

THE USE OF MODERN INFORMATION TECHNOLOGIES IN THE EDUCATIONAL PROCESS

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Abstract: Currently, much attention is paid to the use of information technology in the educational process. At the end of the 20th century, humankind entered a stage of development called the post-industrial or information society. The judgment "we live in the age of information and communications" is not entirely true, since information and communications have always been, but the post-industrial society is unique in that it is characterized by the exceptionally rapid development of information and communication technologies. World experience indicates that the solution to educational problems begins with the training of teachers. That is, thorough training in the field of modern information technologies is necessary.

Keywords: information technology, education, educational process, cognitive activity, educational technology.

1 Introduction

Teachers should be able to choose and apply exactly those technologies that fully correspond to the content and goals of studying a particular discipline, contribute to the achievement of the goals of the harmonious development of students, taking into account their individual characteristics. A special role in the process of creating and using information technology belongs to the school's education system. A characteristic feature of the education system is that it acts, on the one hand, as a consumer, user, and on the other, as the creator of information technologies, which, subsequently, are used in various fields. This ensures the practical implementation of the concept of the transition from the informatization of education to the informatization of society. However, we should not exaggerate the capabilities of computers, since the transfer of information is not a transfer of knowledge and culture. Therefore, information technology provides teachers with very effective, but auxiliary tools. First, it is necessary to understand the essence of the concept of "information technology". When speaking about this concept, in some cases, people imply a certain scientific aspect, in others - a specific way of working with information: this is a body of knowledge about ways and means of working with information resources, and a method and means of collecting, processing and transmitting information to obtain new information about the studied object. In a sense, all pedagogical technologies are informational, since the educational process is always accompanied by the exchange of information between the teacher and the trainee. Nevertheless, in the modern sense, educational information technology (EIT) is a pedagogical technology that uses special software and hardware methods (movies, audio, and video tools, computers, telecommunication networks) to work with information. (1) Thus, EIT should be understood as an application of information technology to create new opportunities for transferring knowledge (teacher's activity), perceiving knowledge (student activities), assessing the quality of education and, of course, the comprehensive development of student personality during the educational process. Moreover, the main goal of educational informatization is to train students for full and effective participation in the everyday social and professional fields of life in the information society. (2) Systematic research in the field of information technology in education has been conducted for more than forty years. The education system has always been very open to the implementation of information technologies in the educational process based on software products of the most general purpose. Since the 1960s, in research centers and educational institutions in the USA, Western Europe, Australia, Japan, Russia (formerly the USSR) and a number of other countries, a large number of specialized computer systems have been developed specifically

for the needs of education, focused on supporting different aspects of the educational process.

2 Materials and Methods

The following classification is accepted for EIT in some countries: CAI (Computer-aided Instruction), CAL (Computer-aided Learning), CBL (Computer-based Learning), CBT (Computer-based Training), CAA (Computer-aided Assessment), and CMC (Computer-mediated Communication). (3) This classification is the intersection of individual technologies. Let us consider each of them in more detail. Computer-aided Instruction is a technology that provides the implementation of the mechanism of programmed training using appropriate computer programs. Computer-aided Learning involves the independent work of a student in studying new material with the use of various means including a computer. Computer-based Learning differs from the previous technology in that it is supposed to use mainly software tools that provide effective independent work of students. Computer-based Training involves all kinds of forms of transferring knowledge to the learner and, in essence, intersects with the above. Computer-aided Assessment can be an independent learning technology, but in practice, it is an integral part of others since the knowledge transfer technology also requires that they have a special system for assessing the quality of knowledge acquisition. Computer communications, providing both the process of knowledge transfer and feedback, are an integral part of all of the above technologies. Computer-mediated Communication determines the capabilities of the information educational environment of a particular educational institution, city, region, or country. The implementation of any EIT takes place within the framework of the educational information environment. Therefore, the tools providing hardware and software support for educational technology should not be limited to just a separate computer with a program installed on it. On the contrary, EIT software and educational technologies themselves are embedded as a subsystem in the educational information environment - a distributed educational information system. (3) To implement the pedagogical process, it is necessary to use the means of information technology aimed at creating forms and methods of training and education that ensure the effective disclosure of learner individuality, cognitive processes, personal qualities, and the development of intelligence. (1) It is necessary to consider the creation of the conditions under which students would want to study and would be personally interested in perceiving educational influences with the use of a computer rather than repelling them.

