Information Technologies in Higher Education Institutions: Experience of Leading Countries of the World

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Summary

The article analyzes and studies that pedagogical design of the educational process using information and communication technologies in educational institutions of higher education based on the development of a model and methodology personalization of training will improve the quality of the educational process at the university and solve the identified contradiction.

A qualitative analysis of foreign countries in the possibility of using information and communication technologies in educational institutions of higher education is carried out.

Key words: *information technology, communication technologies, education system, educational process.*

1. Introduction

If we consider the modern stage of development of society, including such a function as education, then one cannot fail to note the widespread computerization and informatization. The rapid development of information and communication technologies, which began in the seventies of the XX century, acquired truly global proportions in the XXI century. Today, information technology is radically changing everything spheres of human society: science and technology, economics and education.

At present, the level of scientific and technological progress has reached a state when the amount of information in the flow entering the sphere of production and science significantly exceeds that which was previously available. It is believed that the amount of knowledge in the world by the beginning of the XXI century has increased more than 250 thousand times. In these conditions, society and the state need people with significant knowledge in various fields. On the other hand, an increase in the flow of information inevitably entails an increase in the informative capacity of classes (including in higher education) and gives rise to the need to improve the educational process.

To solve this problem, it is required to develop and implement a scientifically based vocational training methodology that will mobilize both the creative potential of students and the pedagogical skills of the teaching staff.

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The current domestic and foreign experience of using information and communication technologies in education indicates that their use allows significantly increase the effectiveness of the educational process. Computerization and informatization of education create good prerequisites for widespread introduction into pedagogical practice of new methodological developments aimed at intensifying the educational process and implementing innovations in it [1].

Modern education can no longer be imagined without computers, multimedia, e-learning systems and support for students and graduates, etc. [2]. Test assignments have long been not limited to just text, a picture or a video fragment - now knowledge control can take place in an interactive form in real time with the ability to compile a rating of students in just a few seconds right in class [8]. These new organizational, pedagogical and educational opportunities and need to be taken into account in training, which requires appropriate logistics.

Modern technologies have opened up ample opportunities for the development and creation of automated training systems, including through various variations of hypertext technology based on the HTML markup language [6]. The spread of hypertext technology, to a certain extent, served as a kind of impetus for the creation and widespread replication on the Internet of various electronic publications: textbooks, manuals, reference books, dictionaries and other educational content [9].

The use in electronic publications of various information technologies (animation, multimedia, adaptive polls, interactive elements, etc.) gives significant didactic advantages to electronic educational content versus traditional:

- on the basis of modeling the learning process, it becomes possible to supplement the classic textbook with test materials and additional content, track, guide, adapt the trajectory of learning the material, thus providing feedback;

- in multimedia technology, an educational environment is created with a simple, vivid and visual presentation of information;
- the integration of significant amounts of information on a single medium is carried out (more than a terabyte in the case of portable solid-state drives, and virtually unlimited amount of information for content posted on the Internet);
- the possibilities of modern information technologies, due to the processing of large volumes of information, provide an opportunity to choose a personal scheme for studying the material.

At the same time, due to the objective socio-economic and political processes currently taking place, in recent years, the circulation of scientific and popular science literature published in physical media (printed publications) has sharply decreased, which for many educational institutions has become practically inaccessible [6]. That is why today many teachers and students are not aware of the latest scientific advances in the field information theory, management, technology, as well as new approaches to solving economic and social problems. The solution to this problem is possible thanks to the widespread use of electronic sources and information and communication technologies, which are currently are experiencing their heyday [7].

The analysis of teaching technologies used in the preparation of students in higher educational institutions shows that the most applicable teaching technology in the disciplines of special training is still classical (traditional) teaching, which is 50% of the total number of technologies used. In second place, with a small margin, are computer learning technologies, which make up 45% of the total number of technologies used.

Thus, today a significant part of the teaching staff uses new information technologies in the educational process.

2. Theoretical Consideration

Attempts to reveal the concept of "learning technology" abroad were made for the first time in the United States, where this concept appeared. In the famous American report "To Learning", published in New York and London, two definitions of this concept are given: in the first – technology learning is characterized as a set of methods and means of communication (communication) between people, arising as a result of the information revolution, used in didactics; in the second, teaching technologies are considered as something more significant than a set of teaching methods and means. Many researchers believe that learning technology is associated with the optimal construction and implementation of the educational process, taking into account the learning objectives [5, 7].

F. Yanushkevich and Ch. Kupisevich at the VII International Symposium on Learning Technologies (Poznan) defined learning technology as “a set of methodological and organizational actions aimed at optimizing the learning process through rational use in this the process of modern technical means and didactic materials, including computers ”[7].

