LMS Moodle: Distance international education in cooperation of higher education institutions of different countries

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Abstract The development of international cooperation requires cooperation in the sphere of education. An enhanced sharing of experience in the sphere of practical teaching activities implies the increase of the quality of teaching process and of scientific cooperation. Sharing of experience in educational activities implies understanding among representatives of different nations anywhere in the world. It means that through LSM teaching the principle of social constructivism is realized, when participants together create a narrow culture of common objects and senses. The article presents an example of practical application of electronic media to the process of a real lesson. The article describes the process of teaching students from different countries using the system of LMS Moodle, beginning with preparing study materials, giving lectures by foreign lecturers, practical tasks and ending with passing an examination. The training has included some full-time students from the Slovak Republic, the Republic of Dagestan and the Republic of Kazakhstan, and has been realized by applying the method of distance learning (LMS).

Keywords International distance learning · LMS Moodle · Exam remote method · International cooperation in training · Virtual learning environment

1 Introduction

One of forms of international cooperation is international exchange of students, exchange of teachers, teachers’ trips to exchange experience. However, this kind of
cooperation depends on finance problems, on the world economic crisis, etc. Disadvantages of the international cooperation in teaching include economic problems, the necessity to cover vast distances, which needs a lot of time. These obstacles for cooperation can be overcome by using information technologies in the form of webinars, video-conferences and systems of study material management.

These factors cause limited cooperation of teachers and students from different countries. Existing programs of academic mobility cover only a little part of teachers and students. How to realize and make accessible international cooperation, which is interaction of students and teachers from different countries?

We can solve this problem using IT, which provides with teaching students by foreign teachers and with students’ participation in the educational process in different countries. A big advantage of applying IT to teaching and learning is the opportunity for large groups of students from different countries to communicate. Application of Learning Management Systems /LMS Moodle/, video-systems and video-lectures or practical tasks using IT for communicating provides with creating a virtual environment close to a life situation (Kultan 2009).

2 Theoretical framework LMS in learning

Now many different scientists discuss problems of developing and using LMS. In the book “Building Virtual Communities of Practice for Distance Educators” (Bond and Lockee 2014) the authors rely on the development of a set of guidelines for creating a virtual community of distance teaching practice, which can easily be realized by specialists in the sphere of education.

The research of theoretical and practical fundamentals of applying LMS platforms to teaching both young and older generations, creation of a stimulating contexts for future generations, relationship between distance learning and IT can be found in the works of Lyashenko and Frolova (2014), Keengwe and Georgina (2012). Distance education is considered in the relationship between academic performance and technological adaptability of students. Many studies consider the impact of technology-assisted learning on academic performance among distance learners and their on-campus counterparts. Duvall and Schwartz (2000) also study the relationship between academic performance and students’ technological adaptability.

Since the appearance of new information and communication technologies (ICT), many have related to them as the new generation of distance education, and some have referred to their implementation in the academic community as challenging the very existence of campus-based universities. Today ICT significantly influences the development, education and socialization of children and youngsters. We can see this influence watching the rising generation use social networks, youngsters’ sites not just for learning purposes. That is why there arises a need for developing and carrying out online activities for children and youngsters (Jonsson 2011, Ghavifekr and Mahmood 2015).

The role of distance education with the use of ICT is very important for lifelong learning. Today scientists explore the quest for the definition of lifelong learning, the recognition of the changing role of informal learning communities, proposing public
policy considerations for those responsible for elementary education and the further development of information and communications technologies. (Kendall 2005).

Distance education and information and communication technologies gave birth to the emergence of e-learning in the system of education and other spheres. ‘Distance education’ and ‘e-learning’ overlap in some cases, but they are not identical. “The lack of distinction between ‘e-learning’ and ‘distance education’ accounts for much of the misunderstanding of the ICT roles in higher education, and for the wide gap between the rhetoric in the literature describing the future sweeping effects of the ICT on educational environments and their actual implementation (Guri-Rosenblit 2005; Ghavifekr and Mahmood 2015).

Distance education is the teaching form based on ICT and multimedia systems. Distance education is organized using electronic learning. Electronic learning (e-Learning) in its turn implies the application of the information contained in databases and used when realizing educational programs, information technologies and technological tools for processing this information, including information and communication networks transmitting this information by communication lines. Trainees’ electronic activity (e-Working) lets create effective on-line courses, use study materials in the form of text files, images, presentations, audio and video files; organize an individual management of the knowledge control system in the form of questionnaires, tests, tasks, lectures, seminars; revise the material under study many times; regularly monitor students’ work; provides with privacy; with interactive communication with students through forums; with working with glossaries, in wiki, in databases; that is, it lets manage the study process and joint actions based on web technology.

