

# Evolution Of Educational Activity: Digitalization Of Information Space Of Distance Education

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## Summary

The article discusses the use of the concept of digitalization in the science of education. The influence of information technologies on the ability to self-study is analyzed. Various technologies that are used in science and education are shown.

The issues of the advantages of using IT as a tool for creating conditions for the implementation of the problem-activity approach and the organization of project activities are considered.

The possibilities are shown, which gives the opportunities that the use of ICT of distance educational resources in the educational process gives. Shown is their auxiliary form of transmission, information retrieval; working out skills and consolidating what has been learned.

Based on the analysis of the presented material of the article, you can see what problems can be solved using IT and remote resources.

**Key words:** *higher education, competencies, education system, information competence.*

## 1. Introduction

Information technology (IT) in education is currently a prerequisite for the transition of society to an information civilization. Modern technologies and telecommunications make it possible to change the nature of the organization of the educational process, completely immerse the student in the information and educational environment, improve the quality of education, and motivate the processes of information perception and knowledge acquisition. New information technologies create an environment for computer and telecommunications support for organization and management in various fields of activity, including education. The integration of information technologies into educational programs is carried out at all levels: school, university and postgraduate education.

Continuous improvement of the educational process along with the development and restructuring of society, with the creation of a unified system of continuous education, is a characteristic feature of education in Ukraine. The

reformation of the school carried out in the country is aimed at bringing the content of education in line with the modern level of scientific knowledge, increasing the efficiency of all teaching and educational work and preparing students for activities in the context of the transition to an information society. Therefore, information technology is becoming an integral component of the content of education, a means of optimizing and increasing the efficiency of the educational process, and also contributes to the implementation of many principles of developmental education.

Currently, the role of information and social technologies in education is growing, which provide universal computerization of students and teachers at a level that allows solving at least three main tasks:

- providing access to the Internet for each participant in the educational process, and, preferably, at any time and from different places of stay;
- development of a single information space of educational industries and the presence in it at different times and independently of each other of all participants in the educational and creative process;
- creation, development and effective use of managed information educational resources, including personal user databases and data banks and knowledge banks of students and teachers with the possibility of universal access to work with them.

Based on the prevailing rates of computerization of the continuous education industry, as well as taking into account the uneven technological computer-network support of the population at home, it can be expected that in the very near future these tasks will not be fully and comprehensively solved [1].

At the same time, there is a growing understanding that the traditional scheme of obtaining education in the first half of life is morally outdated and needs to be replaced by continuous education and lifelong learning. New forms of education are characterized by interactivity and cooperation in the learning process. New learning theories

such as constructivism, student centered education, learning without time and space boundaries need to be developed. To improve the quality of education, it is also proposed to intensively use new educational technologies [2].

Various approaches to the definition of educational technology can be summarized as a set of ways to implement curricula and curriculum, which is a system of forms, methods and teaching aids that ensure the achievement of educational goals. Specialists usually deduce the difference in educational technologies from the difference in the teaching aids used. Information educational technologies arise with the use of information and computer technology. The educational environment in which educational information technologies are implemented is determined by the components working with it:

- technical (type of used computer equipment and communication facilities);
- software and hardware (software tools to support the implemented learning technology);
- organizational and methodological (instructions for students and teachers, organization of the educational process).

Educational technologies in higher education are understood as a system of scientific and engineering knowledge, as well as methods and means that are used to create, collect, transfer, store and process information in the subject area of higher education. A direct relationship is formed between the effectiveness of the implementation of educational programs and the degree of integration of the relevant information and communication technologies into them.

The overriding task of understanding and implementing the problem of informatization of higher education is that as a result, a global rationalization of intellectual activity in society should be achieved through the use of new IT in order to increase the efficiency and quality of training specialists to the level of information culture achieved in developed countries. Training of personnel with a new type of thinking should be provided, corresponding to the requirements of a post-industrial society [3].

The use of the information system in the learning process "allows not only to give students information about the object of management, but also helps them to realize all the diversity and complexity of connections typical for real enterprises, to trace the dynamics of these connections when external and internal factors change, as well as to destroy the interdisciplinary barriers due to the temporal sequence of the presentation of academic subjects. Such a toolkit makes it possible to build modern educational technologies that provide for the formation of extraordinary thinking in students, a creative approach to management. Ultimately, their activity becomes not a set of standard techniques, but is based on an understanding of

the cause-and-effect relationships of phenomena and processes, which significantly increases its motivation and effectiveness"[4].

