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Рассмотрены проблемы образования, нанотехнологий, динамики и прочности механических систем, информатики и кибернетики, экономики и управления.

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Для ученых, инженеров, работников и аспирантов ВНЗ.

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Рассмотрены проблемы образования, динамики и прочности, материаловедения, нанотехнологий, экономики и управления.

Для научных и инженерных работников, специализирующихся в области изучения этих проблем.

Розглянуті проблеми освіти, динаміки і міцності, матеріалознавства, нанотехнологій, економіки та управління.

Для науковців та інженерних працівників, які спеціалізуються в області вивчення цих проблем.

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REALITY OF TODAY'S SCHOOL: OPEN ELECTRONIC TEXTBOOK

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In recent years, in all countries of the world, the classical forms of training and tools are in a crisis – the need for their continuous updating and updating of their essence is formed. One of the most promising ways of developing modern education is the use of electronic educational resources (EER) – manuals, textbooks, directories, etc, along with traditional means. Dynamic technological transformations have an impact on changing the paradigm of the ratio of users to textbooks. In particular, on-line access to e-learning materials for students is simpler than the use of traditional printed (paper) textbooks – since some time they have an access to electronic tutorials and PDFs, on-line tutorials and video collections. The experience of educational institutions in different countries, particulary in the USA, Germany and Japan, shows that in these countries authors of commercial publications more and more promote their textbooks without a license. Textbook publication companies counteract this by encouraging schools to use textbooks with applications that, for example, can be homework that should be done on the company's WEB site. That means that if student has purchased a new textbook, he has to enter the registration code on the site contained in the textbook in order to use all of applications. However, if student receives used book, then he has to pay a fee to the publisher in order to gain access to the WEB-site. Another practice in this industry is the packaging of a textbook with additional materials, which can be CDs, workbooks (notebooks), on-line codes and additional materials, which was very criticized.We have to take into account students do not always have the opportunity to buy these materials separately, and often disposable materials

impede the full resale of the textbook. According to The Student PIRGs', the typical completed textbook is used 10–15 % more than not completed – 65 % of teachers say that they rarely or never use full completed materials in their work. The latest trend in the textbooks is "open" free textbooks that are offered for reading on-line. Its appearance is explained by increased attention to the availability and cost of training. At the end of the 90s, the Massachusetts Institute of Technology initiated a movement towards the active development and use of Open Educational Resources [1]. This institute has published OpenCourseWare already in 2000–2001, according to PIRG, they are 80 % more cheap than traditional textbooks.

The importance of this approach was quite quickly recognized by the United Nations Educational, Scientific and Cultural Organization (UNESCO), which proposed to call "open educational resources (OER) digital Educational resources (courses, textbooks, videos, tasks, etc.) that are absolutely free for all subjects of study. They can be used in accordance with the real interests of teachers and students, their content can be freely combined, changed, extended or adapted to the requirements and conditions of the educational institution" [2]. Since then, UNESCO has been actively disseminating OER around the world on the basis of its own UNESCO Open Educational Resource Platform. The search for solutions that will enable the creation of competitive innovative textbooks, the introduction of which will improve and assist the effective delivery of learning material to the student, without the need for additional material costs, focuses on the possibility of using Web-technologies in the development of open electronic educational resources (OEER). The urgency of the development of OEER as an electronic textbook of the new generation in Ukraine is conditioned by the need to provide educational resources and increase the requirements for the quality of education. That, in turn, explains the expansion of pedagogical innovation, which needs the content, forms, methods and means of organizing the educational process to be modernized.

The methodological and theoretical foundations for the creation of OEER were the results of scientific searches of ukrainian researchers V. Bykov, R. Gurevich, A. Gurzhiy, Y. Zhuk, V. Kukharenko, V. Lapinsky, V. Oliynyk, S. Semerikov, O. Spivakovsky, O. Spirina, P. Stefanenko, I. Teplitskiy and others. According to these researches its development and use, according to didactic tasks, allows to carry out and/or support: preservation of educational information objects, interaction of participants in the educational process, object-image reflection of information objects (in audial, visual or audiovisual form), typical and control external devices and special devices (computer-oriented teaching tools) that make up the laboratory systems and more. To enhance the didactic effectiveness of the use of OEER, it can be used in integration (synchronously or asynchronously) with

other teaching materials (for example, methodological recommendations), forming integrated software and methodical complexes.

By the methodological foundations of the creation of OEER we have defined the basic provisions, which mean the following [4; 5]: Electronic educational resource means educational, scientific, informational, reference materials and tools developed in electronic form and presented on media of any type or placed on computer networks, which are reproduced using electronic digital means and necessary for Effective organization of the educational process, in part, which concerns its filling with qualitative educational and methodological materials; An electronic textbook, as an electronic educational resource, is an integral part of the educational process, has a teaching and methodological purpose and is used to provide educational activities of an educational institution and is considered as one of the main elements of the informational and educational environment.

