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**TRAINING OF ENGINEERS IN THE FIELD
OF INFORMATION TECHNOLOGY
WITH THE USE OF DISTANCE EDUCATIONAL TECHNOLOGIES**

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Training of Engineers in the Field of Information Technology with the Use of Distance Educational Technologies

The article is devoted to the issues of professional training of future engineers in the field of information technologies in conditions of using distance educational technologies. In the process of research, in order to realize the use of distance educational technologies, the training and methodological support of the process of training future engineers in the specialties "Computer Engineering" and "Software Engineering", consisting of network electronic courses in the disciplines "The Basics of Creating Internet Applications" and "Modern Internet Technologies", which include electronic interactive educational materials on disciplines and means of interaction. As a technology platform for the implementation of training using distance learning technologies, the distance education system "Moodle" is used. The main learning tool used in this system is the distance course, which consists of a large set of interactive elements.

The author singled out the psychological and pedagogical conditions for the training of future engineers in the field of information technology in the context of distance learning. The main features of the process of training engineers using remote educational technologies that significantly influence the organization of the learning process and require great methodical work are studied and determined. The results of the research show the effectiveness of using distance education technologies in the system of training engineers in the field of information technology.

Key words: distance education technologies, distance course, training of engineers in the field of information technology, system of distance learning "Moodle".

At the present stage of development of a society, professional activity of a specialist is a complex dynamic process. The main requirement for any specialist is, above all, the ability to adapt to new conditions and to master new technologies. For future engineers in the field of information technology (IT professionals), this task is

especially relevant, which is related to the specifics of the object of their professional activities.

The basic principle of modern education is its continuity. In this regard, in the process of teaching, it is expedient to introduce such methods and technologies that contribute not only to the formation of professional knowledge and skills, but also develop the ability to independently carry out their cognitive activities and use modern information tools for gaining new knowledge.

Each higher educational institution, separately, and the whole educational system as a whole, try to improve the process of training specialists in the field of information technologies, making the most of innovative pedagogical technologies, in order to increase the efficiency of the educational process.

One way to solve this problem, as well as the tasks of individualizing the learning process, is to consider the use of remote educational technologies in the process of training IT professionals [1; 2].

The problem of the introduction of information technology and the use of distance learning in the educational process is considered in the works of such domestic scientists as V. Bykov, O. Bondarenko, Y. Bulakhova, V. Zabolotny, G. Kozlakova, O. Mischenko, O. Pinchuk, O. Shestopal and others, as well as in the works of foreign authors – O. Andreev, N. Gein, N. Davydov, O. Kalmykov, V. Kinelev, Y. Kruglov, M. Lapchik, E. Mashbits, E. Polat, I. Semakina, V. Soldakhin, V. Tikhomirov, E. Henner, A. Khutorskoy and others. From the analysis of these works, it follows that the development of the process of using new technologies in education can be realized through the formation of an educational information environment. However, these studies do not cover issues related to the formation of an educational information environment that takes into account the peculiarities of IT specialists training at the university.

The purpose of the article: to highlight the psychological and pedagogical conditions of the training of future IT specialists in the conditions of distance learning; To explore and identify the main features of the process of training future IT engineers using distance learning technologies.

In pedagogical literature, a number of characteristics are inherent in any type of distance learning technology, if this training is supposed to be effective [3]:

- technology of distance learning involves more thorough and detailed planning of the student's activities, its organization, clear statement of goals and objectives of training, delivery of the necessary training materials;

- interactivity – the key concept of the learning process based on distance learning technology; Technology of distance learning should ensure the maximum possible interactivity between a student and a teacher, the feedback between the student and the teaching material, provide group training opportunities;

- it is extremely important to provide highly effective feedback so that students can be sure of the correctness of their advancement from ignorance to knowledge; Such feedback should be both operational, operational and delayed in the form of an external evaluation;

- motivation – also the most important element of specialist training on the basis of distance learning technology; it is important to use various methods and means for this purpose;

- the structuring of the course on the basis of distance learning technology should be modular so that the student has the opportunity to clearly understand his progress from the module to the module; Volumetric modules or courses significantly reduce the motivation for learning.

The effectiveness of the use of distance educational technologies in the training of IT professionals also depends on a number of psychological and pedagogical conditions that must be taken into account when organizing the learning process.

The analysis of literature allowed us to highlight the following psychological and pedagogical conditions for the training of future IT specialists: psychological features and methods of interaction of the teacher and students in the conditions of distance educational technologies; use of pedagogical technologies; development of methodical materials and methods of their delivery; control and self-control of students; selection and use of feedback types; the choice of ways to organize training with the use of remote educational technologies.

