

# CREATING AN ONLINE LEARNING SYSTEM IN ENGINEERING SCIENCES IN THE REPUBLIC OF MOLDOVA

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**REZUMAT.** Aceasta lucrare reflectă dezvoltarea rețelei Interuniversitar eLearn-ing Moodle în conformitate cu proiectul TEMPUS «Crearea Rețelei digitale interuniversitare în domeniul științelor aplicate și economie din Republica Moldova (CRUNT)». Acest proiect are ca obiective crearea unei rețele interuniversitare cu o infrastructură modernizată pentru a sustine platforme on-line eficiente de învățare, crearea unui centru tehnologic, dotat cu calculatoare, echipamente audio / video, asistate de software modern, pentru a crea cursuri on-line eficiente și atractive pentru studenți și dezvoltarea unui set de cursuri pilot în diferite domenii, ce vor fi aplicate la universitățile partenere.

**Cuvinte cheie:** învățare on-line, asistată de calculator, proiectul eLearning "TEMPUS", rețea de eLearning.

**ABSTRACT.** This paper deals with the development of interuniversity's Moodle eLearning network in accordance with the TEMPUS project «Creating Digital Network Universities in Applied Science Themes and Economics in Moldova (CRUNT)». This project has the objectives as creation of an interuniversity network with a modernized infrastructure to sustain effective modern online learning platforms, creation of a technological center, endowed with computers, audio/video devices, assisted by modern software to produce online courses efficient and attractive to students and development of a set of pilot courses in different fields, which will be applied at the partner universities.

**Key words:** online learning, computer-assisted instruction efficiency, eLearning project "TEMPUS", eLearning network.

## 1. INTRODUCTION: CURRENT TRAINING NEEDS

Current training premises are: accentuated specialization, accelerated obsolescence of knowledge in the peak areas, permanent training, the increase in the number of those who wish to attend a training system for the highest possible level, slower growth in training capacity of institutions, the increase of information possibilities. An important factor is permanent training. With the acceleration of knowledge accumulation, stages of retraining are becoming more frequent and shorter, they almost "touch" each other and training becomes an ongoing process. This continuous training consists of short periods of training, very narrow and very punctual areas. The university does not provide valid and sufficient knowledge throughout life any more, its role being to form value systems that do not become outdated, provide general knowledge and basic assumptions, to create prerequisites to adapt to future changes. Continuous

training currently takes place in a little or no institutionalized conditions. The trend is however to organize different institutional forms for continuous training, more flexible than large organizations. In this paper we present current TEMPUS project objectives "Creating digital network applied science universities in themes and economics in Moldova (CRUNT)" and ways to solve the problems of online/computer-aided eLearning.

## 2. ANALYSIS OF ONLINE LEARNING ALTERNATIVES

Now information technology has made strong mark on education, revolutionized the manual based educational system. Computers evolved from a high study subject to an indispensable training tool, regardless of the field. Literature uses different phrases to describe the use of computers in education, with similar meaning: CAT (computer aided training), CAI (computer aided instruction), CAL (computer

aided learning), CBT (computer based training), and CBL (computer based learning).

Design and large-scale introduction of computer aided training systems pursues several objectives that come to greet modern training problems:

- ✓ Independent Study. The student is offered the opportunity to study at his own pace, depending on his interests and availability.
- ✓ Relieving the teacher. The existence of alternative forms of teaching, some teachers' requirements are taken by the system - especially the tasks of information transmission where there is no great intellectual application.
- ✓ Reduction of time to access information. The system can access information much faster than man and can have rapid access to a much larger amount of information than human memory.
- ✓ Increased motivation and interest of students.
- ✓ Improving the quality of learning in general.
- ✓ Developing the capacity of collaboration and teamwork.
- ✓ Decrease of long term training costs. The short term training costs could increase due to the implementation of a new system, but once implemented it can be used with low costs for maintenance and for a long-term.
- ✓ The increased number of students by eliminating the physical space restrictions imposed by the classroom. In the virtual study environment, an unlimited number (besides the technical performance of the system) of students can participate simultaneously in the same activities.