However, now many managers and theorists of higher education believe that the term "educational technologies" today is not entirely adequate. More often, as a rule, they talk about information technologies, about computer technologies, a little less often - about communication technologies, and very rarely - this is already the subject of special discussions - about audiovisual technologies. We consider information, communication and audiovisual technologies in aggregate as subordinate to solving a more important task - creating a new educational environment, where information, communication and audiovisual technologies are organically included in the educational process for the implementation of new educational models [5].

One of the definitions of the educational information environment formulates its understanding as an information system that combines through network technologies, software and hardware, organizational, methodological and mathematical support, designed to improve the efficiency and accessibility of the educational process of training specialists [6].

The UNESCO Report on Main Directions for Action in Education and Informatics since the First International Congress on Informatics and Education indicates that it is not technology itself that is important, but its interaction with learning and its role in the context of the education system as a whole.

## 2. Theoretical Consideration

Today, one of the characteristic features of the educational environment is the ability of students and teachers to refer to structured teaching materials teaching multimedia complexes of the entire university at any time and anywhere in space. In addition to the availability of educational material, it is necessary to provide the trainee with the opportunity to communicate with the teacher, receive advice on-line or off-line, as well as the ability to receive individual "navigation" in the development of a particular subject. "Students will strive for a flexible learning regime, modular programs with multiple incomes and deductions, which will allow them to accumulate credits, freely transfer from one university to another, taking into account previous experience, knowledge and skills. The opportunity for personal development and professional growth will continue to be important for students; degree programs and short courses are likely to be in equal demand; the need for vocational training programs and postgraduate programs will sharply increase"[7].

Developers of distance education (DE) concretize the individualization of educational behavior in the following way, considering that the traits of a personality-oriented way of learning are most clearly manifested in DE:

**Flexibility** - the student is free to independently plan the time, place and duration of classes.

**Modularity** - materials for study are offered in the form of modules, which allows the trainee to generate a trajectory of their learning in accordance with their requests and potential capabilities.

**Accessibility** - independence from the geographical and temporal location of the student and educational institution allows you not to limit the educational needs of the population of the country.

**Profitability** - economic efficiency is manifested by reducing the cost of maintaining the premises of educational institutions, saving time and material resources (printing, reproduction of materials, etc.).

**Mobility** - the effective implementation of feedback between the teacher and the student is one of the main requirements and grounds for the success of the DE process.

**Coverage** - simultaneous access to many sources of educational information (electronic libraries, databanks, knowledge bases, etc.) of a large number of students.

**Manufacturability** - the use of the latest achievements of information and telecommunication technologies in the educational process.

**Social equality** - equal opportunities to receive education regardless of place of residence, health status, elitism and material security of the student.

**Internationality** - export and import of world achievements in the educational services market [8].

Information technologies bring the opportunity and the need to change the very model of the educational process: the transition from reproductive learning - the "overflow" of knowledge from one head to another, from the teacher to the students - to the creative model (when a life situation is modeled in the classroom with the help of new technological and technical support or process, students under the guidance of a teacher must apply their knowledge, show creativity to analyze the simulated situation and work out solutions for the tasks). Experts believe that the development of traditional and new technologies should proceed according to the principle of complementarity and intercorrelation, which, in turn, allows us to talk about a fundamentally new dimension of the educational environment - a global dimension that exists in real time and associates the entire set of educational technologies.

"The Internet is a hyper-technology that includes everyone else, and its success is due to the fact that it can "give everyone everything"... However, there is always an area for the application of lower-level technologies such as computer conferences or e-mail. Likewise, the time has

not yet come to abandon distance learning courses that are global in nature, but do not use any computer or communication technologies" [8].

According to Barbules, the most important feature of this new technology is that it allows you to create "networked communities". Thanks to this, the concept of community takes on a global scope and some completely new features. According to the author: "One of the most important features of such a space is its global nature, which allows for almost instant communication and communication. Already, this environment is indispensable for commercial and financial transactions involving a wide variety of societies and cultures. Thus, the Internet is both the main cause of globalization and its most visible manifestation. Moreover, it is globalization that determines the nature of network communities" [5].

Thanks to the Internet, the various facets of globalization (scientific, technological, economic, cultural and educational) have had a very significant impact on both traditional face-to-face educational institutions and the development of a variety of educational innovations such as distance learning and virtual universities. In all these organizations, globalization requires profound and radical changes in the structure, methodology of teaching and research, as well as the training of management and teaching personnel [6].

