

Organizing of a Virtual Learning Environment at the International Scientific Educational Center of NAS RA

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ABSTRACT

To develop a Virtual Learning Environment (VLE), which will ensure E-learning of International Scientific Educational Center (ISEC) NAS RA for different regions of Armenia a platform Moodle CMS was suggested. The Moodle CMS's features, capabilities and the need of their use in the development of an E-learning system are investigated. Moodle needs to be adjusted for organizing E-learning, taking into account the ISEC NAS RA's requirements and functions. As well as there is a necessity to create an Armenian language interface with E-learning environment. The security mechanisms of the Moodle CMS were researched and certain vulnerable parts have been discovered: solutions and methods for making the system more secure and safer were proposed in the previous research of author Vahe Arakelyan [10]. Within this work the BigBlueButton conference system is integrated into MOODLE, which enables to create a communication between students and lecturers through videoconferencing. The interface of "Electronic dean's office" module is modified into Armenian. This module allows to create an infrastructure, which simplifies the way of being informed about the changes in the education system both for academic department staff and students.

Keywords

VLE, Moodle, E-learning, Content Managing System (CMS), Open Source Software (OSS).

1. INTRODUCTION

Rapid progress in information technology allows the use of computers as an effective teaching means. Automation of the learning process is realized by means of computer training programs and by the use of electronic textbooks, which are used not only for magnetic storage media (laser disc) to the application, but also for local and global computer networks. By means of the use of global computer network it creates a specialized information-educational field which allows to realize and carry out training, using modern technologies. For implementation in informational educational sphere as well as in local and global computer networks, it is essential and necessary effective use of E-learning materials, high-operative development. The objective of the creation of Electronic Training Materials is to improve the quality of the efficiency of the learning process and the mastering of the specialists. In the field of higher education E-learning materials can be used as an additional educational resource, which allows to organize the teacher's control on student's independent work correctly. Thus, higher education will involve step by step contribution of virtual learning environment technologies, particularly in E-learning.

E-learning is a mode of delivering education and instruction, often on an individual basis, to the students who are not present physically in a traditional setting such as a classroom. E-learning provides "access to learning when the source of information and the learners are separated by time and distance, or both." [1].

E-learning is also an approach that takes education to many learners who are separated, by the time and space, from those who are teaching. It is a mode that has a high potential for transcending barriers that are caused by distance, time, and age. Therefore it facilitates lifetime learning. Through E-learning, the learner enjoys a high degree of autonomy in deciding what, when and how to learn. Nowadays, E-learning programs are able to make full use of information and communication technology through the application of a wide range of media: print, audio-visual, CD-ROM, computers and the Internet [2].

International scientific-educational center at the National Academy of Sciences of the Republic of Armenia (ISEC NAS RA) plans to consume such system, due to which the trainings will be available to students who live in different regions of Armenia and even beyond the republic. Particularly ISEC NAS RA cooperates with Artsakh State University. Within this cooperation creating of virtual laboratories and classes is intended, where students will have the opportunity to get modern education. First of all technically it is possible to realize taking into account the existence of a high bandwidth fiber-optic connection between Artsakh State University and NAS RA. To fulfil this idea a VLE must be organized and electronic educational materials must be created and developed for students under VLE. As a platform for making, managing, developing and organizing E-learning we find it appropriate to use the Moodle system.

Moodle is a Content Managing System (CMS) with a special design for creating high-quality online courses. "Moodle" is the abbreviation, which is found from the "Modular Object-oriented Dynamic Learning Environment" expression: Moodle has been translated into many languages and is used in more than 190 countries.

The main advantage is that Moodle is an Open Source Software (OSS). Having a number of functions and modules Moodle CMS competes with famous commercial E-learning systems such as Blackboard, Desire2Learn, and SharePoint LMS and so on. The advantage of the distributed OSS is that it allows you to modify the system specific study program characteristics, and, if necessary, add new modules.