Current education is getting more open and implies an active communication of all the participants of distance education, and availability of educational platforms. One of such platforms is the Moodle environment. Distance education in the Moodle environment provides with the possibility to organize a student’s productive individual work at acquiring an educational discipline, contributes to developing professional competences, contributes to students’ mobility, to their abilities to seek and gain a new knowledge; gives the whole process of learning a new quality providing with permanent access to information at any time; contributes to flexible education based on new prospects of ICT services, including a possibility of holding video conferences (Kultan and Kerimbayev 2015).

The main software tool of electronic learning is learning management system (LMS). LMS is a tool for organizing distance education.

In the article, we attempt to familiarize readers with the process of teaching, in which the following higher education institutions took part: UIB (University of International Business, the Republic of Kazakhstan, Eurasian National University named after L.N.Gumilyev (Astana, Kazakhstan), University of Economics in Bratislava (Slovak Republic) and Dagestan State Institute of National Economy (DSINE, Makhachkala city). The organization of co-education of these higher education institutions demonstrates that distance, time difference and linguistic distinctions are not problems for establishing cooperation, for sharing experience for improving the educational process.
3 Methodology

In the sphere of education of the universities UIB, ENU named after L.N.Gumilev, University of Economics in Bratislava and DSINE, electronic learning on the base of the Moodle LMS system is applied, which is the educational method integrating information and communication technologies.

The main objective of the educational info media of LMS is raising the level and quality of methodological, didactic and information-related support of organizing an educational process for students and teachers.

The information/education environment of MOODLE-learning is flexible and adaptable. A teacher has a possibility to get the information of levels of students’ cognitive processing and to correct their further work. If the teacher feels that the students did not acquire the material of some subjects properly, he/she can give them additional consultations, correct the lecture material, and introduce additional tasks and tests. The aim of using the platform resources is lessening time consumption for controlling students’ knowledge and feedback from students and teachers, and as a result, increasing the time for individual work. The system of LSM MOODLE distance learning provides with implementing such basic methodological principles as a huge motivational potential and a high interactivity.

Technically, e-Learning system is constructed on the basis of a wide range of software products.

The system of distance education is the basis of any e-Learning system. The learning management system realizes the following functions

- Registration of listeners, personalization, access differentiation.
- Management of learning process, recording of learning outcomes and results of testing.
- Integration with mechanisms of synchronous and asynchronous communication.
- Integration with external information systems.

Educational materials and tests are developed using means of developing learning content, which are then included in the database of the learning management system. Through this database listeners gain access to educational materials. The system of information exchange provides students, teachers, experts and other participants of the educational process with the possibility to exchange information both in real time (synchronously) and asynchronously. As a rule, web-interface of the learning management system is based on content management tools.

The educational content, which we have developed and use, is one of the most popular and widely used Moodle platforms, it is interactive, and it contains animation options and voiceover. For constructing the static content, some standard editing
programs were used, such as Microsoft Word. The interactive content was created using special software products.

The module of information exchange of the e-Learning system provided with the following functions (subject to the software chosen):

- Asynchronous communication, that is forums, bulletin boards, electronic mail;
- Synchronous communication, that is voice and computer chats, videoconferences, sharing of software products, virtual audience.

When implementing international distance learning of students from different countries, LMS Moodle attracts interest of IT-specialists, and it has the following advantages:

- Moodle cross-platform solution works without modifications in any operation system supporting PHP.
- Moodle operates as a set of modules and allows to flexibly add or delete elements at different stages. The design of the site is easily operated by the set of predefined templates, which could be supplemented by one’s own developments.
- Moodle is easily updated to new versions. It has an internal system of updating its own base and restoring it.
- Moodle requires only a single database of SQL type and could be used together with other applications.
- A particular attention is paid to security problems at all the stages, from validation of the data introduced using forms to coding cookies.

Due to the ease of installation and program settings, independence on the server operation system and free software orientation, Moodle systems were given a favorable opinion, and now they are widely used in the educational environment.

The LMS MOODLE system has a convenient intuitive web-based user interface, lets even inexperienced computer users create distance-learning courses. The set of modules including in the standard distribution enables to create distance-learning courses of any complexity and on various areas of knowledge. The capabilities of the system are constantly enhanced, new modules are added, which can be installed whenever necessary.

