Information technologies in the educational process of ecology and environmental sciences

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Abstract. The article deals with the advantages of using information technology in the process of education for ecology and environmental science. Information technologies significantly expand the possibilities of presenting educational information. The use of color, graphics, sound, and all modern video equipment allows you to recreate the real environment of the activity. The use of ICT in the educational process increases the possibilities of setting educational tasks and managing the process of their solution. Computers allow you to build and analyze models of various objects, situations, phenomena. The use of information technology makes the learning process interesting, productive, carries out a differentiated approach to learning, makes it possible to objectively and timely monitor and summarize. Also, modern information technologies allow teachers to qualitatively change the content, methods and organizational forms of training.

1 Introduction

The development of the information society is inextricably linked with the increasing need of each person for continuous professional development, updating knowledge, mastering new types of activities. This trend has led to the question of changing the paradigm and model of education itself. There was a need to ensure the adequacy of education to the dynamic changes taking place in nature and society, the entire human environment, the increased volume of information, the rapid development of information technologies. The entry of humanity into the era of the information society has caused the change of the established motto "education for life" with a new motto — "education for life". Qualitatively new features characterizing the innovative paradigm of education are orientation to a developing personality, transition from a reproductive model of education to a productive, humanistic, culturally oriented one; diversity and variability, the activity nature of education. The most important component of the new paradigm of education has become the idea of continuing education, covering all forms, types and all levels of education.

The implementation of the idea of continuing education is aimed at overcoming the main contradiction of the modern education system — the contradiction between the rapid rate of growth of knowledge in the modern world and the limited possibilities of their assimilation.

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by a person during training. This contradiction forces educational institutions, first of all, to
form the ability to learn, to extract information, to extract the necessary knowledge from it.
However, for this, the teacher must not only own the basics of information knowledge and
skills, but also be professionally ready to broadcast them. [1]

The modern stage of society's development poses a number of fundamentally new
problems to the education system caused by political, socio-economic, ideological and other
factors, among which it is necessary to highlight the need to improve the quality and
accessibility of education. Increasing academic mobility, integration into the global scientific
and educational space, creating economically optimal educational systems, increasing the
level of university corporatism and strengthening ties between different levels of education.

One of the effective ways to solve these problems is the development of modern
educational technologies. A huge number of pedagogical technologies have been developed:
technology of problem-based learning (V.F. Shatalov), integral technology (V.V. Guzeev),
humane and personal technology (Sh.A. Amonashvili), technology of personality-oriented
education (E.V. Bondarevskaia), etc. New educational technologies are emerging not as a
tribute to fashion, but as a result of scientific research due to scientific discoveries.

2 Main part

Currently, the concept of pedagogical technology has firmly entered the pedagogical lexicon.
But there are great discrepancies in its understanding and use. Pedagogical technology is
often defined as an ordered set of actions, operations, procedures that instrumentally provide
a predictable and diagnosable result in changing conditions of the educational process (state
standard of higher professional education). In UNESCO documents, learning technology is
considered as a systematic method of creating, applying and defining the entire educational
process of teaching and learning knowledge, taking into account technical, human resources
and their interaction. The technological nature of the educational process is to make the
educational process fully manageable.

The formation of new technologies should be carried out in the following sequence:
identification of opportunities with the help of fundamental research; determination of
effectiveness with the help of applied research; analysis of needs and demand among teachers
and students; development of documentation, software and methodological tools; teacher
training; replication and distribution of software tools.

The emergence of new information technologies associated with the development of
computer tools and telecommunications networks has made it possible to create a
qualitatively new information and educational environment as a basis for the development
and improvement of the education system. The task of technology as a science is to identify
a set of patterns in order to determine and use in practice the most effective, consistent
educational actions that require less time, material and intellectual resources to achieve any
result.

Taking into account the transition to a global informative society and the formation of
knowledge, the adequacy of education to the socio-economic needs of the present and the
future can be said only if its modernization is based not only and not so much on
organizational innovations, but on changes in essence - in the content and technologies of
personnel training and the preparation of scientific research. As a social institution that
reproduces the intellectual potential of the country, education should have the ability to
advance development, meet the interests of society, a specific individual and a potential
employer.

Information technologies in a broad sense should be understood as a set of means and
methods of collecting, processing and transmitting data (primary information) to obtain
information of a new quality about the state of an object, process or phenomenon
A retrospective analysis of the process of introduction and use of computer equipment and computer technologies in the educational process allowed us to identify three stages of informatization of education (electronics, computerization, informatization of the educational process) [3].

The first stage of informatization of education (electronics) was characterized by the widespread introduction of electronic tools and computer technology into the process of training students first in technical specialties (late 50s - early 60s), and then in humanities (late 60s - early 70s) and involved teaching the basics of algorithmization and programming, elements algebra of logic, mathematical modeling on a computer.

Such an approach provided for the formation of an algorithmic style of thinking among students, mastering some programming languages, mastering computer skills using computational and logical algorithms. The relatively low performance of computers of that time, the lack of user-friendly, intuitive for the average user (not a programmer) and having a friendly interface of software tools did not contribute to the widespread use of computer technology in the field of humanities education.

The second stage of informatization of education (computerization) (from the mid-70s to the 90s) is associated with the emergence of more powerful computers, software with a friendly interface, and is characterized primarily by the use of human-computer dialog interaction. Students, as subjects of the educational process, for the first time had the opportunity, working on a computer, to interact with models - "substitutes" of real objects and, most importantly, to manage the objects of study. Computer educational technologies made it possible to study various (chemical, physical, social, pedagogical, etc.) processes and phenomena on the basis of modeling. Computer technology began to act as a powerful learning tool as part of automated systems of varying degrees of intelligence. In the field of education, automated learning systems, knowledge control and educational process management have become increasingly used.