Computer aided training systems solve many problems and bring benefits, but also raise new problems to be solved. Among the advantages of these systems are the following:

- ✓ Using of the eLearning increases student independence. This is a positive factor because:
  - sometimes learning is an iterative process, especially in the early stages. Even at an advanced level learning can be a time consuming process, the teacher being unable to pay attention to each student individually.
  - can lead to the reduction of teachers demand, providing an alternative form of teaching.

- computers can access information in less time than a man can do.
- ✓ The virtual environments can lead students in a virtual world where they can practice the already studied material.
- ✓ It can increase students' motivation and interest so that they allocate voluntarily time and effort to learn.
- ✓ A well designed program can increase the quality and quantity of work.
- ✓ The integration of different fields stimulates greater interest of students and encourages multidisciplinary projects.
- ✓ It leads to the reductions in teaching time and the rate of failure in examinations.
- ✓ Computer aided learning popularity has increased, particularly at younger students.
- ✓ Learning autonomy, because students can control the pace and sometimes the track of learning.

The various offers of training platforms currently existing on the market make the process of choosing and implementation of a new educational technology more difficult. Being constantly under competition, the new products designed for distance education seek to develop and provide learning environments in which those involved in education - teachers, students, and administration - can take advantage of as many facilities as a classic learning environment can provide. Taking these into account, as well as that the eLearning /computer aided training environment consists of several components: *organizational, technical, technological, functional, and pedagogical*, with specific features determined by digital technology that supports it, which may cover a wide range of educational applications and processes, we oriented towards Moodle eLearning platform.

### **3. PROJECT OBJECTIVES AND WAYS OF SOLVING ONLINE TRAINING PROBLEMS**

The TEMPUS project «Creating Digital Network Universities in Applied Science Themes and Economics in Moldova (CRUNT)» was launched on October 1, 2011. The project involves partners from 9 Moldavian universities (Technical University of Moldova, State University of Moldova, Academy of Economic Studies, Agricultural University, "N.

Testemiteanu" State Medical University, Cooperative-Commercial University, "Alec Russo" State University of Bălți, Cahul State University, Comrat State University), Ministry of Education, Ministry of Information and Communication Technologies, Endava Ltd. The project partners from the European Union are the following universities: Agrocampus Ovest, Rennes I and Rennes II (France), University of Ghent (Belgium), University of Santiago de Compostela (Lugo) (Spain), University of Pisa (Italy), Technical University "Gh. Asachi" (Romania).

The project has the following objectives.

- a) Creating an interuniversity network with a modernized infrastructure capable of supporting efficient modern online learning platforms. Although there have been a number of attempts before implementing online training, they were not successful. Taking into account the different universities participating in Tempus project "CRUNT", it is proposed the following solution, which would balance the chances of implementing online learning in these universities. The idea is to create an online training infrastructure in Moldova using Moodle platform based on clusters of servers dedicated to basic university servers or routers for each university / campus, which can be performed on a computer with modest performance. At present, at most Universities in Moldova there have been developed information systems based on computer networks, which represent a hierarchy of cores with various servers and several computer rooms, computer labs and offices. Most of the network computers have access to Internet. The situation is more satisfactory at three universities: Technical University of Moldova, State University of Moldova, and Academy of Economic Studies. These information systems provide the educational process, access to bibliographic sources, scientific research and monitoring of training. It requires a serious adjustment and development of university information systems to support online training. Another important aspect is to create a distributed system that would allow sharing of resources for online training. This consists in the location of the electronic courses Moodle servers to be used jointly by several universities. For example, the physics courses will be placed on Technical University of Moldo-

va cluster, but the courses in mathematics will be placed on cluster State University of Moldova (USM) and the economics courses will be placed on Academy of Economic Studies (ASEM) cluster and will be used by all other universities (fig. 1).

Creating a technology center, equipped with computers, audio/video equipment, assisted by modern software to produce the efficient and attractive online courses to students. Due to the project there will be created a common technology platform and a digital university network. Knowledge (methods, techniques) will be promoted to develop online courses on disciplinary groups. Pilot online courses will be also tested for the Bachelor and Master cycles (full time and part time studies).