Concept design of OEER is based on individually oriented, differentiated and integrative approaches in education and didactic principles (regularity, consistency, availability, differential approach, science) as well as the principles of adaptability to the individual needs of each student, handling (teacher's ability to correct the training process on any stage), interactivity (communication between subjects of the educational process), optimality (combination of individual and group work; support of psychological comfort of students while working process, etc.) [3–5].

The main idea of the concept was understanding of the leading role of ICT, WEB-technologies, in the organization of the educational process, the use of which opens up broad prospects for the formation of basic and professional knowledge of students, opens creative potential of students and teachers according to their requests and abilities. The explanation of the methodology of OEER creation was based on the provisions of the "National Strategy for the Development of Education in Ukraine until 2021", "Concepts of the Development of Ukraine's Education for the Period 2015–2025", in which the provision of appropriate education quality is proposed through the introduction of an ICT educational process, modern textbooks and real books for professional theoretical training, etc.

The purpose of such textbooks is to modernize the content of education, to ensure equal access for the participants of the educational process to quality educational and methodological materials, regardless of their place of residence and of education, satisfaction of individual educational students and increase of the autonomy of their educational and cognitive activity.

An example of this resource is "An electronic textbook for the Ukrainian language. 6 form" (Fig. 1), which is built on the basis of an integrated presentation of the content of the subject that corresponds to the

curriculum and contains a flexible content management system (cross references, hyperlinks to external and internal objects, etc.), built-in internal navigation system, graphical management and use of external depositaries, hypermedia system, moving elements, drop-down panels (for example, content menu), scalability, the ability to create electronic bookmarks, keyword or phrase searches, providing page-by-page access to the material, ease of navigation and much more.

The development of OEER complies with the general requirements: compliance with the subject's program; observance of the current sanitary norms and ergonomic, programmatic and technical requirements. Tools: WEB-oriented software tools (CMS Joomla 2.5 (Open Source) system), which are based on the organization of interaction between teacher and students, can be used in organization of distance and full-time studying and provide realization of personally oriented, individual and differentiated approaches by integrative functions.

Fig. 1. Open electronic resource "An electronic textbook for the Ukrainian language. 6 form" (http://ualan-6.ues.by/)

Innovative methodology for the creation of OEER is a step-by-step logically constructed procedure: the formation of information content (selection of content and additional information, adjustment and layout of the material (according to the curriculum), technical implementation (justification and selection of software and WEB-technologies (systems and platforms), which can be used as a toolkit; design of a template textbook,

the choice of visualization tools) and the implementation and evaluation of the performed work.

Advantages of these OEER: free (technically and legally) access for all participants of the educational process to content; use of foreign depositories (WEB-depository) and internal repositories – which reduces the load on the server platform of a single textbook, and therefore provides a data transfer rate; Animation of illustrative material – which allows to demonstrate different processes that can not be shown when using traditional teaching methods; possibility to choose the level of study of the topic (differentiation of studying) through the use of cross-references and hyperlinks; Dynamism and openness – the ability to supplement and modify text or illustrative material; it is possible to use such educational technology as a problematic presentation of lectures, heuristic method of practical lessons, laboratory work, problem-oriented business and role-playing games that shows the possible future professional preferences of students by modeling different professional situations; the strategy of educational interaction where teacher is not only a carrier and transmitter of scientific information, but also is the organizer of the learning process of the students, he not only builds the content of the discipline, but also designs studying according to the curriculum, using the properties of linking hypermedia content of the textbook. Social significance of OEER is in development of innovative methodology of the creation of electronic textbooks, which is based on the WEB-technologies, which has a clear focus on an innovative upgrade of the textbook production system in Ukraine. Use of the developed with modern requirements electronic books, as open educational resources, helps to provide educational tools in schools.

The scientific novelty of the work is that the innovative method of creating textbooks on the basis of WEB-technologies has been further developed. The practical significance of the results is the analysis of software, which are designed to develop ESM, and explanation of the use of WEB-technologies (CMS Joomla 2.5 (Open Source)) for creation of innovative electronic book, which are based on the cooperation between teachers and students, and are used for different organizational Forms of study: full-time, part-time, out-of-school and distance learning.

It should be noted that the use of textbooks of the described format in the educational process ensures the implementation of personally oriented, individual and differentiated approaches. The end user receives a simple to use tutorial interface that does not require additional training and which includes all the features of the modern WEB-resource: hypermedia system, moving elements, drop-down panels (for example, content menu), scalability, the ability to create electronic bookmarks, search for Key word or phrase, page access to material, easy navigation, and more (Fig. 2–5).