The third, modern, stage of informatization of education is characterized by the use of powerful personal computers, high-speed high-capacity storage devices, new information and telecommunication technologies, multimedia technologies and virtual reality, as well as philosophical understanding of the ongoing process of informatization and its social consequences [4].

Information technologies, unlike other technologies, are constantly undergoing changes caused by the rapid development of computer technology and modern communications. Therefore, today we should talk not just about information technologies, but about modern information technologies. They are based on such scientific achievements as: the emergence of a new environment for the accumulation of information on machine-readable media; the development of communication means that ensure the delivery of information to almost anywhere in the world without significant restrictions in time and distance, wide coverage of the population by means of communication; the dynamic development of microprocessor technology that provides the possibility of digital information processing; the possibility of automated information processing using a computer according to specified algorithms; the emergence and rapid development of the Internet [5].

The use of information technologies makes it possible to significantly speed up the process of searching and transmitting information, transform the nature of mental activity, automate human labor. It is proved that the level of development and implementation of information technologies in education determines its success. The basis of information technologies are information and telecommunication systems built on computer tools and representing information resources and hardware and software that provide storage, processing and transmission of information over a distance.

The article attempts to analyze the scientific and pedagogical literature on the use of ICT
tools for teaching a foreign language (in particular, Russian as a foreign language) language. The analysis showed that the main technological features of ICT tools that have opened up wide opportunities for the use of information and communication technologies for the formation and development of foreign language communicative competence are:

- interactivity (changing the content or the way of communication),
- publicity (organization of remote online communication and publication in open access),
- multimedia (use of materials of different formats: text, audio, photo, video materials);
- hypertext structure (creating hyperlinks and clicking on active links) [7].

To create an information and educational environment in the learning process, one or more information systems (LMS, MOOC) are used, which operate on the basis of ICT. At the same time, information systems have the following pedagogical capabilities:

- availability of the entire volume of educational material at any time, anywhere, independent extraction of knowledge;
- variability of forms of presentation of educational material (creation of files, links, hyperlinks to text, audio or video material; creation of intermediate and control tests for working out grammatical structures and lexical material; creation of interactive homework and simulators for independent work of students);
- interactive informational interaction between students and the teacher for feedback, between students and ICT tools for testing and monitoring results, between students to create a single research project;
- providing systematic teacher support for all levels of students, including in remote groups.

Information systems used for teaching a foreign language have the following didactic capabilities:

- individualization and differentiation of the learning process (step-by-step formation and development of all system-forming language skills and development of speech skills of the Russian language for the professional activities of students);
- providing access to the information network;
- visualization of educational information (replacing text content with audio-visual);
- unlimited execution of training tests in the process of mastering educational material and self-preparation of students;
- development of communication skills (formation of writing and speaking skills for professional activity);
- intensification of all levels of the educational process; deepening of interdisciplinary connections;
- improvement of information and methodological support of pedagogical activity (high rate of updating of information);
- structuring of information in accordance with the selected educational program [11].

### 3 Results and discussions

Information technologies turn learning into an exciting process with game elements, contribute to the development of students' research skills. The technology of conducting classes using modern technical means and new information technologies trains and activates memory, observation, intelligence, concentrates the attention of students, makes them evaluate the information offered in a different way. A computer in the classroom significantly expands the possibilities of presenting educational information. The use of color, graphics, sound, and modern video equipment allows you to simulate various situations and environments. This helps to strengthen the motivation of students to study.
The use of information technologies makes it possible to make the learning process interesting, productive, implements a differentiated approach to learning, makes it possible to objectively and timely monitor and summarize. The penetration of modern information technologies also allows teachers to qualitatively change the content, methods and organizational forms of training. An example of the use of information technology in universities is the widespread use of educational software. These include: training programs, electronic textbooks, etc. Training programs are designed for independent work of students. They contribute to the maximum activation of trainees, individualizing their work and giving them the opportunity to manage their own cognitive activity. And electronic textbooks include didactic, methodological and informational reference materials on the academic discipline, as well as software that allows them to be used comprehensively for independent acquisition and control of knowledge.

With the development of information technologies, a system of distance education appeared, which supplemented full-time and part-time forms of education and provided an equal opportunity to receive education for all categories of citizens. This opportunity is valuable for people who are physically unable to get to their place of study. This category includes persons who have movement restrictions for health reasons; persons living in remote settlements, or receiving a second higher education.

Modern information technologies also play an extremely important role in Russian as a foreign language classes.

Working in a computer classroom using modern information technologies in Russian language lessons in national groups allows:
- find the meaning of unfamiliar words using a variety of dictionaries, reference books, encyclopedias;
- get the necessary information about the country of the language being studied;
- to get acquainted with the biography and work of Russian writers and poets;
- read excerpts from literary works;
- to pick up additional material on the topic under study;
- create a multimedia presentation on the topic;
- find a review of a literary work, the work of a poet or writer of a certain literary direction;
- write a report or an abstract on the topic under study;
- check your level of knowledge by completing test tasks.

The use of information technologies in teaching Russian to students increases the effectiveness of teaching, develops motivation, cognitive activity of students, stimulates their independence, reduces the loss of working time to a minimum, and also makes the learning process bright and exciting.

4 Conclusion

In conclusion, we note that a methodically well-organized educational process involves an optimal combination of information technology and traditional teaching methods at all stages of learning. The use of ICT makes it possible to improve and differentiate training, take into account the individual characteristics of students and encourage them to further independent work.

Thus, the active and effective introduction of information technologies into education is an important factor in creating an education system that meets the requirements of the information society and the process of its reform, improves the quality of education and education, allowing students to adapt more successfully and faster to the environment and ongoing social changes, accumulate and realize the innovative potential of the participant in
the educational process.

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