Regarding the ways of organizing training with the use of distance educational technologies, the most common "way" to create a distance learning system for a long time was to translate the teaching materials into an HTML form and place them on the websites of educational institutions. Currently, all market participants agree that online access to educational material alone is not enough to talk about a complete training system. Obviously, learning involves not just reading the teaching material, but also actively understanding it and applying the knowledge in practice [4].

Today among the companies of developers and providers of services in the field of distance learning can be noted the following:

- The system of distance learning WebTutor;
- The system of distance learning "Prometheus" (<http://www.prometeus.ru>);
- The system of distance learning "DOCENT";
- LMS eLearning Server (<http://www.learnware.ru/static.php?id=3010>).

Among the freely available existing OpenSource systems LMS\LCMS, the following can be distinguished:

- ATutor (<http://www.atutor.ca/>);
- Claroline (<http://www.claroline.net/>);
- Dokeos (<http://www.dokeos.com/>);
- OLAT (<http://www.olat.org/>);
- Sakai (<http://sakaiproject.org/>);
- Moodle (Modular Object-Oriented Dynamic Learning Environment) (<http://moodle.org/>).

In the Luhansk Taras Shevchenko National University, the system of distance learning "Moodle" was chosen as a technological platform for the implementation of distance learning with the use of distance learning technologies, which combines the richness of the functionality, flexibility, reliability and ease of use. The main means of learning used in this system is a distance course, which consists of a large set of interactive elements such as a glossary, resource, task, forum, wiki, lecture, test and others. These elements include both traditional distance learning and distance learning, libraries for teaching and teaching materials, communication subsystems

and testing subsystems. The subsystem of communication allows participants of the educational process to interact both in synchronous and in asynchronous modes.

At the same time, educational, methodological and informational materials of the distance course are located in the software environment, which provides protection against unauthorized access, authorization of access, structuring of users by category, formation of a catalog of information resources, etc. This process involves the organization of student activities, leadership, management of this activity by the professional-teacher. The process of learning is characterized primarily by the fact that it is interactive in its organization, that is, in the interaction of a teacher and a student.

In the course of research for the implementation of the use of remote educational technologies, we have developed a teaching and methodological support for the training process for future engineers of the specialties “Computer Engineering” and “Software Engineering”, consisting of network electronic courses on disciplines “Fundamentals of Internet applications creation”, “Modern Internet Technologies” and others, including electronic interactive teaching materials on disciplines and means of interaction.

The core of these courses is electronic interactive teaching materials, the structure and sections of which correspond to the work program of discipline. The number and content of the training modules corresponds to the topics being studied.

Each module of the course contains cognitive and practical parts. The cognitive part forms the course participants the theoretical knowledge necessary to solve professional problems. The practical part is designed to develop professional skills and abilities. Both parts mutually complement each other and allow the future engineer to formulate the competences necessary for practical work.

Remote training of future engineers in the field of information technology has a number of features, among which the following can be noted:

- a very wide spread in the level of basic training of students: some are already working and have some experience, while others (and a lot of them) are only beginning their way to mastering the profession;

- a large number of used programming languages and development tools: even the most popular ones form a whole list – C ++, C #, JavaScript, PHP, HTML, CSS, jQuery and others [5];

- the practical orientation of the preparation, when the student needs a large independent work on writing various programs without constant contact with the teacher.

The above factors greatly influence the organization of the educational process with the use of distance educational technologies and require the teaching staff to do extensive methodological work.

The main element of mastering the program of courses is the independent work of students, which includes:

- work with developed electronic educational materials;
- preparation of algorithms for solving tasks by topics and writing programs in accordance with the compiled algorithm.

It is in the process of solving problems that the maximum proportion of new material is studied, so the task system plays a huge role in the preparation of future engineers in the field of information technology.

Given the peculiarities of programming as a type of educational activity, one can distinguish the following tasks:

- ability to navigate in a variety of software products in search of new information;

- on the ability to determine the most effective methods of collecting and processing information;

- the ability to describe and structure data;

- the ability to construct an algorithm solution, as a step-by-step conversion of the source information into the resultant;

- on the ability to master the methods of using software to solve practical problems;

- the ability to develop interfaces, models of components of information systems, including database models;

– on the ability to use modern tools and programming technologies [6].

The set of tasks for practical implementation is ensured by purposefulness, diversity, mutual connection, consistency and gradual complication of works.