3 Results and Discussion

Information technologies in the educational process are usually considered in three aspects: as a subject of study, as a means of learning, and as a tool for automating learning activities. The emergence and widespread adoption of multimedia and Internet technologies make it possible to use information technologies as a means of communication, education, and integration into the global community. The combination of these traditional and innovative orientations of the implementation of information technology in the educational process creates the prerequisites for the implementation of a new integrated concept for the application of information technology in education. Its essence is to realize the potential of information technology for a personality-oriented development of students and teachers. The practical implementation of new technologies is possible due to the development and implementation of educational information environments in the educational process. Such environments are the most effective form of all previously known educational software. It is advisable to use them in educational and especially in independent information retrieval activities.

Educational information environments allow implementing most of the modern technology opportunities in the educational process, and thus contribute to the following:

- Better assimilation of program material because the submitted material becomes more exciting, visual, its informatization capacity is enhanced. The possibility of a comprehensive examination of the phenomenon under study appears. The arsenal of methods for supplying educational material is expanded. The time necessary for its presentation is saved;
- The realization of the possibilities of intellectual control over the educational process. It will create the conditions for individual and differentiated learning, the choice of the pace to study material, the separation of tasks by difficulty levels;
- Automated evaluation of knowledge, abilities, and skills, which helps to increase the objectivity of such an evaluation and enhances learning motivation;
- Organization of independent study of educational material to allow increasing student intellectual level.

A specially organized information environment built primarily as a diverse school environment provides each child with the opportunity to express themselves, to determine themselves and to realize themselves as individuals. The more diverse the educational environment, the easier it is to reveal the individuality of each student. (1, 4) It is necessary to rely on this individuality when taking into account the identified interests, inclinations, and the richness of personal experience, to direct and correct personal development, its natural and subjective activity. It is necessary to achieve in practice the transformation of students into a true actor in the pedagogical process. Modern society is characterized by the constant development of information technology means. The objectively ongoing process of informatization of a society significantly affects the goals and content of education and makes new demands on the professional training of specialists in the use of IT tools. (5, 6) The main modern requirements for the teacher of any discipline are a high level of computer literacy, information culture, the ability to use various software products to achieve the goal, and knowledge of the functional and didactic capabilities of IT tools. The main task of the teacher acting in the modern educational process is student development and students' personal formation. The informatization of the education sector helps to find ways to use the potential of IT tools in order to increase the effectiveness of the educational process, to develop students' skills in using IT tools in future professional activities. (7) The increasing importance of using modern information technologies in the learning process is currently caused by many factors including

- The complexity of the pedagogical process in an educational institution in the context of the integration of special disciplines, as well as the integration of an educational institution with advanced companies and research organizations;
- The expansion of students' disciplinary knowledge to increase the volume of educational material and the need for its generalization;
- Expanding areas of activity leading to the need to solve a variety of professional tasks (design, research, technological ones, etc.);
- The inclusion of advanced technologies in the learning process, including the base of modern telecommunication and computing facilities. Therefore, information technology in training is a kind of response to changes in the system of higher education related to the management optimization of student cognitive activity. (8, 9) One of the modern approaches to the organization of the educational process in the school is the creation of a special educational environment, i.e. the creation of conditions that would contribute to the development of an active independent creative personality able to freely navigate in the surrounding information space. (10, 11) Modern information technologies provide many opportunities for organizing such an educational environment.

The content of teacher education enriched by the use of information technology associated with obtaining key competencies (social, communicative, informational, cognitive

and special ones) will become much deeper and more meaningful under the following conditions:

- Creation of real conditions for the training of pedagogical personnel capable of taking part in the implementation of educational informatization programs;
- A significant increase in the level of professional interaction between teachers and students due to the possibility of joint projects including telecommunication;
- the emergence of qualitatively new conditions for the realization of the students' creative potential;
- Performance enhancement of students' independent work with traditional and electronic resources;
- Implementing continuous open education, when students will be able to actively participate in the organization of the learning process and to choose courses available at any time thanks to telecommunications.

