TEACHING MATERIALS FOR HIGHER EDUCATION IN CONDITIONS DEVELOPMENT OF THE INFORMATION TECHNOLOGY INDUSTRY

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Introduction. The process of transforming society into a global information space is based on the competence of specialists, which allows to actualize the problem of innovative approaches to the organization of educational processes. The main features of the information society are: increasing the role of information in public life, increasing the number of professionals engaged in information technology, the growth of informatization and the role of information technology in public relations; creation of a global information space that provides access to global information resources. The modern education system has additional requirements for the training of specialists to solve non-standard problems, which is why the leading place in such a system is occupied by innovative methods of training students in the higher education system. In this regard, the problems of innovative methods of teaching students in the development of informatization and the information technology industry and their analysis are certainly relevant. The work of many domestic and foreign scientists is devoted to the study of innovative methods of teaching students in the development of informatization and the industry of information and telecommunications technologies and their analysis, which notes the complexity and multifaceted nature of this process. Scholars argue that an innovative approach to student learning should be systematic and cover all aspects of educational work in the training of future professionals, while reviewing theoretical and practical approaches to educational content, development of new technologies and teaching methods. V. Andreev, M. Zhaldak, V. Lapinsky, E. Mashbyts, I. Osmolovska, Y. Ramsky, V. Rudenko, I. Pidlasy, N. Symonenko, V. Shapkin, M. Shut. General theoretical foundations of professional training in the context of modern education were studied by: V. Bezpalka, S. Goncharenko, O. Dubasenyuk, P. Saukha. According to I. Osmolovska, the basis of innovative educational technologies used in the educational process should be a social order, professional interests of future professionals, taking into account the individual, personal characteristics of students [21, p. 184]. A separate analysis is worth discussing the use of new technologies in distance learning, about which B. Holmberg said that this is not so much a form of learning as a way of thinking. M. Zhaldak, V. Lapinsky, M. Shut investigate modern computer-based teaching aids in mathematics, physics, computer science [9, p. 201-204]. V. Hrytsenko, S Kudryavtseva, V. Kolos, E. Varenych, consider theoretical and practical aspects of distance learning [7, p. 11].

The concept of distance learning refers to the form of learning in which the teacher and student are at a distance, and modern means are case - technology, TV - technology and network learning technology. In many cases, information, computer, communication, audiovisual and other technologies are considered separately. It is better to consider them together, to solve a complex problem - to create a new educational environment, where information, communication and

audiovisual technologies are organically integrated into the learning process to implement new educational models. N. Symonenko believes that the use of innovative forms and methods in the training of specialists in higher education should be organically combined with a pragmatic understanding of the goals and objectives of teaching and training and notes that innovative methods are reflected in many teaching technologies aimed at developing and improving teaching. educational process and training of professionals for professional activities in various spheres of modern society [22, p. 203-204]. These and other studies allow us to identify promising areas in the application of information and telecommunications technologies in the educational process.

The aim of the article is to analyze innovative methods of teaching students in the development of informatization and the information and telecommunications technology industry. The actual problems of professional training of specialists are analyzed and the ways of their solution are investigated. The types of innovative teaching methods in higher education have been studied. The role of information and social technologies in education is analyzed. The peculiarities of educational software have been studied. The directions of using information technologies in the educational environment are substantiated. The set goal defined the tasks: to define the concept of pedagogical innovation as an innovation in the field of pedagogy; to analyze modern information educational technologies; identify promising areas in the use of information and telecommunications technologies in the educational process. The theoretical and methodological basis of the study were the works of leading domestic and foreign scientists and specialists in the field of improvement and analysis of innovative methods of teaching students. General scientific methods were used in the work: comparison, generalization, formalization, analysis and synthesis.

Presenting main material.

The main task of the higher education institution at the present stage is to train specialists who are able to respond in a non-standard, flexible and timely manner to changes in the world. Therefore, to prepare students for professional activities in the future, innovative methods of teaching at the university are used. Such methods include problem-based learning, interactive learning, collaborative learning, the project method, creative learning, and more.

