this principle are: use of interactive approaches to learning; creating a comprehensive training system






for organizing training in a computer environment; ensuring mutual unity of educational activities.

3. The principle of hierarchy. The studied materials related to the science of mathematics should be in a hierarchical form. Hierarchical educational information is presented in a visual form and used in mathematics education, students develop the ability to independently solve examples and problems, and their interest in science increases.

4. The principle of demonstrability. This principle creates an opportunity for students to form cognitive thinking and receive visual education by demonstrating objects, processes and events. According to K. D. Ushinsky, visual education increases students' attention and contributes to a deeper study of their knowledge; visualization of training is based on the characteristics of students' thinking; visualization increases students' interest in knowledge and simplifies learning. Skillful use of visual aids ensures that complex theoretical positions are accessible and understandable to students. Visibility includes: real objects and phenomena of natural appearance, machine models, images (pictures, drawings), graphics (diagrams, graphs, tables), various technical means (educational films, computers).

5. The principle of distribution of educational materials. This principle ensures that educational materials are located not on the student's computer, but locally and on the Internet. This allows the user to have the ability to obtain information independently and improves the culture of using network technology. This principle ensures high-quality distribution of educational materials related to mathematics, increases students' interest in science, and allows to enrich the methodological and software of the educational process at a high level.

**Group 2. Pedagogical and psychological principles.**

1. The principle of flexibility. This principle ensures that the materials are theoretically and scientifically uncomplicated. It also controls the provision of information. Failure to follow this principle will result in poor data absorption. The principle of flexibility is that the use of ADs in teaching mathematics should be adapted to the individual capabilities of the learner, that is, to the psychological characteristics of the learning process, and attention should be paid to: the possibility of choosing an individual tempo; diagnostic analysis of the condition; versatility as much as possible for the contingent.






According to their needs, users of ADs created in mathematics in higher educational institutions should be able to create additional illustrative materials and interpret the studied concepts.

2. The principle of interest. Arousing interest in mathematics depends on the internal needs of the student. For this purpose, it is possible to achieve the goal with the help of information space modeling that develops students' interest and motivation.

3. Dynamic principle. The dynamic principle determines the possibility of learning in a comfortable environment, taking into account that students do not attend regular mathematics classes. Information networks, databases, information banks and remote data are created in it. From this information, students will have the opportunity to study anywhere.

4. The principle of individualization of education. ADs of the computer play an important role in the individualization of education. With the help of ADs of the computer, it ensures the organization of management of knowledge activities, taking into account the specific characteristics of conducting classes in mathematics. Implementation of the principle of individualization with the help of ADs makes it possible to use interactive, adaptive, multi-level and multi-level computer training tools.

According to this principle, a student studying on the Internet can use all scientific and methodological materials posted by the teacher on the global network. There is an opportunity to choose one's own individual path in performing tasks given as independent work.

5. The principle of evaluation and impartiality. This principle ensures the objectivity of assessment of mastered knowledge of mathematics. It is implemented through the following criteria: standardization of training and monitoring programs; multilateral control procedures for ensuring individuality and independence in training; learning and control process; reliability of statistical results and availability of control results. These can be effectively organized using ADs.

6. The principle of democratic education. Teaching mathematics with the help of computer technology will fundamentally change the attitude of students to this subject. In this case, the main task should be performed with the help of ADs intended for distance learning.