The fulfillment of these conditions contributes to the achievement of the main goal of modernization of education - improving the quality of education, increasing access to education, ensuring the needs for the harmonious development of individuals and the information society as a whole. (8) It is necessary to understand and evaluate the capabilities of information technologies for more complete development of students' personalities, to see how it is possible to integrate the educational information technologies in the educational process in the most organic way. The question of the role of modern information technologies in improving and modernizing the existing educational system has remained relevant for several decades. Successful implementation of the educational modernization program will require not only modern technical equipment for schools but also an appropriate training of teachers and organizers of the education system. Therefore, for each teacher, the main goal is to ensure the quality of education, which can be facilitated by the use of information technology. IT in school society can be considered as a means of teachers' self-realization and self-affirmation. (12) It contributes to the development of fruitful cooperation with students and to the growth of pedagogical authority. It shapes the skills of functional literacy of a teacher and significantly increases the level of teacher professional culture. It expands the possibilities of disseminating accumulated experience, own views on the content and methodology helping to move from the role of a teacher-translator of knowledge in the lesson to the position of a teacher-tutor organizing and directing the process of independent student cognitive activity. Information technology plays an important role in the development of teaching methods since the work of each teacher is of importance for methodological and pedagogical science development as a whole.

The goal of informatization is the global intensification of intellectual activity through the use of new information technologies such as computer and telecommunication. Information technology provides the following opportunities:

- Rational organization of student cognitive activities during the educational process;
- Enhancing learning performance by involving all kinds of student sensory perception in a multimedia context and by equipping the intellect with new conceptual tools;
- Building an open education system that provides each individual with his or her own learning path;
- Involving categories of children with different abilities and learning styles in the process of active learning;
- Using the specific computer properties individualizing the educational process and turning to a fundamentally new cognitive means;
- Intensification of all levels of the educational process.

The current stage of development of education is characterized by a number of distinctive features associated with scientific and technological progress, the rapid growth of educational information. It is necessary to use the curiosity and high cognitive activity of students for the purposeful development of their personality. The formation of the cognitive interest of

students is of fundamental importance for the conscious assimilation of the material.

The use of project activities, student-centered learning, information and communication technologies (ICT), multilevel and problem-based learning help to arouse students' interest in a given discipline, and to intensify their educational and cognitive activities.

The use of new information and communication technologies in the educational process will help to direct the intellectual potential of students to positive development. It is in the lessons under the guidance of a teacher that schoolchildren can learn to use computer technology for the comprehensive development of their intellect, to master the methods of obtaining information for solving educational, and subsequently practical tasks, to acquire skills that will help to continue education throughout life.

By conducting research in this direction, we propose to intensify the cognitive activity of students through the use of computer technology and thereby integrate information knowledge with the course of high school subjects. Such integration allows developing new approaches to learning and making discipline learning more mobile and adapted to the requirements of modern society. The use of computers in the educational process contributes to the improvement of teaching methods to a greater extent than any other technical means available to teachers. The implementation of information technology in the educational process significantly changes and ultimately increases the effectiveness of teaching. First, the computer significantly expands access to sources of information that teachers use when preparing for classes.

One of the most important methodological principles allowing the effective use of information and communication technologies (ICT) is the combination of computer technology with the traditional one. The use of ICT in the lesson should be appropriate and methodologically justified. Information technologies should be accessed only if they provide a higher level of the educational process compared to other teaching methods. A computer is able to replace the bulk of visual aids and models (and sometimes they are too voluminous and cumbersome. Moreover, the number of manuals is not always enough to provide the entire class). When organizing practical work, the computer becomes an effective assistant. Electronic textbooks equipped with three-dimensional illustrations contribute to the development of spatial thinking. The use of computer models promotes imaginative thinking and better assimilation of the material. In the lessons, computer technologies can be used in the study of new material, during the initial consolidation of knowledge and skills acquired in the lesson, during the development of skills and abilities (training testing), during the workshop, as well as when evaluating and correcting knowledge.

The use of slides during the lessons provides dynamism, visibility, a higher level and volume of information compared to traditional methods. When preparing the slides for the lesson, electronic textbooks and Internet information can be used along with their own presentations.