At present, information and communication technologies occupy a special place in raising the quality level of education abroad. Their use made it possible to change existing and open up new pedagogical technologies that meet the requirements to a greater extent.

Activation of training, the use of the latest achievements of science and technology directly in the educational process. In the United States and developed European countries, educational technologies based on information technology have been associated with the use of software and communication capabilities of the Internet [4].

The software made it possible to present educational information on the screen in various forms, initiate the process of assimilating knowledge, acquiring skills in educational and industrial activities, effectively monitor the progress of the educational process, and activate the cognitive activity of students.

Software tools used abroad, in their own way functional purpose are divided into the following types [6]:
- application programs designed to organize and support of the educational dialogue between the user and the computer;
- diagnostic, test programs, the purpose of which is - ascertaining the reasons for the erroneous actions of students, assessing their knowledge, abilities and skills, establishing the level of training;
- software tools intended for the design of educational software (systems), or the generation of educational and methodological materials, the creation of service add-ons in the form of a musical or visual image;
- subject-oriented software environments that allow modeling the objects under study or their relationship in a specific subject environment;
- software tools designed to generate culture of learning activities based on independent - control software, the purpose of which is to control the actions of real objects;
- software tools that ensure the performance of some of the teacher's functions. These software tools issue commands related to work on the computer. Instructions on the beginning, end, delay in work, on the implementation of the check, on obtaining additional information, etc.;
- service software that provides the comfort of the user.

Widespread use in the United States, England, Germany, France and Japan has received the use in the educational process of a local area network in display classrooms and e-mail [4].

The use of e-mail, first of internal communication, and then of external one, made it possible to expand the sphere

of interaction and use the experience of other educational institutions and organizations.

Building a local area network in display classrooms made it possible to apply training programs in various academic disciplines, linking them, thus, into a single complex of knowledge development.

The use of a local-computer network made it possible to obtain information about the level of successful mastering of educational material by each student directly in the classroom and, thus, implement the principle of student-centered learning.

One of the common types of computer technology training, widely used abroad, are computational procedures, implemented using a computer. As a rule, a computer is used to perform practical tasks, course design, as well as to formalize the results of scientific and practical activities.

This technique allows students not only to master various algorithms and programs for solving specific problems, but also develops research skills. In addition, computer technologies create the possibility of visualization and mathematical modeling of real processes, which forms the skills of design and spatial imagination.

At present, there is great interest abroad for improvement of the learning process is represented by such a branch of computer training programs Internet learning technologies (ELMS, MOOC) [7-9].

Modern technologies use hypertext systems (Hyper Text Markup Language), combining special ways of presenting information, which, being natural, in nature and often used in everyday practice, only with the advent of computers have become a powerful tool for information processing [1-3].

In their modern form, the ideas of hypertext are the result of the development of three main directions [5, 12 -14]:

- Achievement of quick and natural access to databases, to information large in volume and various in form, presented in the form of texts, pictures, drawings, photographs, etc .;
- providing multilevel selective presentation information in the extended area based on a multi-window interface, e-mail and telecommunication methods;
- changing the way a person reads or prepares text using a computer.

Essentially, hypertext can be viewed as a collection of components of two types: fragments of text information and links between these fragments.

Due to the presence of links, fragments of text are connected into a network. An analogy of hypertext can be a book or article, provided with footnotes, notes or comments containing cross-references. This analogy reflects well the idea of connections between fragments and the need for intermittent reading to obtain more complete information.

The peculiarity of hypertext is that the information is not it is generally represented as one level of text, but is set by a multilevel system, in which only one layer is available at a time, but more information is concentrated in the hypertext than is available at the moment.

Hypertext thus defines a non-linear representation and non-linear, intermittent way of obtaining information depending on the interest in it and the possibilities of its assimilation by the consumer.

Thus, all information that is a hypertext can be obtained only in the case of enumeration of all levels of information in this hypertext.

Hypertext allows you to form nodes from separate fragments that carry the main semantic load, and form chains from them, reflecting causal relationships, chronological or any other dependencies.

So using hypertext allows you to give an individual interpretation of the material and express your point of view, presenting your understanding of the facts.

Modern hypertext systems used abroad are a powerful means of individualizing learning. The ways and rates of studying the material can be chosen and implemented by the student in accordance with the existing level of knowledge, established working methods and psychological characteristics of the personality.

Working with hypertext forms and develops the ability to independent activity to acquire and improve knowledge, skills and abilities. The possibilities offered by the user's work with hypertext and the techniques necessary for this clearly define its main purpose - to be an effective means of independent work.

However, as shown by studies in the United States [2], the use of the hypertext system in the educational process also creates some difficulties.