Analysis of theoretical and practical aspects of the problem allows to identify pedagogical innovation as an innovation in pedagogy, purposeful, progressive improvement that introduces certain innovations into the educational environment that improve the characteristics of its individual components and the educational system as a whole. Accelerating the development of modern information and telecommunications technologies promotes the transition to the information society and is a major factor in the informatization of all spheres of human activity. Dissemination of information on machine media is the new information technology, which in its principle and method of perception is closest to the traditional: the user knows exactly what he is getting, but he does not know if he needs it to such an extent [2; 3].

The analysis of the last researches allows to define perspective directions in the field of application of information and telecommunication technologies in educational process: modern methods and strategies of selection of the maintenance, methods and organizational forms of training and education; creation of methodical training systems focused on the development of students' intellectual potential; formation of skills to independently acquire knowledge, carry out information and educational activities; modern mechanism for managing the education system based on the use of information and methodological materials; creation of a single information space; self-education, in particular advanced training with the use of Internet information technologies; distance education, etc. [5, с. 75].

A special place among innovative technologies is occupied by computer-based learning technologies, which involve extensive use of computer, information and telecommunication technologies that ensure effective interaction between teacher and student. All this requires additional requirements for teachers, the skills of using information, telecommunications, multimedia and other technologies to manage the educational process are becoming relevant. Currently, the role of information and social technologies in education is growing, which provide general computerization of students and teachers at a level that allows to solve the following tasks:

providing access to the Internet at any time and from different locations; development of a single information space of educational industries and the presence of all participants in the educational process; creation, development and effective use of managed information educational resources.

New forms of education are characterized by interactivity and cooperation in the learning process. New theories of learning must be introduced, such as constructivism, student-centered education, and learning without temporal and spatial boundaries. Different approaches to the definition of educational technology can be described as a set of ways to implement curricula and study programs, which is a system of forms, methods and tools of learning that ensures the achievement of educational goals. Information educational technologies arise when using information and computer technology. The educational environment in which educational information technologies are implemented is determined by employees with its components: technical, software and technical and organizational and methodological. Educational technologies in higher education are understood as a system of scientific and engineering knowledge, as well as methods and tools used to create, collect, transmit, store and process information in the subject area of higher education. There is a direct relationship between the effectiveness of curricula and the degree of integration of relevant information and communication technologies.

It is important to implement the problem of informatization of higher education, which is that the result should be achieved global rationalization of intellectual activity in society through the use of new information technologies to improve the efficiency and quality of training to the level of information culture achieved in developed countries. Thus, the use of information systems in the learning process allows not only to give students information about the object of management, but also helps them understand the diversity and complexity of relationships characteristic of real enterprises, to trace the dynamics of these relationships with changing external and internal factors. which gives the opportunity to build modern educational technologies that involve the formation of students' extraordinary thinking, creative approach to management. Thus, their activity does not become a set of standard techniques, but is based on understanding the causal relationships of phenomena and processes, which significantly increases its motivation and effectiveness.

The Ukrainian Distance Learning System - UDL System (http://www.udl.org.ua/) is interesting for all subjects of the educational process. UDL System is a partner organization that brings together higher education institutions, research institutions, banks, corporations and non-profit organizations to create new quality through the innovative application of the latest information technologies in education Objectives of the UDL System:

to expand the scope of educational services in Ukraine, using Web technologies in order to make the process of learning and research more efficient, accessible and more interactive;

provide training services for businesses and individuals in Ukraine through distance learning using e-mail and the Internet;

to provide professional development and advanced training in the field of distance education, development of online courses and their teaching remotely;

engage in market research and promotion of distance learning methods and technologies;

create a joint portfolio of courses and develop professional certified programs and offer them to students, entrepreneurs, executives and corporations;

provide support and assistance to universities and business schools in the use of multimedia telecommunications network technology to more effectively promote their products and services in the business environment;

to conduct research work on pedagogy and teaching methods in a virtual environment; Provide resources, information and skills for the dissemination of distance learning tools in business education in Ukraine.