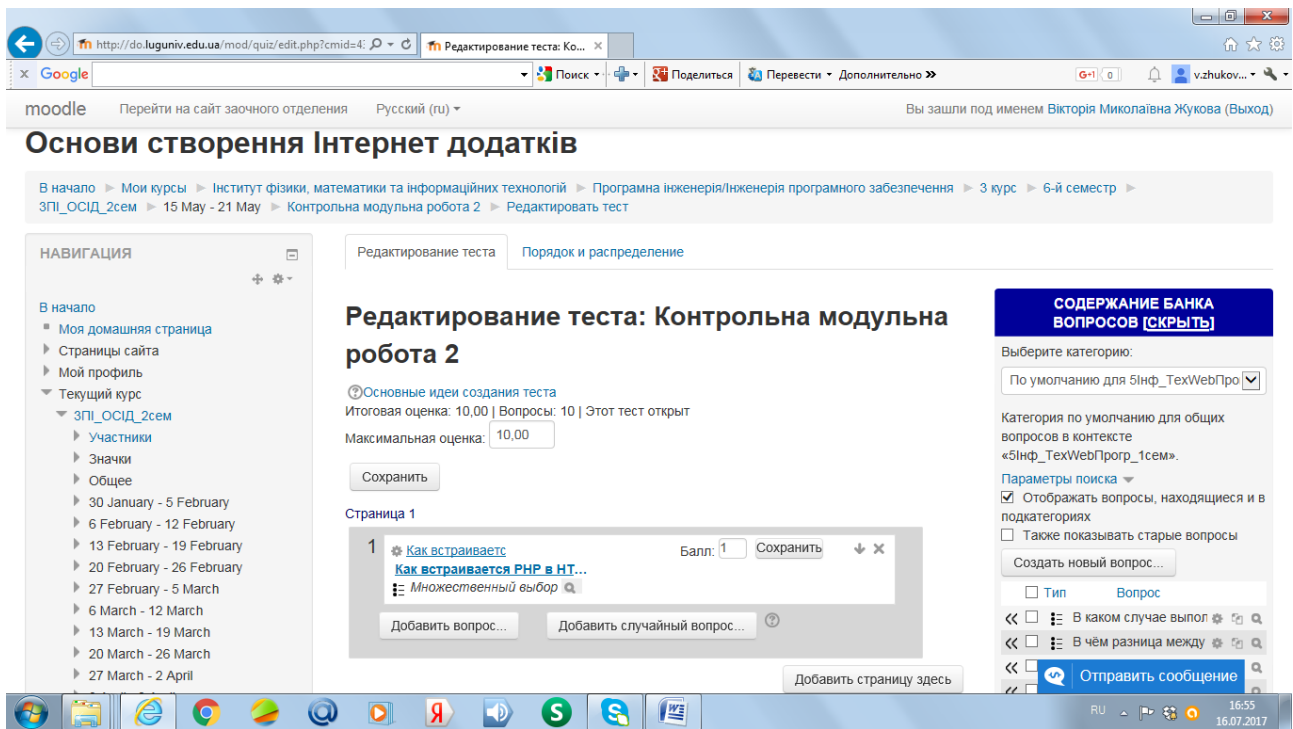
In the conditions of distance learning, control of the skills and abilities of future engineers becomes very important. The monitoring of the success of such training should be operational and foreseen in the development of appropriate teaching materials from the lead teacher.

Current control is to carry out laboratory and practical work, and to verify the correctness of the student's written program. For intermediate control of students' progress, computer testing of passed topics is used, the active use of which helps maintain the educational level of future engineers. The final control tasks in the discipline are a programmatic implementation of the task, which includes material on all topics of the course, or can be in the form of tests, abstracts, presentations, creative developments.

To implement computer testing for each course developed and updated and replenished by a large bank of issues stored in the system. The vast majority of questions are formulated unconventionally, so there are no ready answers to them in textbooks and Internet sources. In such a system, guessing and writing off is virtually eliminated.

The teacher has the opportunity to form a test script at his own discretion, including the necessary number of questions on various subjects of the subject (pict. 1). For each correct answer the student receives a certain number of points, which is determined by the teacher.

Another important task of organizing distance learning is the creation of psychological comfort for participants in the learning process. To successfully solve this problem it is necessary to study and take into account individual personality characteristics of students, the level of development of mental properties and qualities, features of interpersonal relations of participants of distance learning, which are important for ensuring the effectiveness of the learning process. It should be



Pict. 1. Formation of the test scenario in the system of distance learning
“Moodle”

noted that, as a rule, students of IT specialties have good skills in working with modern means of information technology. Students are able to use Internet services and communication tools at an adequate level, have experience in chatting, in forums, with Skype. Therefore, in our opinion, they are more suited to learning with the help of distance educational technologies than students of other specialties and directions. Accordingly, the probability of a psychological problem in the process of training in future IT professionals is lower.

Communication is more emotionally rich with audio and video communication. In this case, communication participants can hear and see each other. The visual contact, the voice of the interlocutor maximize distance communication to the eye, thereby contributing to reducing the likelihood of students experiencing the feeling of isolation and loneliness.