The first is how to combine the hypertext system with other forms of knowledge delivery. The danger lies in the great appeal of working on a computer and ignoring other forms of learning.

The second problem is related to the fact that the work with the hypertext system depends on the author's vision of the problem being studied, the hypertext system, which is introduced into the student's mind as the only correct one.

There is less freedom with deviations in the assimilation of knowledge than with the study of material from books.

The third problem is related to the interactive nature of the knowledge acquisition process.

The second and third problems can be solved by using hypertext systems with multiple interpretations of information, which provide a number of new and fundamental opportunities for the educational process.

Currently, the process of programmed learning (CAI - Computer Aided Instruction) abroad is characterized by work not on stand-alone computers, but on computers connected to telecommunication networks (CMC - Computer Mediated Communications) [2-4]. Means of telecommunications many times speed up the assimilation

of the necessary educational information, allow to significantly expand audience of listeners who may be at a considerable distance from the teacher.

In addition, programmed learning technologies allow you to join one of the most promising ways of acquiring knowledge - satellite educational television. The use of satellite educational television can provide invaluable assistance to educational institutions seeking to achieve international contacts in an increasingly integrated field of education.

In addition to those listed, there are still a large number pedagogical technologies, which are either a particular manifestation of the considered technologies, or a combination of them.

Over the past decade, many fundamentally new means of production, perception and processing of information, initiating the formation of promising pedagogical technologies.

Great opportunities in the application of new pedagogical technologies are represented by multimedia technology [5-7, 17].

Multimedia is a collection of techniques, methods, ways production, processing, storage, transmission of audiovisual information.

Multimedia - operating environments based on the use of CD technology allow the integration of audiovisual information presented in various forms (video, text fragment, graphic information or audio track), using the possibilities of interactive dialogue.

The capabilities of modern multimedia systems used in the educational process abroad are as follows:

- functioning of databases of audiovisual information with the ability to select a frame from the library of audiovisual programs and advance into the depth of the selected frame;
- selection of the line of development necessary for the user the plot in question;
- manipulation (overlay, movement) of audiovisual information presented in various forms, both within the field of this screen, and within the field of the previous or subsequent screen;
- implementation of animation effects;
- deformation of visual information presented in in various forms;
- discrete presentation of audiovisual information: with breaks, substitutions, connections, the possibility of excluding or adding information;
- toning the image - painting the entire field, or its separate parts;
- multi-window presentation of audiovisual information on one screen with the ability to make any part of the screen active.

Thus, the capabilities of multimedia systems allow present any audiovisual information on a computer screen in a complex way, realizing an interactive dialogue between the user and the system.

For the effective implementation of information and communication technologies in the learning process, it is necessary to prepare a faculty who owns information technology [4]. Recent Research by Office for Technology Assessment showed that the majority of teachers abroad do not speak sufficiently by means of information technologies for their effective use in the learning process. They need to be trained to integrate these tools into curricula to achieve their learning objectives. It is necessary to ensure the exchange of experience between the teaching staff - in this sense, the widespread introduction of telecommunications and the Internet is necessary.

Research carried out among teachers [14-16] showed that: more than half of teachers do not attach particular importance to computer technology as a means of teaching; a third use a computer and believe that it is a promising learning tool; only 10% try to make the most of the computer in the process teaching, however, they cannot form an idea among students about the computer as a means of constructing and researching various objects.

There are currently several dozen online distance learning programs for teachers in the United States. Through these programs, educators can share experiences, including through email, forums, or real-time dialogue.

time via Skype or one of the video conferencing services such as WebEx or Adobe Connect [2].

The use of the Internet provides access to hundreds of Web pages designed specifically for teachers [3].

Thus, the analysis of information and communication teaching technologies used in the educational process abroad has shown that, since the 70s, a large number of specialized computer training systems have been developed in research centers and educational institutions in the USA, Western Europe and Japan. In Ukraine, this work began only in the 90s, which predetermined the lag in this area.

In the 80s in the United States and developed European countries, pedagogical information technology-based technologies have been associated with the use of learning software.

Widespread use in the USA, England, Germany, France and Japan is currently used in the educational process of social networks, educational portals, as well as specialized services [8-12].

For the effective implementation of information and communication technologies in the learning process, it is necessary to prepare a teaching staff who owns information technology tools.

Conclusions

Thus, the analysis of information and communication technologies and their application abroad showed a similarity with the trend of using information and communication technologies in Ukraine.

The difference is a certain advance with which foreign pedagogy introduces modern achievements of information and communication technologies and the readiness of the teaching staff to actively introduce innovations and the latest information and communication technologies.

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