At present, there are previously more than 250 sources of commercial E-learning and more than 45 of them are free of charge OSS offerings. The better-known OSS are Moodle, Ilias, eduplone, Claroline, SAKAI, WebCT and Bscw, and they have wide developer societies who present strong points

of view for considering OSS as a straightforward and potentially practicable competitor to commercial products. The philosophy of creating Moodle is that it is developed with both pedagogy and technology in mind. One of the main advantages of Moodle over other systems is its strong grounding in social constructivist pedagogy and good educational tools. The Moodle software suite is particularly effective at: providing information, opportunities to discuss that information, and cooperate in providing information. Moodle allows users to post news items, assignments, electronic journals and resources, and to collect assignments, etc. Thus, Moodle is learner-centered, cooperative, interactive, transparent, and geared towards developing intrinsic motivation through these means. Hence Moodle is "constructivist", and generally 'right-on'. However, due to this emphasis on "constructivist" learning, earlier versions of Moodle were a little weak (compared to commercial systems such as Blackboard and WebCT) in the areas of teacher-centered control of the learning process such as triggering and testing. Triggering refers to the concealment and controlled availability of resources, such that, for example, a test only becomes available once students have viewed a particular resource, or a resource only becomes available when students have achieved a certain score on a test. Date trigger and instructor triggered resource (de-) concealment has long been available in Moodle but the, "once you jump through the hoop" type triggered de-concealment functionality has been made available only very recently in additions to Moodle. WebCT, on the other hand, has for some time boasted a similar control option called "selective release." While earlier versions of Moodle did have good, randomized, multi-format tests, (and the capability to import Blackboard and indirectly, WebCT format tests since there are many defectors), it was only very recently that cheat-proof timed "exams" were implemented using Moodle (with the addition of functions to disable Ctrl-p, right click, the browser back button, and include multiple password protection, and auto submitting, etc.). This sort of testing and 'learner-controlling' functionality is more suited to "make them memorize and test them afterwards," non-constructivist methodologies. I think that this is one of the areas in which the Methodology of Moodle may have (past tense) affected the range of pedagogies available to the Moodle user. However, since Moodle is open source (you can see the source code, change it, add to it, and distribute it) and there are now thousands of educators using it and many *contributing* to it, Moodle is growing at a pace that commercial software producers may find difficult to match. New activity modules (referring to things like Web Quest, dialogue, exercise, glossary, library and journal modules) are being added weekly. For this reason, the Moodle software suite has a functionality which is now overflowing the boundaries of the original creator's particular pedagogical proclivities. Now it is possible to use Moodle to put students in an electronic straightjacket, jump through hoops, and make memories by using a very non-constructivist pedagogy. How do these three systems rank in terms of number of language packs: WebCT 16, Blackboard 23, and Moodle 28. Moodle is stable, powerful, fast, easy to use, and free [3].

No	1	3	4	5	6	7	8	9	10	
Product Name	Desire2Learn	KEWL	ANGEL	eCollege	TheBlackboard	Moodle	Claroline 1.6	Dokeos	OLAT	Sakai
Tools	Learn 6.1		(10)		eed		2.1.1			
Discussion Forums	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Discussion Management	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
File Exchange	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Internal Email	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
On-line Journal	Y	Y	Y	N	Y	Y	N	Y	Y	Y
Real-time Chat	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Video Services	N	N	N	N	N	Y	N	N	N	N
Whiteboard	Y	N	Y	Y	Y	Y	Y	Y	N	Y
Bookmarks	N	N	N	N	N	Y	N	N	N	N
Calendar	Y	N	Y	Y	Y	Y	N	N	Y	Y
Searching Course	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Work Offline	Y	Y	Y	Y	Y	Y	N	Y	Y	Y
Group work	Y	Y	Y	Y	Y	Y	Y	N	Y	Y
Community	Y	Y	Y	Y	Y	Y	N	Y	Y	Y
Student Portfolios	Y	Y	Y	Y	Y	Y	Y	N	Y	Y
Total Features	15	15	15	15	15	15	15	15	15	15
Total Available	14	13	14	13	13	15	10	11	12	14
Total Missing	1	1	1	1	1	0	5	4	3	1