It should be noted that in the process of work, study or obtaining the necessary information there is an increasing need to process texts in a foreign language. The modern software market offers various dictionaries and translators to automate translation. Among such programs, the most popular are the ABBYY Lingvo electronic dictionary, which, in addition to the direct translation of

the desired word, offers examples of its use, and the multifunctional electronic translation software Prompt XT, which can process text documents saved in various formats, including PDF.

If the need for translation is quite rare, it is not advisable to buy and install special licensed software on your computer. In such cases, you can use free online dictionaries and translation services. Most translation programs and electronic dictionaries are licensed. In case you need to translate mainly from Ukrainian into Russian and vice versa, the Play program, which is a part of the ProLing Office package, is easy to use. In addition to the electronic translator itself, the package includes the Ruta program - a spell checker program in Ukrainian and Russian texts, as well as the Ukrainian-Russian and Russian-Ukrainian dictionary Ulysses. The program is easily integrated into standard Microsoft Office programs and allows you to translate, for example, directly in the document window of the MSWord word processor. Internet technologies help to master a foreign language and promote its practical application. They allow:

deepen their knowledge constantly, not only in foreign language lessons;

use additional opportunities, in particular through distance learning courses;

receive additional materials and texts in the original language; perform exercises and send them by e-mail for testing to the teacher;

receive individual recommendations for further training;

use translators, electronic dictionaries, in particular online;

discuss various issues through individual communication by e-mail or on electronic forums in the relevant foreign language.

The development of state standards in the field of teaching aids is based on a system of conceptual requirements for these teaching aids. The development of requirements for e-learning tools is especially important, because standards in this area are just being formed. Identifying ways to develop and implement requirements largely depends on the classification of tools. In the context of the formation of a single information and educational space, the classification provides guidelines for the selection and use of the necessary tools on a single basis, the basis for creating common requirements and standards for teaching aids, their subsystems, systems and complexes. The problem of identifying the main types of software that need to be formulated requirements, creating a systemic basis of their typology does not have a clear solution in our time due to the emergence and development of new approaches, technologies that are not yet sufficiently developed and researched. Due to the intensive development of information technology, new areas and ways of using software tools are emerging, so the problems of their typology are becoming more acute [6, 10]. An important step in developing a classification and creating requirements for teaching aids is to define and streamline terminology. Identifying and classifying types of activities in the field of education is a promising object of research today [1, 4, 5]. The issue of classification of teaching aids and their main types was considered in [3, 6, 9, 10, 11]. However, the activity aspects of the use of teaching aids related to identifying the role and place of certain types of tools in the overall structure of educational activities, which types of processes can be automated with their help, what are their stages and components, what functions perform certain types of tools. In addition, the classification and formulation of requirements for promising types of software, in particular tools with elements of artificial intelligence, which are little studied, needs further development. The aim of the work is: to propose a classification of teaching aids, based on those types of activities to support which can be used tools of each type. Consideration of these aspects can be a further basis for creating requirements for certain groups of e-learning tools. The main groups of terms in the field of software training. Problems of terminology are one of the reasons for the difficulty of creating requirements for learning software. Often the concepts used are given different meanings. For example, such a term as "electronic textbook", according to some authors characterizes the pedagogical software in general, and according to others - a certain type [5, 7]. One way to solve this problem is to consider the types of activities for which computer support is designed. This approach to the problem of classification will make it possible to more clearly define what meaning is embedded in the term, if it is not fully characterized by the definition. When considering the classification of e-learning tools, a certain hierarchy can be identified. The group of terms of the

upper level of the hierarchy includes those that can characterize these learning tools in general. This group includes such as "electronic learning tool", "computer-based learning tool", "software learning tool", "computer learning system" and others [3, 6, 9, 10, 11]. Recently, the term "digital electronic resource" has become widespread [2, 5, 8]. At the next level of the hierarchy, two groups of tools can be distinguished - tools with elements of artificial intelligence (AI), in which there is further differentiation, as well as tools that do not contain these elements.