### **The structure of the information and educational environment.**

Analysis of the advantages and disadvantages of the existing information educational environments (IEE), and the current state of information technologies and telecommunications, allows us to formulate the following principles on which the currently designed information and educational environments should be built:

**Multicomponent** - the information and educational environment is a multicomponent environment that includes educational and methodological materials, high-tech software, training systems, knowledge control systems, technical means, databases and information and reference systems, information storage of any kind, including graphics, video etc., interconnected.

**Integrality** - the information component of the ITS should include all the necessary set of basic knowledge in the fields of science and technology with access to world resources, determined by the training profiles of specialists, take into account interdisciplinary communications, an information and reference base of additional educational materials that detail and deepen knowledge.

**Distribution** - the information component of the ITS is optimally distributed over information storages (servers), taking into account the requirements and limitations of modern technical means and economic efficiency.

**Adaptability** - the information and educational environment should not be rejected by the existing

education system, should not violate its structure and principles of construction, and should also allow flexible modification of the information core of the IEE, adequately reflecting the needs of society.

The formulated principles of building ILE make it necessary to consider the information and educational environment, on the one hand, as a part of the traditional educational system, and, on the other hand, as an independent system aimed at the development of active creative activity of students using new information technologies [2].

Today, the problem of education as a whole is not a problem of technology, but of a person, a teacher, who comes to the classroom. It is the teacher who is the weak link in terms of information technology. In addition, most of the specialists working in universities often have no pedagogical education at all. Therefore, the main attention in the education system should be primarily directed to the pedagogical training of subject teachers. By combining teacher education and education in the field of new information technologies, it will be possible to provide a breakthrough in creating a new educational environment [7].

“Any discussion of the quality problems of distance education will inevitably affect the selection, retraining and support of the teaching staff participating in the technological training program. In the traditional academic environment, teachers are carefully selected according to very strict criteria, which are mostly academic in nature, taking into account related factors, the availability of research papers and publications, etc. The criteria for selecting teachers for distance learning programs should be primarily academic”[8].

Problems of the effectiveness of education in the new educational environment.

#### **Distance education problems.**

When organizing and introducing distance learning into the education systems of various countries, the problem of assessing the effectiveness of distance education in comparison with traditional education arises. As studies show, which have been going on for more than a decade, the problem of evaluating effectiveness is quite complex and multifaceted and does not have a final solution.

The development and expansion of the use of educational IT is directly related to the problem of changing the effectiveness of training. Determining the effectiveness of a method, teaching technology includes - measuring the achieved result, the cost of material resources and the time to achieve it. The effectiveness of training is measured either by the results of control works in points, or by the results of testing as a percentage of solved problems. In this case, they usually compare the groups of students who used and did not use computer-aided learning support.

Evaluation of the effectiveness of teaching methods using information technology is usually given in comparison with the so-called traditional methods and is limited to measuring the learning outcome, sometimes taking into account the time spent by students. Is it possible to apply traditional quality criteria to key aspects of distance education in a technological learning environment? The application of this approach to the assessment of information technologies in teaching implies that the latter do not introduce anything new into the goals and objectives of teaching. In fact, the introduction of information technology affects the quality and content of education.

According to experts, new information technologies of teaching make it possible to increase the effectiveness of practical and laboratory classes in natural science disciplines by at least 30%, the objectivity of monitoring students' knowledge - by 20-25%. The progress in the control groups studying with the use of educational IT, as a rule, is higher on average by 0.5 points (with a five-point assessment system). In particular, the speed of vocabulary accumulation with computer support for learning foreign languages increases 2-3 times [5].

At the same time, there is an approach that presupposes the use of traditional criteria of quality and efficiency in technological higher education. The key aspects are considered to be: qualified teaching staff; teaching excellence; development of a course with the addition of elements due to the use of technological teaching aids; the work of student services.

For example, at Regis University, the Jesuit Humanities University located in Denver, Colorado (USA), quality standards are currently being developed in the following areas:

- the process of selecting teachers and preparing them for online teaching;
- constant retraining and support of teachers;
- development of a technological learning environment;
- technical and academic support for online students;
- technological policies to ensure continuous monitoring and improvement;
- organization of student services for distance learning.

#### **Priorities and problems in the development of new information technologies in education.**

Information and communication technologies are recognized by specialists as one of the priority areas of science and technology, which will become decisive and critical in the 21st century.