4 Performance capabilities of educational materials in LMS MOODLE

When teaching the course “Database Systems”, the electronic course (Fig. 1) was developed in LMS MOODLE. The objective of this course is to familiarize students with basic concepts, to teach them to build up a database, to apply SQL instructions, to develop skills of solving problems of applying the data stored in a database.

The electronic course was realized in the servers kultan.euba.sk/modle (or 193.87.20.2/moodle,) and http://virtualedu.kz. The data portion of the server contains several courses in the Kazakh, Slovak, Russian and English languages. They are applied to the teaching processes of the universities-partners. The educational material has been constructed in cooperation of teachers from UIB (Almaty)
Besides the basic educational material presented in the electronic form, the educational text of this course in Russian and Slovak was developed. Application of the electronic version of a textbook provides all the competent teachers with the possibility to make improvements in the textbook. Therefore, students can always have a current version. A paper version of the textbook provides students with possibility to use it if they do not have access to the Internet.

One of basic concepts of the system of distance learning Moodle is a course. Within the system a course is not only a means of organizing teaching process in the traditional understanding. A course can be just a communication area for interested people within particular subjects. A fulltime work at the system means setting up a computer account, which is compulsory. But depending on configurations of each course, the access to it can be enlarged or limited.

The basic content of the course is divided into modules: zero module consisting of general for the whole course elements, and thematic modules.

Zero module usually contains course forums, course chats, general descriptions concerning the course in whole. Zero module of a typical educational course, for example, contains the forum “Course News and Advertisements”, the topics, which are automatically sent out to all the course participants. Only the teacher of the course can add a topic, but all the course participants can discuss it.

“Public Forum” and “Public chat” are intended for free communication of students and teachers. All the course participants can add and discuss topics.

A thematic module of a typical educational course, for example, can contain the following things:

- A brief description: dates of beginning and ending, subject, date of passing tests;
- Notes of lectures and tests for self-control;
- Thematic test, trainings, final test (they are not shown in the picture).
The work at the forum has an activity-related module, which provides participants of a distance program with the possibility of asynchronous communication (Fig. 2). Within the system you can come across forums of different types:

- A standard forum, which consists of unlimited number of discussion topics and messages concerning these topics;
- A simple discussion, which consists of one topic and it is usually used for focusing discussion on one topic;
- A so called open topic, that is each of participants suggest one topic, participation in open topics is unlimited;
- The forum “question – answer”. In this type of a forum only a teacher can create topics, a student will see the answers of other participants only after he/she answers the question proposed in the topic.

For each specific forum, a teacher or administrator can make the following configurations, which affect the work of users at it:

a) Access configurations: a standard public forum, that is a student can both create topics in the forum and give his/her answers in them; a news forum with the possibility of discussing topics, that is a student can only give his/her answers in topics but can not create them; a forum for distributing messages to uses, that is a student can neither create topics nor answer in them;
b) Possibility of subscription: all the participants are subscribed to a forum and can not be unsubscribed; participants can subscribe or cancel subscription to a forum; participants cannot subscribe to a forum;
c) Message assessment. For messages there can be an option of assessment, in this case the following additional configurations are possible:

- Only teachers can assess messages;
- Both teachers and students can assess messages;
- Students can see only their grades;
- Students can see all grades.

One of principle possibilities of a teacher (if you have all necessary rights) is editing a course, that is adding, deleting, transferring resources, activity-related elements, and blocks.

A possibility is the description of one typical function of a specific element of the system. For example, Course: Create, Task: Browsing, Forum: Subscription management. For each element of the system there are sufficiently many possibilities defined.

Permission is the value determining a certain possibility for a certain role. For example, to allow or to prohibit.

Context is some space of the Moodle system. For example, course, activity-related element, block.

The introduction page of electronic educational materials contains a general information of the given course, objectives of the course. At lectures students receive tasks, which they have to send within a specific period of time. For those students who have some difficulties when solving problems there are some examples of problems solved. It is natural that the solutions without some novelty, which just follow a pattern, cannot be graded highly. When assessing tasks teachers should remember this. Main educational materials must be prepared before training sessions begin. Also one should remember that the given materials can be completed at any time during a course. In that way the drawbacks or errors, which are detected when performing particular tasks, can be corrected.

5 Participants

5.1 Schedule for conducting training in Almaty

The training schedule was developed in accordance with requirements and convenience of a foreign teacher. Lectures with the use of the LMS MOODLE system were scheduled.