It is worth focusing on the interpretation of the terms of the group of tools with elements of AI, which is quite extensive and very little covered in the literature. Expert system of educational purpose - a system that manages learning in a subject area by providing a sequence of educational tasks, explaining them, diagnosing errors and monitoring the achieved level of knowledge. Modeling student activities is based on knowledge. Knowledge processing involves obtaining results based on existing knowledge, generating answers to questions, making logical conclusions and transformations in the process of solving problems, explaining the sequence of their reasoning in a way that is understandable to man [8, 14]. There are a number of types of systems of this type. Expert system of educational dialogue. It is used, as a rule, to master the conceptual apparatus of a subject area by asking questions and providing answers [8, 14]. Expert language learning system or translation system. It is designed to teach various aspects of language use - replenishment of vocabulary, formulation and writing of expressions, automatic translation, dialogue, etc. [8, 10, 11]. Expert system of teaching subject or artificial languages. It can be used to master the rules of using symbolism, transforming formulas, equations, constructing expressions of formal languages, etc. Expert classification system. Designed to teach classification problems, such as biology, chemistry, medicine, and more. Working with the system is to master the rules of classification to assign objects of study to a particular class, type, species, subspecies, etc. Problem-oriented expert system is used to solve problems that require planning, algorithms, problem-oriented rules or schemes, each of which leads to solving a specific problem or sub-task, in various fields. The expert system of proof of theorems is designed to teach solving problems of proof, which consists in obtaining consequences based on a set of axioms (initial statements), theorems (inference statements) and rules of inference [16-18].

Modeling environments (microworlds) are used to study some integral part of the course. In the structure of the environment the means of description and operation with the studied objects, their properties, relationships in the software language are implemented. These are programs of simulation modeling of some microworld with the possibility of achieving certain educational goals, guided by guidelines. Quite often these environments provide higher education students with the basic elements and types of functions for independent creation of a model of a certain phenomenon or situation [9, 11, 17]. Simulator programs are designed to master complex situational algorithms (decision-making, management), to master the skills of working with technical equipment (design, commissioning, installation, etc.), for diagnosis and classification (troubleshooting, detection of class affiliation, medical diagnostics), in general, to solve problems that require procedural knowledge in the form of scenarios, situational algorithms, plans, schemes of action, etc. "Intelligent" knowledge control program - a system of educational purpose (or its module), which monitors the level of knowledge of higher education students diagnoses errors, provides recommendations for their correction, evaluates the results of repeated surveys, adjusts the complexity of questions depending on the stage of study on which the student is. The student's knowledge and skill level can be monitored continuously, but not necessarily at the end of a topic or course. The program may contain a number of knowledge (concepts, rules, regulations), which are offered to the applicant for higher education for repetition, if as a result of diagnosis their absence is established as the cause of errors. Experimental simulation program, namely the environment for experiments or laboratory work, the production of which is difficult or not possible in a higher education institution (for example, due to lack of costly equipment). The work in the environment is based on the use of computer simulation models of objects of study. Means of implementation of specific procedures of the experimenter's activity are provided - selection and adjustment of parameter values, measurements, construction on the basis of data of tables, graphs, interpretation

of results. Classification of teaching aids with elements of artificial intelligence. Teaching aids with AI elements make up a significant class of software. The main difference of this group of tools is the use of concepts of modeling the intellectual activity of the student as one based on knowledge Approaches to knowledge modeling developed in the field of artificial intelligence (AI) are finding new areas of application in education. There is a tendency to further intellectualization of educational software [4, 8, 11, 14, 15].

Particular attention should be paid to educational software (ES), which should perform a number of functions: individualization of the learning process, diagnosis of errors with two-way communication, self-control and correction of learning activities, efficiency and visualization of learning, simulation of processes and phenomena optimal solution, increasing learning motivation, etc. Today the list of ES includes electronic manuals, lectures, tests, reference books, educational bases, collections of tasks and generators of examples, subject-oriented environments, educational and methodical complexes; program-methodical complexes, etc. It should also be noted the positive capabilities of modern Internet technologies that allow the use of experimental resources, virtual online laboratories, where experiments are conducted on virtual or remote equipment. A number of low requirements are set for the developers of ES, the implementation of which affects the effectiveness of their use in the educational process. The advantage of educational software compared to traditional non-learning tools is the availability of easy-to-use means of visualization of educational material: static and dynamic representation of objects, processes, phenomena, their components, graphical representation of patterns and results of student experiments, experiments, solutions. One of the advantages of ES is the quick feedback between the user and the IT tools, which ensures the implementation of a dialogue between the higher education seeker, the teacher and the software learning environment. This feedback is called software interactivity. Thanks to the use of ES, learning can be carried out at the pace that most satisfies the applicant.