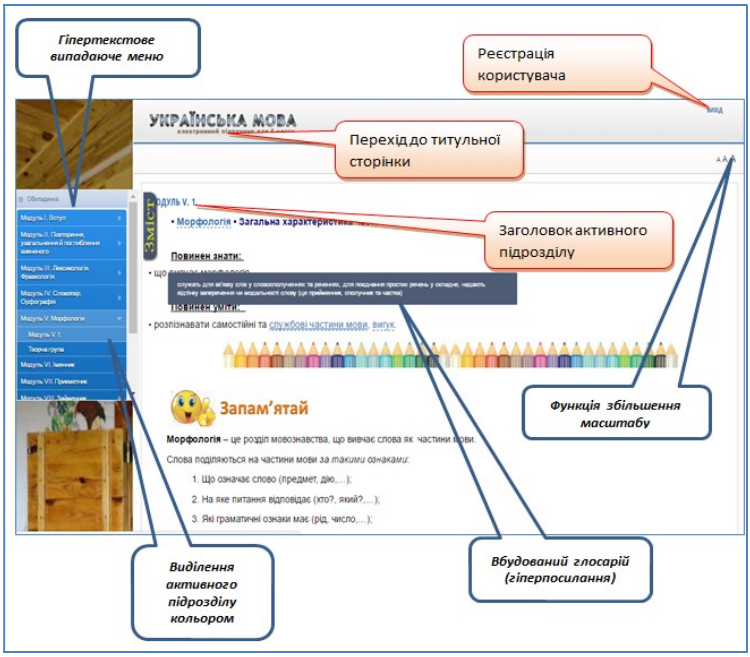

Fig. 2. Functional features of open e-learning resource

The main task of the electronic textbook "Electronic Textbook on Ukrainian Language. Form 6" was the formation of deep and solid knowledge of discipline for students. The content of the training material provides for students necessary knowledge and skills provided by the program.

The textbook is developed on the basis of CMS Joomla 2.5 and can function as an independent WEB-resource, as well as in the electronic library. It can be placed at a random Internet address, thereby creating a cloud of platforms with other textbooks. The end user can access the textbook platform both from the main site and by entering its own address.

The result of the work on innovative textbooks is the goal achievement – to create a template of OEER based on scientifically grounded innovative method of creating electronic textbooks of the new generation, which involves the use of WEB-technologies – freely distributed IT tools, which allows the textbook to provide next qualities: openness , accessibility, ease of use, adaptability to various operating systems and devices, possibility to organize distance learning; dynamism and so on. An advanced and proven effective WEB-technology for designing electronic textbooks is innovative. One of the significant achievements can be considered as the

introduction of didactic-psychological decisions, which ensure the adaptation of the electronic textbook to the personal qualities of each student. Organizational and methodological approaches to the creation of the OEER create the preconditions for the formation of the informational and educational environment of the educational institution, in the future – e-systems (e-platforms) of the OEER for the system of education of the country.

Fig. 3. Functional features of open e-learning resource

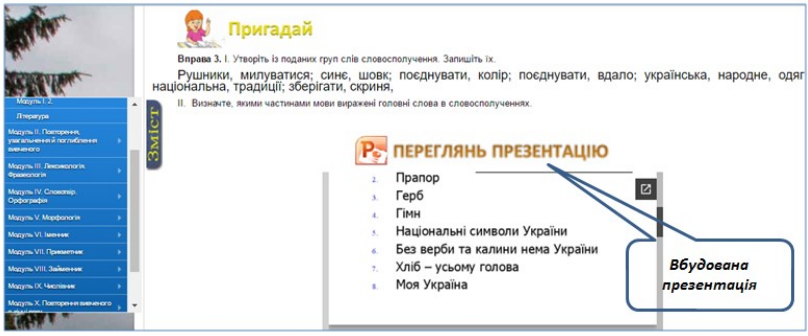

Fig. 4. Functional features of open e-learning resource

Considering a sample, the textbook reproduced in the figures, it should be noted that it corresponds to the Regulation "About Electronic Educational Resources", approved by the Order of the Ministry of Edu-

cation and Science, Youth and Sports of Ukraine dated 10.1.2012 № 1060. The contents of the textbook reveals theoretical and practical issues of the curriculum on the subject. It is oriented on modern forms of education, provides compatibility with traditional teaching materials, fully complies with the normative documents that regulate the content of education.

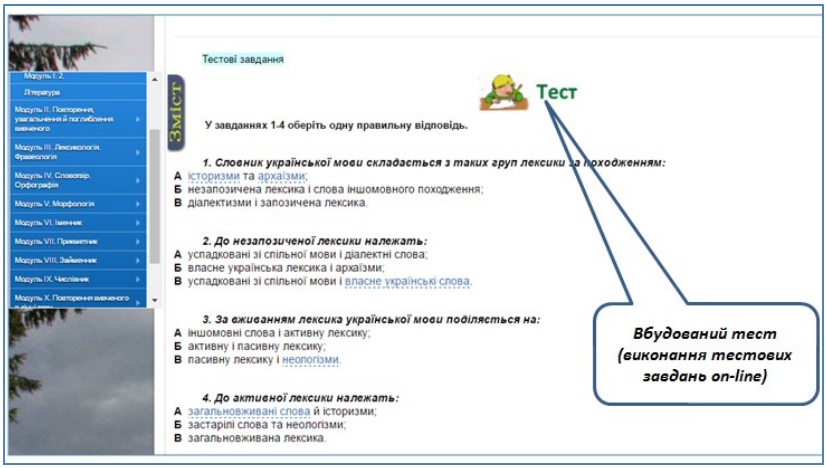

Fig. 5. Functional features of open e-learning resource

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