If there is a need to discuss new material with students at the lesson, then a teacher can conduct a combined lesson in the form of a conversation using a computer presentation. The presentation allows for making this process more visual and vivid. It contributes to the systematization of knowledge and more successful assimilation of it. When presenting slides a teacher can place the necessary formulas and schemes in accordance with the sequence of studying the material in the lesson. In order to timely eliminate gaps in knowledge and consolidate the most important issues of the topic, control questions or tasks should be placed on the last slide of the presentation. If students cannot answer a question, then a teacher can return the slide where there is information for the correct answer by using a special control button with a hyperlink. Therefore, it is necessary to carry out a revision of material that was difficult for students. Multimedia technologies allow not

only building the material in the form of a sequential presentation, but also creating the possibility of nonlinear movement between individual parts of the subject. Students get the opportunity to work at a pace convenient to them and pay special attention to those issues that cause difficulties for them. At this time, a teacher can conduct individual work with those students who need help. Thanks to this, students study the material in the sequence necessary for them. When working with a training program that helps to eliminate knowledge gaps and does not punish for an incorrect answer by lowering grades, students will experience positive emotions that are very important for successful learning.

The use of computers in the lessons facilitates the assimilation of educational material, contributes to an increase in cognitive interest in a given discipline, the development of the desire and ability to learn makes it possible to carry out an individual approach to learning and allows to objectively evaluate students' knowledge. The observations of the learning process show that even "weak" students work more actively in lessons using ICTs.

The use of computer technology enhances perception, facilitates the assimilation and memorization of material, and affects several student information channels at once. At the same time, students become more interested in lessons.

The main educational value of information technologies is that they allow creating an immeasurably brighter multi-sensory interactive learning environment with almost unlimited potential opportunities available to both teachers and students. (13-15) Unlike conventional technical teaching aids, information technologies allow not only saturating a student with a large amount of knowledge, but also developing students' intellectual, creative abilities, their ability to independently acquire new knowledge, and work with various sources of information.

Eight types of computer tools used in training are distinguished in accordance with their functional purpose: (16)

1. Presentations, i.e. electronic filmstrips, which can include animation, audio, video, and interactivity elements. The use of presentations expands the range of conditions for the creative activities of students and the psychological growth of personality, develops independence and increases self-esteem. (17, 18) Presentations are also actively used to present student projects.
2. Electronic encyclopedias. Hypertext systems and hypertext markup languages such as HTML are used to create such encyclopedias. Unlike their paper counterparts, they have additional properties and capabilities:
 - They usually support a convenient search system for keywords and concepts;
 - Convenient navigation system based on hyperlinks;
 - The ability to include audio and video elements.
3. Didactic materials - collections of tasks, dictations, exercises, as well as examples of essays presented in electronic form.
4. Training programs, which perform the functions of didactic materials and can track the progress of the solution and report errors.
5. Virtual experiment systems, i.e. software packages that allow a student to conduct experiments in a "virtual laboratory". Their main advantage is that they allow the student to conduct experiments that would be impossible in reality for security reasons, time characteristics, etc. The main drawback of such programs is the natural limitation of the model embedded in them, beyond which a trainee cannot go.
6. Knowledge Testing Software, which includes questionnaires and tests. Their main advantage is the quick, convenient, impartial and automated processing of the results. The main drawback is the inflexible response system that does not allow a student under test to show his or her creative abilities.

7. Electronic textbooks and training courses, which combine all or several of the above types into a single complex. For example, a trainee is first invited to view a training course (presentation), then put down a virtual experiment based on the knowledge gained when viewing the training course (virtual experiment system). Often, at this stage, a relevant electronic reference book or an encyclopedia is also available for the student, and in the end, he/she must answer a set of questions and/or solve several problems (Knowledge Testing Software).

8. Educational games and educational programs are interactive programs with a game scenario. When performing various tasks during the game, children develop fine motor skills, spatial imagination, memory, and, possibly, gain additional skills, for example, learn to work on the keyboard. (19, 20)

4 Conclusion

In the educational process, a computer can be both an object of study, and a means of training, education, development, and diagnosis of learning content. There are two possible uses of computer technology in the learning process. However, today, at least two more functions have been determined: a computer as a means of communication, a computer as a tool in management, and a computer as a developing environment. In the educational process, the simultaneous use of all these areas is important. The existence and interaction of all of them at the same time, not only in the educational but also in the formative process, leads to the desired result that society sets before schools. As a result of the use of information technology, there are dynamics in the quality of students' knowledge and increased motivation for learning activities.

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