

# MODERN INFORMATION TECHNOLOGIES IN ENVIRONMENTAL EDUCATION OF STUDENTS

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**Abstract:** The problem of modern information technologies in the environmental education of students had been revealed in the article. It is proved that the introduction of advanced technology, based on the process of global informatization in all spheres of public life, needs to informatize education. It is stated that the hallmark of information technology of education from traditional computer use is a computer use as a means of creating and storing of academic information databases, computer graphics, multimedia, fast searching and sharing of targeted information via a global computer network learning. Its usage radically changes the system of forms and methods of teaching. An electronic textbook "Regional Ecology" had been proposed.

**Keywords:** informatization of education, principles of education information, information, information technology, computer, computer network of training, electronic textbook.

Nowadays, Ukraine tries to solve a problem of rethinking of national economic activity and changes that are possible and necessary. We need a radical increase the efficiency and quality of training to the level achieved in developed countries, in other words, teaching staff training with a new type of thinking through the use of new technologies for making effective changes in economic activity.

Humanity is entering a new era - the era of information, and how effectively information as a factor of civilization will be used, well-being and stability of society depends on. Therefore, the study of recent advances in the field of informatics, its means and methods, as well as prospects for further development and practical application should take priority in the education system.

The introduction of advanced technology, based on the process of global information in all spheres of public life, needs to informatize education. Except natural improvement of the quality and increasing the degree of education accessibility, economic potential of the country has been significantly risen due to the growth of enlightenment of the population and held an integration of national education system into the scientific, industrial, social, civic and cultural information infrastructure of the international community.

We see informatization as the main way to overcome the crisis of education through the development of new models of distance education, introduction of new technologies and theories of learning, improving organizational policy in the field of information studies.

Conceptual fundamentals of education informatization were defined in the Laws of Ukraine "On the National Informatization Program" (1998), "On the Fundamentals of Information Society in Ukraine in 2007-2015" (2007), the State Program "Information and Communication Technologies in Education and Science" (2006).

In particular, the Law of Ukraine "On the National Informatization Program" indicated that its main purpose is to create the necessary conditions for ensuring citizens and society with timely, accurate and complete information through the widespread use of information technology, and providing information security of the state [2].

According to the Law "On the Fundamentals of Information Society Development in Ukraine for 2007-2015", the information society is a society where everyone can create and collect information and knowledge, have free access to them, use and share opportunities to realize the potential that will facilitate social and personal development and raise the quality of life [3].

The various aspects of specialists' training in terms of education informatization, psychological and pedagogical principles of training implementation using modern technology, had been revealed in the works of the following scientists: S. Abdullayev, I. Androshchuk, V. Bykov, R. Gurevych, M. Zhaldak, D. Kolomiyets, V. Kushnir, V. Madzihon, L. Maslennikov, E. Mashbyts, N. Morse, T. Nekrasov, L. Pietukhov, P. Pidlasyi, O. Polat, L. Prokopenko, S. Rakov, Yu Ramskyi, I. Robert, S. Salavatov, S. Smirnov, O. Spirin, A. Tereshchuk, S. Tsvilyk, S. Yashanov.

The important psychological and pedagogical peculiarities of modern information technologies implementation into an educational process had been studied by A. Aleksakhyn, Yu. Voronin, S. Gladkyh, A. Huzhiy, H. Petsiuk, S. Semerikov, A. Stryuk, A. Tevyashev, A. Shevchenko, M. Shypitsyn, L. Shkutina.

The main directions of education informatization are the following:

1) mathematization of learning content and the development of algorithmic component, where algorithm and computer are central concepts;

2) information modeling, where information, information processes and models become central concepts [4, p.21].

3) implementation of information and educational environment at an educational establishment level, which is considered as a complex of works on creation and maintenance of technology of its functioning;

4) system integration of information technology in education, supporting the processes of learning, scientific research and organizational management;

5) the construction and development of a unified educational information environment [6, p. 18].

The II UNESCO International Congress "Education and Informatics" defined technology training as a way to implement the training content provided by training programs, which is a system of forms, methods and means of education, that ensures the achievement of the didactic goals [1].

Information technology of training is a learning technology based on the principles of informatics and implemented by computers [5]. The main feature of information technology of training is a computer usage as a means of creating and storing of academic information databases, computer graphics, multimedia, fast searching and sharing of targeted information via a global computer network learning, which use radically changes the system forms and methods of teaching.