When carrying out the training in Almaty city, most of the lectures were given within a month (the time of a foreign teacher’s trip). For this aim, a subsidiary timetable for lectures and practical lessons was created. Additional lectures were scheduled for the time when students did not have other lessons, and then, after a foreign teacher left students had more free time. In addition, there is a possibility to use other teachers’ lessons, which they can catch up later after a foreign teacher leaves. However, the latter variant is not optimal since in this case a lecture course is given after practical lessons.

Practical lessons were used for training in the remote access mode of a teacher (Fig. 3). Students also worked through task passing mode, consultation mode, and remote access mode and database management system.
Further training was conducted using the method of distance learning at the full-time department. Practical lessons were conducted once a week, according to the timetable. The objective of these lessons was explaining some tasks from the system of distance learning, checking up the tasks performed and considering examples for explaining new tasks. At these consultations, students’ preparedness can be checked up after solving short problems in the mode of direct connection with a chosen server.

The simplest form of connection is Skype with applying a camera (Fig. 4). The teacher could see and hear all the students, check all the queries in the chat, and the results of these queries could be checked directly on the server of the database system. If needed we could apply the program Team viewer for viewing any student’s computer screen.
The students were solving all the problems on the server Oracle, which was installed on the sever kultan.euba.sk:8080/apex or MySQL installed on the site hostinger.ru. All the participants decided to apply the server MySQL at the lessons. It was more convenient for the students since the language of communication was Russian. Picture 4 shows the beginning of the lesson. The teacher knew who presented at the lesson. In Fig. 5, one can see the content of the chosen server and results of students’ work. (A teacher can see the results of each student’s work in real time).

In such a way, lessons can last 50–100 minutes. A teacher need not be online all the time. Students attend lessons being prepared better. As a rule, they know their week points, and what problems they come across. However, we think that it would be better for a teacher to be online during the whole session (practical lesson) in order to make students feel that they are in the interactive form of teaching-learning.

Since 2013 there has been a possibility to use the new development system, which provides with a chance of organizing virtual (online) learning (Kerimbayev 2016; Kerimbayev et al. 2016).

The portal of “Virtual learning” is a developed virtual infrastructure including an electronic library, which provides with the possibility of participating in videoconferences in online mode. The specifics of this portal is that it provides with educational resources for trainees “at distance”, gives additional possibilities of studying university subjects presented in the Virtual Center, original auctorial courses and study materials (Fig. 6).

The portal is represented by a text chat, using which one can communicate with other visitors during a conference. Participants exchange text messages using the chat; they have a chance to express their opinion and answer questions.

So called “on-line test” is carried out for controlling and self-controlling trainees’ knowledge level. On-line tests help students determine not only their knowledge level but also the course of study for effective independent acquirement of a discipline.
As mentioned above, seminars are conducted during the whole semester. Students get used to these teaching methods step-by-step, and make better use of mutual communication facilities. The results of their work are better than the results of using classical teaching methods. The electronic check-up and registration of a student’s work make them participate in the lesson, not just be present.

5.2 Schedule of training in Dagestan

Training in this university is conducted in accordance with the schedule of Bachelor’s full-time department. Besides, training is conducted under the developed system: students can see a teacher and a teaching material. The teacher simultaneously watches the activity in the classroom.

5.3 Final examination

At the end of each semester, students’ work is assessed. The examination and final rating include several components. A part of the grade is awarded for the tasks passed and the results obtained by a percentage (Fig. 7). A percentage is chosen as grade since it is difficult to determine the number of tasks at the beginning of the semester. The number of tasks can be increased or lessened based on the learning results gained by the students.

The examination consists of both theoretical and practical parts. The teacher on the site LMS (Fig. 8) familiarizes students with terms, time and methods of passing the examination. As students are not in the same room with the teacher, the examination tasks should be formulated so that they cannot be solved using the methods of CtrlC, CtrlV. Students get short answers. In the first part, it is necessary to work properly with systems of searching information. In the second part, the objective of which is analysis of the data gained, a student should demonstrate understanding of the problems. In the
third part, he/she should apply and show that he/she can work with this instrument, which means that he/she is able to realize a certain part in his/her project.

As to the theme, which must be developed, students receive it at the very examination. There is one theme for each student. There is a tendency to give the same theme to two students with the aim to compare their results.

The practical part of the examination is conducted in the mode of a direct connection with the server of the system chosen. Students can choose a server for better work. Students’ tasks can be the same but should be formulated so that they do not suggest instructions of SQL. For example, “Write the instructions which show the income from the sale of each group of products / services”. Students should apply these instructions to their database. Since each student has his/her own project, his/her own name and communication system, the probability of creating the same instruction is very small. Nevertheless, the teacher can check up each student’s work using direct access methods to the computer desktop.