**3 – group. Technological principles.**






1. The principle of mutual agreement. The principle of a systematic approach. In the teaching of mathematics with the help of ADs, it provides a teaching methodology based on didactic, psychological and sociological, on the one hand, and control theory, computer technology, system engineer, ergonomic and design principles, on the other hand.
2. The principle of interactivity. In a broad sense, interactivity includes the interaction of any users with each other, using available tools and methods. Interactivity reflects the learning process - one of the main features of interaction. It is evaluated as quality and efficiency criteria of communication technologies. Development of new teaching methods based on modern ICT (hypertechnology, multimedia, 3-D system, artificial intelligence, etc.) means implementation of the principle of interactivity. He also takes an active part in the communication of both sides (teacher and student): exchange of questions and answers, management of the interview process, control of the implementation of the decisions made, etc. The interaction of the teacher and the student with each other through ICT is an interactive environment. In the process of distance education, teachers and students communicate with each other, this communication is carried out using various telecommunication tools, e-mail, telegram, teleconferences, real-time conversations, etc.
3. The principle of support. Depending on the nature of the educational materials, the learner should be able to use computer technologies at any time. As a result of its use, it is possible to solve complex examples and problems, analyze their results, and present complex processes.
4. The principle of mediating communication. This principle creates a didactic opportunity for students to expand their knowledge of mathematics, to work online and offline with the help of computer and network technologies to prepare, store, and distribute information.
5. The principle of variability. This principle is related to the preparation, periodic updating and design of educational materials. It allows you to constantly update information on the subject of mathematics, recommendations on the performance of educational tasks, development and use of ADs on the subject in various didactic options.
6. The principle of compatibility of using new information technologies. New information technologies affect all components of the educational system: the composition of goals; methods and pedagogical complex and actual tasks; intellectual, creative and analytical thinking; develops the student's






independent education. These tasks can be performed at a higher level using ADs.

7. The principle of economy. The most important way to ensure the principle of economy is to create an educational environment with the help of the Internet. In this case, the distribution of ADs related to mathematics through the Internet creates an opportunity to provide a comprehensive education to the learner. As a result, the time and cost of going to the place of study of the student is saved.

**4 – group. Principles of organization and communication.**

1. The principle of mass learning. In higher education institutions, students learn subjects according to their individual abilities. The pace of education is determined based on the wishes and personal circumstances of the student. Learning mathematics is free and flexible, and the student should be able to complete the assigned tasks in an order convenient for him. In this case, the student independently determines the duration of the training time.

2. The principle of free access to information and educational materials. Open education should be developed to allow users of mathematics ADs to read, download, copy, distribute and print.

3. The principle of independence in the organization of education. This principle allows to provide the student with enough information for independent education. Also, with the help of computer technologies, the development of student's motivation and the possibility of independent self-assessment is created.

This principle provides for the delivery of the main volume of the studied information related to mathematics on the basis of ADs and the cooperation of teachers and students in the educational process with mutual cloud services, as well as educational materials for students to engage in independently. provides with

4. The principle of social equality. With the help of ADs, uniformity of education is ensured regardless of the student's residence, family situation, health, nationality, social status.

5. The principle of integration. Distribution of information materials related to mathematics, close connection and significant expansion of the field of subjects of the educational process, creating an environment of interaction with teachers and students, as well as teaching, modeling, demonstrating, controlling






Pedagogical software tools allow students to generalize their knowledge, synthesize and master generalized models of problem solving.

6. Principle of quantization. The volume of ADs created for the science of mathematics is small, but the content should be divided into whole modules and be able to be used.

7. The principle of ensuring information security. It is necessary to provide technical methods for safe and reliable storage, transmission, and use of information related to mathematics. Mathematical ADs require security when placed on the Internet (no file modification or falsification).

In order to create ADs in mathematics of higher education institutions and teach using them, first of all, it is necessary to create general didactic principles of organizing and managing classes.

Among the subjects in higher education institutions, mathematics is complex and requires more engagement to learn. Therefore, it is appropriate to use modern teaching tools in teaching this subject. There is an opportunity to learn scientific examples and methods of solving problems with the help of computer technologies. As a result, students' interest in mathematics increases.

It is advisable to use the pedagogical software tools indicated above when creating online educational resources and ADs related to the science of mathematics. These pedagogical software tools are popular, the educational resources created with them work flawlessly on the Internet and are displayed in a convenient way on the computer screen.

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