

O. S. Meniailenko, SE “Luhansk Taras Shevchenko National University”

O. I. Zakhzhay, SE “Donbas State Technical University”

V. E. Krasnopolskyi, Volodymyr Dahl East Ukrainian National University

E-LEARNING AND DMS-INTEGRATED EDUCATIONAL TECHNOLOGIES BASED ON MOODLE PLATFORM

Menyaylenko O. S., Zakhzhay O. I., Krasnopolskyi V. E.

E-learning and DMS-Integrated Educational Technologies Based on Moodle Platform

Contains the questions of e-learning and DMS services integration in one information system on Moodle platform. The system provides the opportunity to realize both learning modes: synchronous and asynchronous. It takes possibility to realize support of any education form: full-time form, correspondence form, distance form. The proposed concept of integration services allows solving questions of complex automated monitoring and control of education institution.

Keywords: E-learning, Blended learning, Document Management System, education institution's control system, automated education and knowledge level control system, education institution document's processing.

Education process at higher school is one of the classic examples of reasonability of using modern methods and tools for computer-aided information proceeding. Traditionally, the main direction of implementing the modern information technologies at the educational establishments is the education process which is related to the necessity of operating with large amounts of teaching information, effective information presentation for the students and to the organizing operative and advantageous feed-back in the system “student – teacher” [1 – 6]. Today, a variety of electronic teaching means has already been created and is created now that has led to the building the complete direction of applied use of information technologies that has got the name of e-learning.

At educational establishments of Ukraine as well as other countries implementing modern information technologies is connected with a desire to improve

the teaching system of both extramural and full-time forms of education due to evident and doubtless advantages: better demonstrativeness of teaching information with keeping asynchronous and individual educative modes; a great variety of forms to present teaching material, taking into account individual psychological constitutions (dominant channel of information perceiving is audile, visual, kinesthetic and diskettes) [2, 3]; automated control and arrangement of education process results.

But, despite very intense development of e-learning, distance learning systems and information technologies in the use of methods and tools of intellectual information processing based on heuristic data analysis and decision-making, in practice there are no complex solutions regarding the complete cycle of informational support for education process.

That is why, there is a problem related to the necessity of development and improvement of theoretical and implementational foundations of using modern information technologies to create e-learning systems (systems of distance learning) which include the complete support of the whole complex of intellectual processes which cover the tasks of presenting teaching information, knowledge level control and organization of feed-back in the “student-teacher” system.

Despite the clear advantages of e-learning systems (systems of distance learning), we can not underestimate the significant advantages provided by synchronous education mode related to close interaction of education process subjects, their work in classrooms, laboratories, etc. This has led to the fact that modern e-learning development is changed to blendedlearning technologies that allows effective combining the advantages of asynchronous and synchronous modes to gain quality knowledge.

It should be noted that in addition to intensive development and implementation of e-learning technologies, there is one more important aspect of educational establishment functioning – document flow automation which does not have such upward trend that significantly decreases the efficiency of educational activity.

So, two analyzed main aspects of educational establishments functioning – educational process and document management – are in close interaction that proves the necessity of developing complex solutions on their improvement.

Today a significant success has been achieved in the sphere of creating and researching approaches, methods, models and algorithms of automated management of educational process. Such scientists as R. Arnold, C. Geyer, G. Preiß [5 – 7] and others has made a great contribution. Fundamental researches of information technologies have been made by M. L. Minsky, V. P. Bepalko, A. M. Aleksyuk [8 – 10] and others. Modern practical developments have been made by A. I. Bashmakov, N. V. Matviishina, M. S. Antonyk [11 – 13] and others. Analysis of works in this sphere has demonstrated the disconnection of approaches to the organization of education with information technologies. The majority of works is aimed to solve the concrete aspect of work but there is no generalization and complex approach to organize the entire education process from setting educational tasks to knowledge level control. Also there are a lot of different e-learning solutions including the most popular: Moodle, SAKAI, ATutor and ILIAS.

A problem of automation of educational establishments' activity does not have a great variety of solutions. As a rule, in this case they use cross functional DMS, the most popular among which are AlfrescoOne, docSTAR, A-site, SmartFile and filedepot. But all these systems are general and not adapted to the requirements of document circulation related to the education process. So, taking into account the specificity of educational establishments, using these systems needs to conduct the additional adaptation which is not able to provide the most productive result. In addition, such systems are not oriented to support e-learning tasks and educational process management.

Thus, solving the problems of education process organization and document circulation needs the use of two separate systems: e-learning and DMS that is not an efficient solution because: 1) load on server platforms hardware is increased; 2) each system requires the individual data base on the server (two systems need at least two data bases on the server that leads to the

additional costly equipment and in the case of using hosting services – to material expenditures); 3) complication of data exchange between e-learning and DMS systems due to the absence of complete integration and matching of document formats; 4) complication of administration (it is necessary to administrate each system on individual basis and to have separate processes of distributing access rights to both systems); 5) it is necessary to create two member accounts for each user.