The introduction of information technology in education allows to create additional opportunities, organizational and technical resources, namely:

- to provide access to a large amount of educational information;

- to give a clear form of presentation of the studied material;

- to support active learning methods;

- to implement modular construction principle that allows you to replicate certain parts of information technology;

- to support information technology by relevant scientific and methodological material.

The new phase of economic reforms in Ukraine is characterized by the need to ensure systemic reform of educational content, create a mechanism for continuous updates, overcome traditional educational processes focusing on the surface "encyclopedic" content, overloading by information and factual material which does not meet students or society needs.

A conceptual principles to ensure implementation of education informatization process are the following.

**System principle.** The changes of the modern world are not only connected with the changes in technology, culture, ideology and lifestyle, but also with the changes of system properties of our world – a complication, the emergence of new subjects and levels of government, new mechanisms and relationship of cause and effect. So, the answer to the challenge of our time has not be associated with some measures, but with the change of system properties of information objects.

Thus, the purpose of the process of education informatization in Ukraine is a change of system properties of education and, above all, high school, in order to enhance its receptivity to innovation, providing opportunities for active targeted use of the global information highway, new opportunities to influence their educational, scientific, and professional trajectory.

**The principle of invariance.** Nowadays, different concepts of further reforms in education in our country are widely discussed. They reflect different policy directions, a different attitude to changes in economic and social system, the idea of the ideals and goals of development. The concept of information must be independent, invariant with respect to the choice of an alternative reform of the education system, which is the choice in political, economic and administrative fields.

**The principle of "fulcrum".** Today informatization is a fulcrum, the key to solving many problems. It facilitates to the solving of many problems that have accumulated in educational institutions and in the bodies of their administration. Informatization – is an infrastructure, supporting construction, the fulcrum where one can build a variety of educational, scientific and social projects.

**The principle of "critical mass".** Field of education and, above all, high school is open nonlinear system able to paradoxical "anti-intuitive" behavior. The obvious and non-obvious solutions can lead

to the opposite of the expected results. It is appropriate metaphor of “chain reaction”. If the “critical mass” is not reached, the positive feedbacks begin to operate at full capacity; if reached, we can follow a new mode of information process.

The principle of self-reproduction. Informatization is associated with the birth of a new world, new individual, social, and scientific technology, new algorithms of civilization development. Informatization is also the result of the underlying processes and their necessary condition, since informatization enables the use of new information technologies and at the same time requires the ability to use them.

Over the past two decades the issue of the role of information and communication technologies in the improvement and modernization of higher system of education has always remained topical. The need for new approaches to teaching can be followed in the broad implementation of personal computers into learning process and the emergence of access to the Internet in educational institutions. It was found that students’ using a PC must be not spontaneous, but steering character.

The purpose of new information technologies introduction into educational process is to ensure the quality and accessibility of education. Professional approach to using ICT in education can dramatically change the possibility of forming creative abilities, develop such thinking qualities as speed, flexibility, originality, and accuracy.

One of the priorities in improving the training system is the development and introduction of new information technologies into the process of learning, including the creating an electronic textbook, which has the following functions:

- effectively manage the activities of the student to study the subject;
- encourage teaching and learning activities;
- to ensure rational combination of different types of teaching and learning activities taking into consideration didactic peculiarities of each of them and depending on the results of the material obtaining;
- rationally combine different technologies of the material submission (text, graphics, audio, video, animation) [7, p.21].

We have developed an electronic textbook “Regional Ecology” that includes training text, informative and illustrative graphic material, video releases, dictionary with hypertext links, cartographic material, search system. The textbook was created in the software environment Delphi 7.

Preparation and structuring of the textbook is based on the following assumptions:

- among students we can identify people who have different goals and levels of the material obtaining;
- the textbook should be structured in order each student had a choice of individual scheme the material studying;
- the textbook can be used in studying various subjects of natural-science and environmental perspective, which raises the questions of environmental status and environmental problems of a particular region;

The mentioned electronic textbook has the following key objectives:

- formation of a common understanding of the subject and tasks of the regional environment, its place in the hierarchy of environmental awareness chapters;
- formation of values system and ideals of human activity in the environment;
- formation the ideas about the unique natural complex of a specific region and special meaning of its landscape potential;
- defining of key environmental problems of the region and their possible solutions;
- formation of the need of ecological activity within the profession and citizenship on environmental issues;
- expanding horizons, increasing of scientific literacy and competence, development of information culture;
- formation of scientific style of thinking, forming the ability to synthesize knowledge from various fields and use them as a tool for learning and scientifically grounded environmental protection.