Table 1. Comparison of E-learning Systems

Table 1 shows the comparison between the VLE products based on Learner Tools. Four products are shown to be the best with almost the maximum number of features - 15 out of 15 features or capabilities of Learner Tools. These products are Moodle, Desire2Learn, ANGEL Learning Management Suite, and Sakai. The Claroline 1.6 products have minimum features and capabilities of Learner Tools, missing 5 out of 15 features and capabilities. KEWL, eCollege and The Blackboard Learning System platforms have missed 2 out of 16. Moodle is the best with three products missing none of the features. Generally the best OSSs is Moodle which missed 0 out of 15 Learner Tools.

The aim of this research is to develop such a system that will fulfill all those terms, which are necessary, to fulfil a high-quality, reliable and secure E-learning. Within this work the Moodle CMS-'s features, capabilities and the need of their use in the development of an E-learning system are investigated. Moodle needs to be adjusted for organizing E-learning, taking into account the ISEC NAS RA's requirements and functions. As well as there is a necessity to create an Armenian language interface with E-learning environment.

The security mechanisms of the Moodle CMS were researched and certain vulnerable parts have been discovered: solutions and methods for making the system more secure and safer were proposed in the previous research of author Vahe Arakelyan [8].

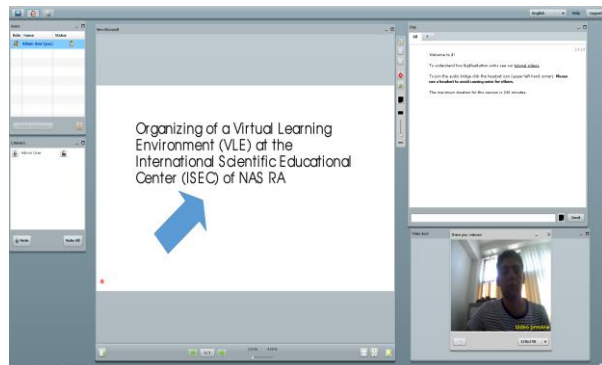
2. SUGGESTED SOLUTIONS

To have maximum effective E-learning systems and make it comfortable for the teacher's and student's usage, we will need certain modules and if it is necessary to design and create new modules and different functional blocks. There are a lot of standard blocks and modules, such as Activities, Admin bookmarks, Blog menu, Blog tags, Calendar, Comments, Community finder, Course completion status, Course overview, Course/site description, Courses, Flickr, HTML, Latest news, Logged in user, Login, Main menu, Mentees block, Messages, My private files, Navigation, Network servers, Online users, People, Quiz results, Random glossary entry, Recent activity, Recent blog entries, Remote

RSS feeds, Search forums, Section links, Self-completion, Settings, Social activities, Tags, Upcoming events, YouTube which are integrated in MOODLE and which we can use in our system.

The E-learning will be more effective, if the VLE makes possible for direct communication between students and lecturers in the process of training.

It is well known that MOODLE does not support online video and audio communication. To solve this problem it is suggested to use the conferencing system called BigBlueButton [4]. The BigBlueButton conference system is integrated into MOODLE, which enables to create a communication between students and lecturers through videoconferencing (Pic1).

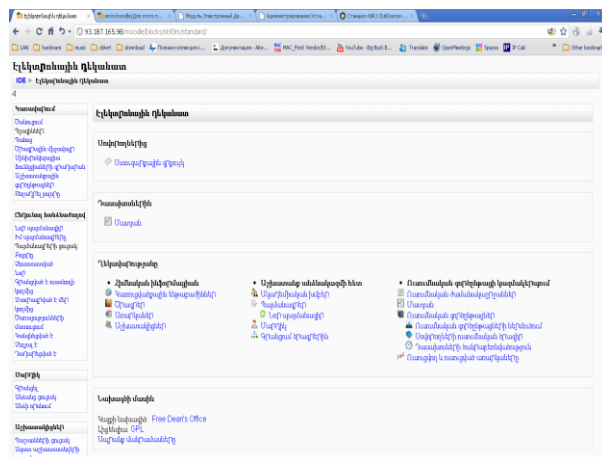


Pic. 1 Conference System Interface

As a result a system is created, which enables the students to attend interactive lessons in the distance, at the same time allows taking part in E-learning courses due to an embedded conference system. The conference system enables the students to participate in online courses, current lectures, communicate with the lecturer via video-conference.