Accordingly to this, there is a vital task of integrating e-learning and DMS services to the single system for effective organization of information support of educational establishments. This will allow removing the above-mentioned defects. To develop the conception of such integration it is necessary to place the additional requirements including the following: workability of *videoconference* technology to organize the lessons and business meetings without the demand of managing the great number of contacts (approach of automated registration of participants but according to the existing access rights); creation of combined *e-learning/DMS* system to support the educational process and to automate document flow; decentralization of administrative tasks and resource management and multilevel management architecture.

Operating on the premise that the system, first of all, must be oriented on the needs of education subjects, implementation of conception of integrating e-learning and DMS services must be conducted on the base of the e-learning system. Comparing with the existing e-learning systems, the most possibilities for integration are provided by Moodle platform. This is due to the fact that the most important thing for implementing DMS services is the possibility of adaptive management of resource access. At this, it is advisable to have not only functionality for creating any number of user accounts with individual access policies but implementation of multilevel distribution of access rights for each account. In this case, Moodle platform has advantages because in addition to creation of individual access accounts and adjustment of account policies it is possible to set accounts for different levels such as the main page, system, course categories, course subcategories, courses and course elements. The additional advantage for using Moodle platform is the fact that

it is distributed according to OpenGPL license and it is the most common e-learning platform in the world and the most common one in Ukraine.

The proposed conception for integration of e-learning and DMS technologies is illustrated by the generalized flow chart at fig. 1. According to this structure, decentralization of administrative tasks is implemented on three levels: administrative, faculty and departmental. Moodle platform has three global categories to implement administrative functions: Administration category, Faculty category and Department category. Having such organization, distribution of administrative functions is flexible and can be changed by increasing the number of intermediate levels or by their removal to complete centralization.

All levels have exact orderliness that provides effective distributions of rights to access the data on the level of user, group of users, subdivisions and groups of subdivisions. Policy of access rights can be adjusted in a wide range.

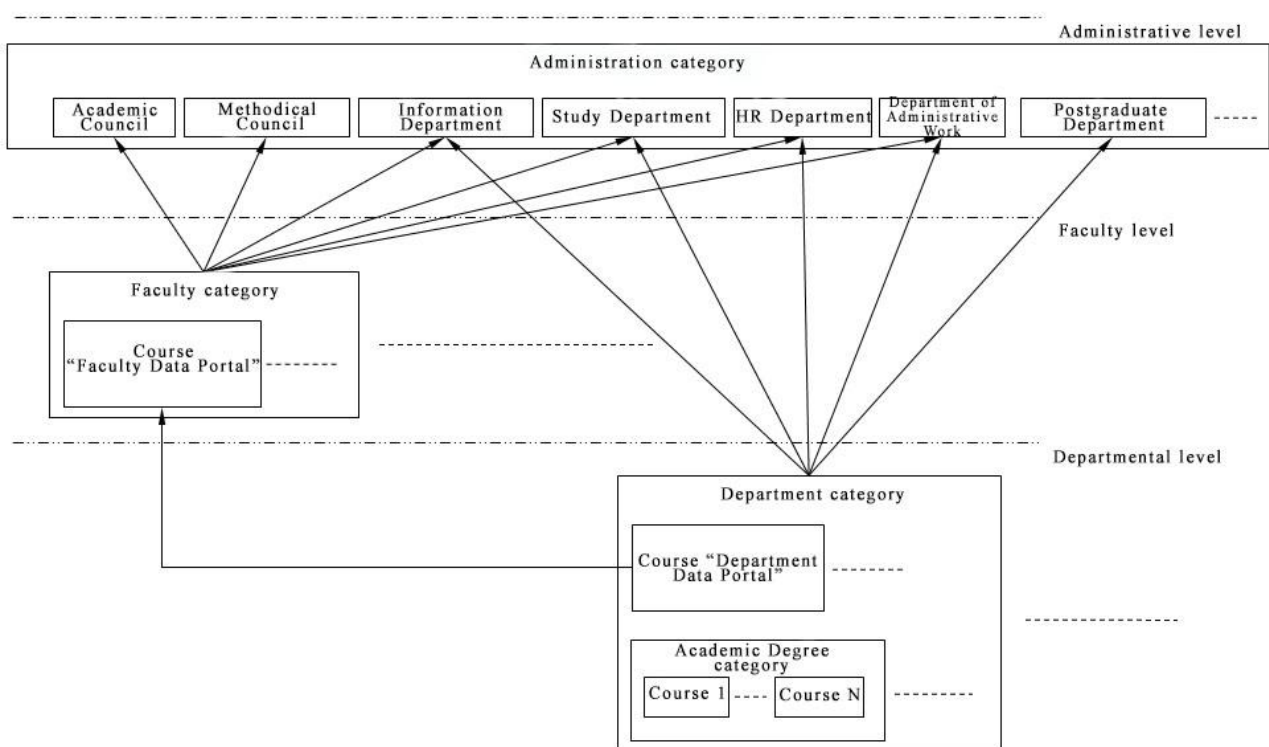


Fig. 1. Generalized flow chart of e-learning / DMS system on Moodle platform

Faculty level is the coordinating one between the departmental and administrative levels. The main element of this category is a course “University Data Portal” which is a platform for document circulation at the level of faculty.