Our experience in introducing remote training forms has shown that the process of training an IT specialist with the use of distance educational technologies involves:

– a flexible combination of independent cognitive activity of future engineers with different sources of information, training materials specially developed for this course;

– operational and systematic interaction with the leading lecturer of the course, consultants-coordinators;

– group work in the form of cooperative learning (cooperative learning) with participants of this course, using all the variety of problem, research, search methods in the course of work on the corresponding modules of the course;

– Joint telecommunication projects of participants of the course, organizing the discussion;

– presentations of groups and individual presentations of interim and final results in the course of electronic news conferences, exchange of thoughts, information with participants of the course, as well as, if necessary, with any other partners through the Internet.

The performed research showed that the problem of increasing the efficiency of training future IT specialists at the university is one of the topical problems in pedagogical theory, which requires its further comprehension.

Thus, the use of remote educational technologies activates the self-education activity of future engineers, increases the intensity and systematic work of the academic work, regulates the control of students' educational activities during the semesters, increases the motivation of students to study the teaching material, which ultimately leads to the improvement of the quality of training future engineers in the field of information technology.

The conducted research does not exhaust the whole range of issues related to the problem of using remote educational technologies in the training of IT professionals. The main perspectives of the study may be related to a detailed study of the mechanisms, factors of optimization of the process of training future engineers in the field of information technology on the basis of distance educational technologies, development of their ICT competence in the new information and communication educational environment.

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Жукова В. М.

Підготовка інженерів у галузі інформаційних технологій з використанням дистанційних освітніх технологій

Стаття присвячена питанням професійної підготовки майбутніх інженерів у галузі інформаційних технологій в умовах використання дистанційних освітніх технологій. У процесі дослідження для реалізації використання дистанційних освітніх технологій було розроблено навчально-методичне

забезпечення процесу підготовки майбутніх інженерів спеціальностей «Комп'ютерна інженерія» та «Інженерія програмного забезпечення», що складається з мережевих електронних курсів з дисциплін «Основи створення Інтернет додатків» та «Сучасні інтернет-технології», що включають електронні інтерактивні навчальні матеріали з дисциплін та засоби взаємодії. В якості технологічної платформи для реалізації навчання із застосуванням дистанційних освітніх технологій використовується система дистанційного навчання «Moodle». Основним засобом навчання, що використовується в цій системі, є дистанційний курс, який складається з великого набору інтерактивних елементів.

Автором виділяються психолого-педагогічні умови підготовки майбутніх інженерів у галузі інформаційних технологій в умовах дистанційного навчання. Досліджуються та визначаються основні особливості процесу підготовки інженерів у галузі інформаційних технологій з використанням дистанційних освітніх технологій, які в значній мірі впливають на організацію навчального процесу і вимагають від викладачів великої методичної роботи. Результати дослідження показують ефективність використання дистанційних освітніх технологій в системі підготовки інженерів у галузі інформаційних технологій.

Ключові слова: дистанційні освітні технології, дистанційний курс, підготовка інженерів у галузі інформаційних технологій, система дистанційного навчання «Moodle».

Жукова В. Н.

Подготовка инженеров в области информационных технологий с использованием дистанционных образовательных технологий

Статья посвящена вопросам профессиональной подготовки будущих инженеров в области информационных технологий в условиях использования дистанционных образовательных технологий. В процессе исследования для реализации использования дистанционных образовательных технологий было разработано учебно-методическое обеспечение процесса подготовки будущих инженеров по специальностям «Компьютерная инженерия» и «Инженерия программного обеспечения», состоящее из сетевых электронных курсов по дисциплинам «Основы создания Интернет приложений» и «Современные интернет-технологии», которые включают электронные интерактивные учебные материалы по дисциплинам и средства взаимодействия. В качестве технологической платформы для реализации обучения с применением дистанционных образовательных технологий используется система дистанционного обучения «Moodle». Основным средством обучения, используемым в этой системе, является дистанционный курс, который состоит из большого набора интерактивных элементов.

Автором выделяются психолого-педагогические условия подготовки будущих инженеров в области информационных технологий в условиях дистанционного обучения. Исследуются и определяются основные особенности процесса подготовки инженеров с использованием дистанционных образовательных технологий, которые в значительной степени влияют на

организацию учебного процесса и требуют от преподавателей большой методической работы. Результаты исследования показывают эффективность использования дистанционных образовательных технологий в системе подготовки инженеров в области информационных технологий.

Ключевые слова: дистанционные образовательные технологии, дистанционный курс, подготовка инженеров в области информационных технологий, система дистанционного обучения «Moodle».

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