If necessary the student can watch a recording of lectures, because it is possible to record any lecture without the lecturer's help. The recording of lessons is possible due to the integration in Moodle CMS RecordingsBN module, which captures online from BigBlueButton and records them in dedicated HDD of your desired database server [6].

The next not less important module, which is designed and integrated into Moodle CMS, is "Electronic dean's office" [7]. The interface of "Electronic dean's office" module is modified into Armenian. This module allows to create an infrastructure, which simplifies the way of being informed about the changes in the education system both for academic department staff and students.



Pic. 2. Dean`s Office Interface

Due to this system it is possible to create a general database, which can include student responsibilities, attendance intensity, their progress, quantity of subjects, information about the lecturers of each subject, hours of subjects, schedule, as well as responsibilities of academic department staff, working hours, employment contracts, employee's position, immediate subordinates, superiors, etc. (Pic 2). Changing combinations of different elements of the course the lecturer will organize the teaching of the course so that teaching forms will meet the goals and objectives of certain courses.

The word list allows organizing a work with the terms; in this case dictionary material could be composed not only by lecturers but also by students. The terms included in the word list will be highlighted in the whole material of the lecture and will be as hyperlinks to the appropriate articles of the word list. The system enables to create a course word list as well as a global word list, which will be available to the participants of all courses. Any material can act as a resource for self-teaching, conducting a research, discussion: any text, illustration, webpage, audio or video file, etc. There is a visual editor embedded in the system which enables the lecturer, who does not know how to use HTML to create a webpage, which includes formatting elements, illustrations and tables.

Task performance is a type of student activity in the result of which a file of any format is created and downloaded to the server or a text is immediately created in the MOODLE system (via the embedded visual editor). The lecturer can operatively check student works, files, give comments and if necessary give recommendations and offer additions in some directions. If necessary the lecturer can open hyperlinks to a student work file and discuss it in the forum. A scheme like this is very convenient for creative courses, for example. With the permission of the lecturer each student can hand over his/her work several times taking into consideration his/her results. It enables to correct student work operatively and reach the complete solution of the student issue. All the texts, files downloaded to the server by the student will be kept as personal data of the student in the portfolio. The forum is convenient for academic discussions of problems and asking advice. The forum can also be used for downloading files by students and discussing them, it enables the students to evaluate works of each other. Conducting a new forum the lecturer has the opportunity to choose its type: one-topic regular forum, a general forum available to everybody or one-line forum for each user. MOODLE forum has a tree structure.

This is convenient for a comprehensive discussion of a task, for example, during the group creation of texts with the principle "add a fragment", successive as well as in any part of the text by another student. If the lecturer wants, the forum messages could be sent to the students in less than 30 minutes after adding them (during this period the message could be changed or deleted). All the messages of the student will be kept as personal data of the student (in portfolio). MOODLE has a useful function for group edition of the text (an element of wiki course). Element "Lesson" of the course allows step by step learning of studying material. The entire material can be divided into teaching units, giving questions at the end of each one to check the assimilation of the material. The system created by the lecturer will care about leading the student to the next or previous level of learning the material by controlling them. This element of the course is valuable for giving opportunity to perform evaluation of student works automatically. The lecturer sets certain parameters of evaluation; afterwards the system itself generates total marks for the entire lesson and registered

them in the documents. The elements of the course “Test” allows the lecturer to compose tests using questions of different types: closed format (multiple choice) Yes / No short answers, Digital Compliance, filling in the answer, random questions and so on. The test questions are kept in a database and again can be used in the same or different courses. Numerous chances could be given during the test. It is also possible to set time limit for the test. The lecturer can evaluate the test simply showing the right answer [3].

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