The main level for education process implementation is the departmental. That is why there is integration of *e-learning/DMS* on this level. The departmental level combines educational courses for different academic degrees and the elements of document circulation. At the Department level the platform of document circulation is a course “Department Data Portal” which can be used for department meetings and document proceedings and their automated submitting to the elements of higher levels.

Grouping of primary courses should be organized according to the academic degrees that will allow every student to have access only to those courses he or she should study on curriculum. The teachers do not have to make the additional grouping of courses because each user has personal account with simplified navigation through available resources.

The analyzed system adjustment allows solving a problem of multilevel management for educational process and document circulation (at the level of faculty and at the level of department) with results submitting to the administrative level.

Regarding organization of education process, distribution of roles in the system is performed traditionally for Moodle system: educational subjects belong to two main roles: “Teacher” and “Student”. Besides of that, there are optional roles “Assistant” and “Course Creator”. Distribution of access rights for portals of document circulation should be held on the other principle.

It is advisable to integrate modules of onlinevideoconference for supporting synchronous mode of interaction between subjects of education process and full implementation of blendedlearning conception and for conducting business meetings of different levels. The best variant among the existing ones for implementation of this technology (with support of desktop demonstration and full-featured webinar conducting) is the use of BigBlueButton server, client modules of which can be integrated to Moodle platform. In this case, there is no need of simultaneous use of

any additional software (such as Skype, GoogleHangouts, etc.) and additional authorization. In this case, those users who have access to the resources of educational course or data portal may join video conference or webinar.

So, the proposed engineering solutions allow integrating e-learning and DMS technologies on Moodle platform and creating information system for education process support in asynchronous and synchronous mode as well as to perform administrative management of educational establishment, monitoring of its activity and automation of document circulation with flexible distribution of access rights.

At this, information system requires only PHP-supported Internet server with one MySQL data base, Moodle system and BigBlueButton server. It should be noted that all necessary software is distributed according to OpenGPL license.

The proposed conception for integrating e-learning and DMS technologies has been implemented on the base of Moodle platform of Donbas State Technical University of MES of Ukraine (dondtu.lg.ua). Software configuration: Debian 7.8 GNU/Linux, Apache 2.2.22, PHP 5.4.36, MySQL 5.5.41, Moodle 2.8.5, BigBlueButton 0.9.0.

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Меняйленко О. С., Захожай О. І., Краснопольський В. Е.

Навчальні технології на основі інтеграції E-learning та DMS на базі платформи Moodle

Розглядається питання поєднання сервісів E-learning та DMS у складі однієї системи управління навчанням на платформі Moodle. Система надає можливість реалізації обох режимів навчання: синхронного та асинхронного. Це дає можливість реалізувати підтримку будь-яких форм навчання: денної, заочної, дистанційної. Запропонована концепція інтеграції сервісів дозволяє комплексно вирішити питання підтримки автоматизованого моніторингу і управління навчальним закладом.

Ключові слова: e-learning, blended learning, Document Management System, система управління навчальним закладом, автоматизована система навчання та контролю знань, документообіг навчального закладу.

Меняйленко А. С., Захожай О. И., Краснопольский В. Э.

Учебные технологии на основе интеграции E-learning и DMS на базе платформы Moodle

Рассматриваются вопросы объединения сервисов E-learning и DMS в составе одной системы управления обучением на платформе Moodle. Система дает возможность реализации обоих режимов обучения: синхронного и асинхронного. Это дает возможность реализовать поддержку различных форм обучения: стационарной, заочной, дистанционной. Предложенная концепция интеграции сервисов позволяет комплексно решить вопросы поддержки автоматизированного мониторинга и управления учебным заведением.

Ключевые слова: E-learning, Blended learning, Document Management System, система управления учебным заведением, автоматизированная система обучения и контроля знаний, документооборот учебного заведения.

Information about the author

Oleksandr Serhiiiovych Meniailenko – Doctor of Engineering Sciences, Professor, Pro-Rector for Scientific and Pedagogical Work, SE “Luhansk Taras Shevchenko National University”.

Oleh Ihorovych Zakhozhai – Candidate of Engineering Sciences, Associated Professor, Head of Department of Specialized Computer Systems, SE “Donbas State Engineering University”.

Volodymyr Eduardovych Krasnopol'skyi – Candidate of Pedagogical Sciences, Associated Professor, Head of Department, Volodymyr Dahl East Ukrainian National University.

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