. System of e-learning management at Sumy State University (SSU), Ukraine

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Among all higher education institutions in Ukraine there are those who first started experiments on including their own web–based developments into educational process: International Scientific Educational Center of Information Technologies and Systems (Kyiv), National Technical University "Kharkiv Polytechnic Institute", National Technical University "Kyiv Polytechnic Institute", Sumy State University (SSU), Khmelnitsk National University, and some others. Mostly widespread platforms for implementation of web-based education in Ukrainian institutes of higher education are Moodle, Prometeus, WebCT and IBM Lotus Learning Space. Still some universities, such as National Technical University "Kharkiv Polytechnic Institute" and Sumy State University are using their own developments.

In 2002 the "Experimental programme for distance learning" was introduced at the University level. In 2008 this experience was acknowledged at the level of Ministry of Education and Science of Ukraine.

For solving problems of using e-learning resources in all forms of education SSU has introduced its own learning content management system (LCMS). Key moments of SSU LCMS are support of different interactive studying facilities, complete cycle of development and use of e-learning materials, operating system for segregation of users' duties based upon distribution of roles. Its specific feature is multifunction that provides:

- organization of student educational activity (from the moment of submitting an application to completion of training program);
- organization of teachers' work concerning maintenance of the distance education courses;
- complete life cycle of materials, from the prior planning of the course structure and creation of materials to their introduction into academic process;
- clear distribution of functional possibilities of groups of users (administrator, course authors, developers, tutors, students, guests etc);
- system of electronic messages with possibility of sending copies of reports to e–mails and RSS-syndication;

- forming different training programs and groups, having the singular database of educational materials;

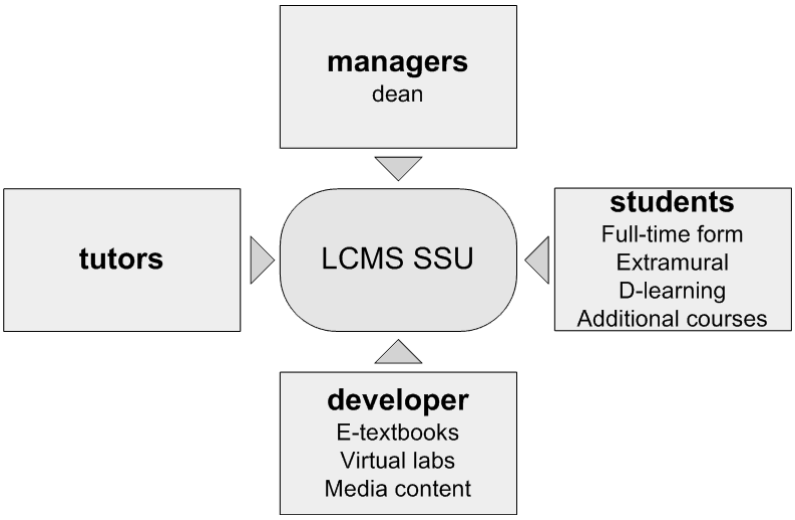

Figure 1. User roles at SSU LCMS

SSU distance learning system is ensured by cooperation of the following units: 1) university administration; 2) distance learning laboratory; 3) regional center of distance learning; 4) teaching staff.

Distance learning system at SSU combines administrative, program-technical and methodical constituents.

The program-technical part is built on a classic for web-oriented supplements scheme. Nginx (static content, media-proxi) and apache 2 (as front-end for dynamic content, and load balancer for the next section) web-servers, cluster with 6 thin (supplement web-server, specific for Ruby on Rails) and PostgreSQL are used as DBMS. This stack works under control of FreeBSD. Connection with other services of SSU is made on the basis of own protocols on the basis of XML.

The component of the technical part of SSU distance learning system is services and extraneous program supply. For better convenience a user has the opportunity to subscribe to RSS-stream of inner mail box and to news of distance learning. Information about terms of tasks fulfillment can also be exported in iCalendar format, which is maintained by most of organizers like: MS Outlook, Evolution, Google Calendar and others. Availability of such appliances is quite important. It doesn't only make users' work easier and allow raising efficiency of answering students' questions but also opens the opportunity to integrate with other educational resources.

Use directions of program-technical part of distance learning system are the following: accurate distribution of functional opportunities of user groups (administrator, methodologist, programmer, teacher, student, guest); maintenance of users communications; providing teacher's work on development and maintenance of distance course; software implementation of distance courses; formation of different curricula and groups of trainees upon a data base of teaching materials; support of students' educational activity (starting from registration in the system to completion of studying program).

Nowadays the methodical constituent of the distance learning system contains more than 200 one or two semester educational distance courses. Distance course is a valuable complex on educational discipline that

contains the complete set of lecture materials, test tasks, computer aids and links to other sources, including traditional sources of information.

Electronic abstracts of lectures provide a student with advantages of availability of needed information and a search rate of required answers.

Among interactive computer tools the following are being used: tests, trainers and multimedia virtual works.

Tests reflect all key points of lecture materials and appear to be an important element in the process of student cognitive activity in relation to perception, comprehension, and memorization of educational materials. On the base of test control some possibilities of adaptive navigation by links are integrated.

Trainers are an interactive computer model, which implements algorithm of typical task solving. In a trainer student gets the orientation on the task solving, by means of instructions that inform what actions need to be done, auxiliary questions are given. The structure of trainers also provides possibility of reception of teacher's consultation concerning certain actions and steps to solve a problem. There are 2 types of trainers. The first type includes those, which contain the typical calculation tasks, and are set off to the student automatically if successfully completed. To another type of trainers belong those, which contain analytical and creative tasks. Such trainers need personal verification by teacher. The introduced system supports both types. Most of tasks are realized using university's own framework based upon java and xml.

Multimedia virtual works are original computer models which are the analogue of traditional practical or laboratory lessons. They virtually display all real world processes to the student. Multimedia virtual works do not only provide information, but also allow acquiring new abilities and skills. Thus the process of mastering theoretical material during work is under control. Multimedia virtual works consist of the following parts:

1) short exposition of theoretical material necessary for conducting of educational research;

2) educational research of the certain effect, process, gear etc;

3) analysis of the received experimental results.

In addition, there is a possibility of returning to theoretical materials part and the repeated work execution in multimedia virtual works.

Methodical base contains over 300 trainers and 70 Flash-trainers. These electronic studying facilities are also pertinent beyond distance learning.

The students of distance education form have the opportunity to pass a complete educational cycle of disciplines for gaining a Bachelor's and later a Specialist's degree.

In the period from 2002 till 2009 Sumy State University has conducted training of economists, financiers, managers, lawyers, information technology experts and journalists.

Distance learning system of Sumy State University is permanently developed and improved in order to provide high quality training of future experts.