Critical is understood as such technologies that are inter-sectoral in nature, create essential prerequisites for the development of many technological areas or areas of research and development, and together give the main contribution to solving key problems of development and progress.

In education, the role of the critical undoubtedly belongs to basic information technologies, i.e. such that are the basis of educational technologies that use information and computer technology and together form the technological infrastructure of an educational institution.

Critical educational technologies ensure the creation of distributed bases of educational technologies based on the infrastructure of corporate telecommunication networks of educational institutions, which, thanks to this infrastructure, can be used anywhere in the educational space, including in the process of implementing the ideology of distance education.

In this regard, the most important areas of informatization of education are:

- implementation of a virtual information and educational environment at the level of an educational institution, providing for the implementation of a set of works to create and ensure the technology of its functioning;
- system integration of information technologies in education that support the processes of learning, research and organizational management;
- construction and development of a unified educational information space.

In essence, we are talking about solving the problem of a qualitative change in the state of the entire information environment of the education system, about the presentation of new opportunities for both advanced, developing education of each person, and for the growth of aggregate social intelligence.

An important and effective condition for the progress of any society has been and is the creation and expansion of a single interactive information space. It is the unified information spaces that historically largely contributed to the acceleration of the development of all mankind as a whole, were a decisive factor in the improvement of civilization in all spheres (spiritual, professional, bodily, cultural and others). The exchange of knowledge, the unification of efforts for further knowledge of nature, for the development of science, technology, culture - all this contributes to an effective increase in the material level. Therefore, the creation of a single interactive information space can be considered a strategic goal of introducing modern and promising information technologies into all spheres of human activity.

The main goals of building a single information space in education are associated with the provision of fundamentally new opportunities for cognitive creative human activity. This can be achieved thanks to modern information and technical equipment for the main activities in education: educational, pedagogical, research, organizational and managerial, expert, etc.

Building a unified information space in education will make it possible to achieve:

- increasing the efficiency and quality of the learning process;

- intensification of the process of scientific research in educational institutions;
- reducing the time and improving conditions for additional education and adult education;
- increasing the efficiency and effectiveness of management of individual educational institutions and the education system as a whole;
- integration of national information educational systems into the world network, which will greatly facilitate access to international information resources in the field of education, science, culture and other areas.

1. Technical equipment of educational institutions is one of the primary tasks, the solution of which is constrained mainly by organizational and economic factors associated with the fact that "small" informatization turns out to be ineffective, and "large" informatization is too expensive and does not give immediate returns. The problem of the implementation of educational information technologies in invariant environments and standards is becoming more and more urgent.

2. Organization of training of specialists. The shortage of specialists in the field of new information technologies (especially network technologies) is aggravated by the processes of their "washing out" from the sphere of education into commercial and other structures, which is especially characteristic of countries with economies in transition.

3. Organizational arrangements. The creation of a unified system of information resources is impossible without constant coordinating participation and control on the part of the pedagogical and scientific community, expressed in one form or another.

4. Transfer of information resources of society to electronic media. Only the translation of most of the information accumulated by mankind into media perceived by computers will create real opportunities for access to this information for all members of society. The improvement of existing technologies for such translation remains one of the urgent problems in the development of information technologies.

5. Integration of national information resources into the global information environment.

Another promising direction in the development of the education system is the widespread introduction of distance learning and self-education methods based on the use of information and telecommunication technologies and means of remote access to distributed databases and knowledge. The development of appropriate recommendations constitutes the direction of the necessary research.

## Conclusions

Uneven investment and interest in participating in e-learning will have a significant impact on the state of affairs in higher education. In addition to elite universities, whose political influence is quite strong (due to rich graduates and solid funds), the rest of higher education institutions will find themselves in a very vulnerable position. Only those universities that systematically invest in e-learning, constantly create programs and enter into partnerships will successfully survive this decade.

A promising education system should take into account the main challenges of the 21st century and the most important human problems associated with them in the modern and emerging information society. The most important areas of transition to a new educational concept, which will become the basis for a promising education system necessary for the conditions of the 21st century, include, in particular, the fundamentalization of education at all its levels; implementation of the concept of advanced education; widespread use of innovative and developmental education methods based on the use of promising information technologies; increasing the availability of quality education through the development of a distance learning system and means of information support of the educational process with modern information and telecommunication technologies.

An increase in the level of computer training of students, an increase in the number and expansion of varieties of copyright pedagogical software, the use of new information technologies in science and education in general, are one of the main directions for improving higher and distance education in our country.

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