Pedagogical software can be divided into the following groups:

electronic textbooks - electronic educational publications that supplement textbooks and contain educational material on a particular subject, individual sections of the discipline, elective course or elective course, often presented using multimedia tools;

electronic (virtual) workshops - electronic training collections of practical tasks and exercises, including: virtual laboratories, electronic simulators, electronic task books; electronic means of control of educational achievements;

multimedia tools for illustrative and reference purposes.

There are combined ES, which combine software from different groups, they are generalized multimedia, or interactive courses. Regardless of the type of pedagogical software, it is possible to assume the presence of the following components:

program menu, which displays the content of the material in the software or provides access to its main functions;

hypertext navigation system between blocks of educational or reference material;

search engine for quick access to the desired block;

references from the subject material or from the program management tools.

Depending on the type of ES, it may include: text information block; collection of graphic images; collection of audio and video materials; unit of training exercises and practical tasks; control unit.

Some ES are developed on client-server technology. They are designed for use in the educational process in full-time education. It is assumed that the server part of such tools is installed on the teacher's computer, and the client part is installed on the hackers' computers. At the same time, it is necessary to take into account the possible negative consequences of the active use of computer technology in education. Using electronic means of monitoring academic achievement, students become accustomed to simple, concise answers to questions that are undesirable during an oral interview. Electronic textbooks do not provide the opportunity to explain the material in other words, if the student does not understand some of the wording, so the program can not fully replace

the work with the teacher. Training material on individual subjects in electronic media may be outdated, this should be taken into account when using them.

Today, more than ever, students need a full-time form of learning when they communicate directly with the teacher, as opposed to a distance form where learning takes place at a distance. Educational services in distance learning are usually provided through computer networks. Applicants for higher education register on special training portals, receive training materials, individual assignments, and download them to their computers if necessary. According to the proposed study schedule, students independently perform tasks and send the results to the teacher on the portal. The teacher, who is called a tutor in the distance learning system, checks the completed tasks and gives each student a grade or the appropriate number of points, which are entered in a special electronic journal on the educational portal. In addition, the learning process may involve testing knowledge in the form of testing. Applicants for higher education can consult with both the tutor and each other. There are appropriate tools for this on the training portal, where special software called distance learning system is installed. The advantages of distance learning include: the ability to choose your own pace of learning; the possibility of studying in an area that is more comfortable for the student (pupil, student); variety of means and methods of teaching; gaining knowledge in the field of new technologies and studying subjects not available in educational institutions.

In Ukraine, the system of distance learning is implemented by educational institutions and business structures as a form of higher education, training, staff training, organization of training of people with special needs and more. Technologies and environments of distance learning are being developed, which differ in the form of presentation of educational materials, ways of organizing control of the educational process, etc. Today, in the period of development of information and communication technologies in all fields, the analysis of modern tendencies of maintenance of quality of preparation of experts is especially actual. Consider this issue based on the fact that the problem of managing relationships with future professionals, in terms of studying this problem through the prism of the concept of CRM-system (Customer relationship management), namely the concept that covers the concepts used by companies to manage customer relationships , including the collection, storage and analysis of information about consumers, suppliers, partners and information about relationships with them. Note that modern CRM is aimed at studying the market of educational services and the specific needs of future professionals. Based on this knowledge, new products or services are developed and thus universities and other higher education institutions have the opportunity to achieve their goals and improve the level of training. There are three CRM approaches, each of which can be implemented separately from the others:

operational - automation of consumer business processes, which helps research and teaching staff to work with students and perform their functions;

collaborative - the program interacts with the subjects of this process without the participation of staff working with applicants for higher education;

analytical - analysis of information about students for various purposes.

Principles of CRM systems:

availability of a single repository of information, where at any time available all information about all cases of interaction with higher education;

synchronization of control of multiple channels of interaction;

constant analysis of the collected information on applicants for higher education and making appropriate organizational decisions.