The content of the textbook includes the following sections: actual issues of regional ecology, historical aspects of the regional ecology, natural resources and environmental protection factors, protected areas, ecological problems, solutions to the environmental crisis, the concept of sustainable development.

Training text is divided into sections, subsections, and modules that have relatively independent significance. Basic definitions and specific terms are in the dictionary, and their explanation are caused by hyperlinks. Along with the text, but some lines are illustrations.

Modules are logically and thematically interconnected and “stitched” through appropriate illustrations: moving from text to the associated illustration, you can click on the mouse to move to other illustration related to the first one, and then to a new module. For example, interconnected historical descriptions of regional ecology and analysis of the current situation and problems of the same localities, photos of some protected areas of the early 20th century and the same objects in 100 years. This enables students independently to analyze the nature and causes of environmental problems, consider options for their solutions.

In the study of environmental problems of a specific region the work with a physical or topographic map or a schematic map of the study area plays an important role. Therefore, the electronic textbook provides the ability to get a specific region map, increasing its necessary parts to the needed size. It empowers individual work with educational material, when analyzing the ecological state of the area as a whole and its separate objects.

Working with specific topics can be carried out by the search system, organized by analogy with the “find” function in text editor Word. At the same time the reference to the same object, phenomenon or term can be easily found throughout the volume of the textbook. It allows to give students the task not on a particular paragraph or section of the textbook, but on the subject in its historical and problem development.

An important advantage of the electronic textbook over a hard copy is the possibility of efficient revision. As you know, the ecological state of the region is able to change quickly and it should be reflected in the training material. But in a hard variant publication such changes can be made only in its subsequent editions, and data may lose its relevance.

In electronic textbook changes can be made quickly, and the speed of their introduction will depend mainly on the level of computer literacy of those who do such work.

Electronic textbook can stimulate the scientific work of both students and lecturers. It allows to train students for independent research on the environmental problems, bring to the awareness of the need to respect for the natural resources, ecological balance and difficulty, and sometimes impossibility of its recovering, draw attention to the environmental problems at the local level, the state of the system “man-nature-society” in regional landscape ecosystems.

So, the training of future specialists should be consistent with global trends of the labor market in the relevant fields of vocational education. One of the priorities in improving the training system is the development and introduction of new information technologies in the process of learning. However, the effectiveness of work on new information technology creation depends on the completeness of psychological characteristics accounting of future users of this technology, the scientific grounding of the knowledge about psyche, intellect, communication, behavior, consciousness, which laid by a developer into the created information system. As powerful amplifiers of human intellectual capacities, information technologies contribute to the emergence and widespread in education flexible systems that can quickly rebuilt. The proposed electronic textbook “Regional Ecology” is such a flexible system.

#### References:

- Datsiuk, G. (2001) *Psihologo-pedagogicheskie osobennosti primeneniya informacionnyh i kommunikacionnyh tehnologij v uchrezhdenijah obshhego srednego obrazovanija*. Ph.D. Rossijskaja akademyja gosudarstvennoj sluzhby pry Prezydente Rossijskoj Federacyi.
- Verkhovna Rada of Ukraine. (1998) *Zakon Ukrai'ny «Pro Nacional'nu programu informatyzacii»*. Kyiv: Verkhovna Rada of Ukraine. Available at: <http://zakon5.rada.gov.ua/laws/show/74/98-бp>.
- Verkhovna Rada of Ukraine (2007). *Zakon Ukrai'ny «Pro Osnovni zasady rozvytku informacijnogo suspil'stva v Ukrai'ni na 2007–2015 roky»*. Kyiv: Verkhovna Rada of Ukraine. Available at: <http://zakon3.rada.gov.ua/laws/show/537-16>.
- Zakharova, I. (2003) *Informacionnye tehnologii v obrazovanii*. Moscow: Publishing House “Academija”.
- Gricenko, V., Dovgjallo, A. and Savel'eva A. (1992) *Komp'juternaja tehnologija obuchenija*. Kyiv: Naukova Dumka.
- JuNESKO. (1996) *Politika v oblasti obrazovanija i novye informacionnye tehnologi*. JuNESKO.
- Semerikov, S. (2009) *Teoretyko-metodychni osnovy fundamentalizacii' navchannja informatychnyh dyscyplin u vyshhyh navchal'nyh zakladah*. Dr. Sc. National Pedagogical Dragomanov University.