The examination is entirely supervised by the camera, and students know that the examination is recorded. It means that students are supervised all the time during the examination. That is the difference of such type of examination from the traditional method of examining.

The examination is conducted by the distance method; the teacher can watch all the students’ activities. The teacher can check up the students’ works on the real server.

Fig. 7 The tasks passed and the results obtained during a semester

Fig. 8 Students’ academic average
6 Results

Based on the results obtained, the University decided to lessen the time of presence of a foreign teacher and derestrict the schedule.

At the beginning of an academic year, a fortnight with a foreign teacher is enough. Within this time, he/she gives introductory lectures and conducts introductory practice lessons. Besides, within this period all the keywords for the access to the LSM system are created. It is possible for a foreign teacher to use also the hours scheduled for another subject, for example, for the course “Algorithms and their complexity”.

The experience of working in the LMS MOODLE system demonstrated better results than when teaching traditionally. This method organizes both students and teachers.

UIB, Eurasian National University named after L.N.Gumilyev, University of Economics in Bratislava and Dagestan State Institute of National Economy, have developed scientific and methodological fundamentals of creating electronic educational publications and applying them to the sphere of higher education. As a result, based on LMS MOODLE for higher and additional education, some reference-information, control-diagnostic and interactive modules of electronic educational and methodological complexes in the form of dictionaries, handbooks, electronic anthologies, didactic materials, training packages, multimedia sets, electronic tutors, tests, practicums and other types of electronic educational resources were developed and introduced to teaching. To improve the quality of an educational process in higher education is possible through developing and implementing of electronic educational resources, which use all possibilities of current electronic publications and subject-related educational-methodological complexes. Creation of electronic educational resources based on LMS MOODLE, enables us to demonstrate all capabilities of interactive electronic publications, videomaterials, demonstration experiments.

During the first term of 2015/2016 academic year, the developed courses were used in the study process both at full-time and part-time departments. All the students had an access to the study material not just from the local University networks but also through the Internet. We should note that most of the students used the time from 19-00 23-00 for self-study (about 90% of the students). They could solve all the problems arose both at face-to-face consultations in the classrooms and distantly through the Moodle system using chats and forums. Local courses provide the parties with the possibility to store and then, at examinations, analyze students’ activities when they study materials on a discipline. When the term was over, using Moodle “Reports”, we analyzed the results of the students’ gaining different course topics, and these results revealed some problems concerning the quality of the study materials, as a result, we came to the conclusion that the study material required being improved, and the numbers of academic hours dedicated for different topics needed to be reconsidered.

Also we analized the effectiveness of the resources and elements of the course. The average use of different resources per student came to:

- Interactive lectures – 12;
- Lectures-presentations – 8;
- Interactive practicums – 20;
- Video-lectures – 10;
Tests – 5; Laboratory and practice work – 6.

The analysis of the rhythm of the students' activities showed that they worked equally during the term, but not effectively enough. On average, about 75% of them perform tasks on time. The effectiveness slightly improves by the end of the term. The activity of the students' work depends directly on the fact how fast the teachers check up their work (laboratory and practice ones), the rest kinds of tasks are assessed automatically.

7 Conclusion

The above method of applying electronic systems to the teaching process implies an active participation of teachers in the international system of education. In such a way, the created electronic courses and methods of implementing them can be used in international cooperation. One can conduct joint courses in the universities of one country with the aim of improving teaching and reducing costs.

Electronic learning is not just a wish to show what we know. It is an international need. Everything depends on us when we become participants of international lecture internships, which help us, not just improve our lectures but also make our University being recognized in the World.

For implementing a unique information space, at the first stage in Moodle we created a unique chair resource, which stored all the educational and scientific information (standards, work programs, calendar plans, articles, methodological materials, etc.) in the structured form with the access through the Internet. The resource is available for the Training Unit and Rectorate in a read-only mode. The use of Distance-learning technology resulted in the increase of out-of-auditorium workloads of the teaching staff. This is due to spending time on maintaining electronic resources and mostly to the costs for distant checking up students' papers (often several times). To deal with this problem, it is necessary to automate a part of manual check up (it has already partly been implemented by the Moodle resources) and reorganize the workload in order to use it more effectively.

We can conclude that on the one hand, the implementation of distance learning technology enabled us to create the unique information space and improve students' training; on the other hand, it created a number of new problems requiring a timely solution.

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