To implement this task, it is advisable to design and develop a database that reflects the results of higher education institutions that provide services to those wishing to increase the level of knowledge in the field of information and communication technologies. We are talking about students of various specialties, schoolchildren, namely, those who are not future specialists in the field of information and communication technologies. The problem was solved using Microsoft SQL Server. Microsoft SQL Server is a commercial database management system distributed by Microsoft. The language used for queries is SQL. It is advisable to create a database diagram in

"dbForge Studio for SQL Server". Database users who create object tables and classes must have the appropriate access rights to create objects in the database and the schema in which those objects will be created. "DbForge Studio for SQL Server" allows you to perform all actions on databases in the graphical interface, while writing in the appropriate area in the form of SQL code. Figure 1 shows the ER-diagram of the database. When creating database tables, you also select primary and secondary keys. Once the links between the tables have been established, our tables have been completed.
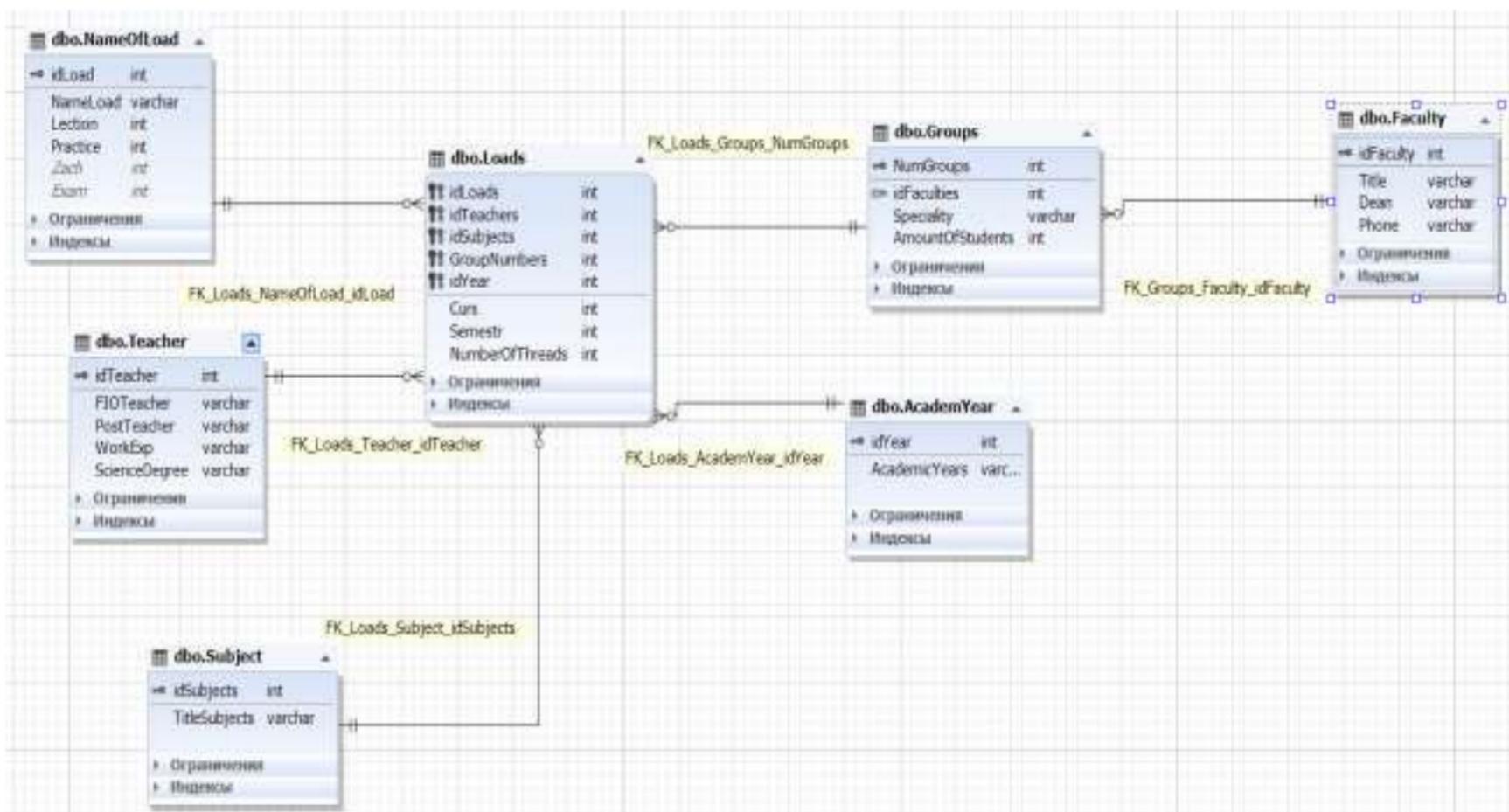

Fig. 1 ER-diagram of the developed information system

For each database that is implemented, you need to perform a series of tests to minimize future usage problems. Database testing is the verification of various aspects related to the database, including the reliability and integrity of the data. Basic testing of the created database includes the following points:

Entering in the int field data in varchar format;

Add an entry to the all table;

Delete an entry from the all table;

Update information in the all table (Replace name);

Limiting the number of characters in the field type;

Correspondence of information of one record in various tables;

Correspondence of information in the fields of its type;

Automatic creation of table indexes;

Data integrity in the database;

Check the relativity of the database;

Installation of Foreign/Primary Keys.

From a technical point of view, testing is to run the program on a set of initial data and reconcile the results with previously known (reference) in order to establish compliance with various properties and characteristics of the program to the ordered properties. After testing, errors were found and eliminated. The information system works correctly. The functional completely and unmistakably carries out the set tasks.

Learning activities in the information and educational space actually acts as a process of working with knowledge. And this means not only the amount of knowledge that is the object of study, mastery, although it is the central point and purpose of learning, but also the sum of skills,

techniques, methods of operating them. Modern means of information and communication technologies to a large extent act as means of activity based on knowledge, or can be integrated into the system of such means. The development of software requirements can be largely based on advances in artificial intelligence in terms of computer modeling of learning activities and their components. Therefore, the application of approaches to knowledge modeling provides a basis for the formation of a common basis for combining different areas and approaches to the development of tools and their evaluation. The fact that the classification is based on the identification of types of activities with knowledge, is a common basis for combining tools of different types, taking into account the internal system of knowledge itself. The classification of teaching aids with elements of artificial intelligence and their varieties according to the types of activities that are the object of modeling deserves special attention. This approach is also productive for further developing requirements for these tools, and can also be used to develop requirements for other types of tools that are also designed to support knowledge processes but do not contain knowledge models. The first direction of software evaluation problems is that these tools can act as components of e-learning systems, in which case approaches to evaluation should be based on lists of functions to be implemented in the system. The second area of problem is the development of requirements for system components, which requires identifying the types of tools that must be available to perform this set of functions.

Conclusions. In modern conditions of informatization of society the main directions of using information technologies in the educational environment are the organization of learning based on a combination of all teaching methods, pedagogical and information technologies, in the development of a single information space, and expanding opportunities to improve education through modern information technologies. Information technologies in education are not only teaching aids, but also qualitatively new technologies in the training of competitive specialists, because in the period of study at universities the foundations of professionalism are laid, the skills of independent professional activity are formed.

One of the definitions of information educational environment formulates its understanding as an information system that combines network technologies, software and hardware, organizational, methodological and mathematical support designed to increase the efficiency and accessibility of the educational process of training. One of the characteristic features of the educational environment is the ability of students and teachers to freely access structured teaching materials and multimedia complexes. In addition to the availability of educational material, it is necessary to provide students with the opportunity to communicate with the teacher, get advice online and offline. The opportunity for personal development and professional growth remains important for students, which is why today there is a growing need to use innovative teaching methods in the development of information and telecommunications technologies.

The use of innovative teaching methods in the development of information and telecommunications technologies in the educational process of higher education provides an opportunity to significantly improve the quality of training of future professionals. The need to introduce innovative teaching methods in the credit-module system in the process of professional training of future professionals, using modern technological capabilities, requires further research and development.

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