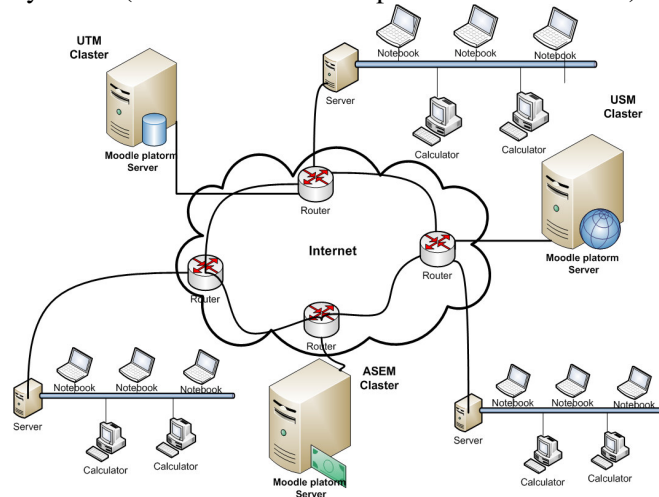


Figure 1. The information distributed system for online learning

- b) Development of a pilot courses set in different fields, which will be applied to all partner universities. Creation of a Moodle Network will give the possibility to access the courses required at all universities without any problems, although the courses of physics, mathematics, economics will be placed on different clusters of TUM, SUM or AESM and will be used by all other project partner universities.

As a result of accumulated experience we have found that academics activities follow several stages: design process, preparation resources, achieving of teaching and learning sequences, assessment results, reflection and adjustment of training activities to students' individual characteristics. Without diminishing the importance of other steps, it should

be noted the fundamental role of the design phase of training. If the traditional teacher training can afford improvisations, then for an online course, on a learning platform, the teacher has to anticipate (through a very rigorous design) the possible parameters of learning situations (student training level, learning style, and so on).

The aim of course design is to make training more effective, more efficient, more attractive and profitable for the students. We proposed to use a variety of interactive media to facilitate learning. Traditional "face-to-face" teaching-learning methods are not ignored or excluded, but will be improved by introducing new learning methods (e-learning or online). There are two alternatives in the design process to achieve the teaching-learning sequences: portioning of course material in periods of time or access to all course materials. We think that we must take into account the specifics of courses and preparedness of students, and we decided that the second alternative is more appropriate for students training level. Online course structure is designed in accordance with the curriculum, which in turn is performed on the above mentioned requirements.

It is well known that the key to online learning effectiveness is student motivation. How can students be motivated? Typically, there are the following ways: by raising their skills, by charging connection to other sources, people, by valuing their work. How can be designed the course in order to motivate learning? First, we proposed collaborative learning tasks that will enhance student interaction. On the other hand, we have also designed individual tasks, which places the student in the so-called "comfort zone", a diverse content is offered, and use own research achievements. Authentic assessment by quasi-professional tasks and visibility of student performance, publication of results (learning portfolios, blogs) are important factors to motivate students.

Diversity of students requires varying contents and ways of their presentation. For example, course content "Satellite Communications" is presented in layers: the first layer contains the minimum necessary; the second layer contains various developments, presentations, references to other sources. Of course, learning tasks and activities make a key element no less important than the content. Therefore we tried to solve three important educational issues: organization of independent cognitive activity of students; of

individual support in learning activities of students and of collective learning (group learning or collaborative learning).

The first problem requires students to organize independent cognitive activity that can be achieved by choosing learning tasks, planning. The second problem concerns the organization of individual support of students learning activity, which is possible because the teacher is freed from routine work by using communication tools, such as "chat", "email", "Skype", etc. Organization of collective learning activity (group learning or collaborative learning). This activity is especially designed although learning platforms are oriented towards learning individualizing.

One of the most effective techniques of evaluation is testing, which consists of a set of tests / questions used to assess the level of knowledge and skills to work with them by comparing responses to a previously developed appreciation scale. Test tasks or test items are simple questions, a statement followed by questions, exercises, problems, structured questions, essays etc. Test items often contain the expected response. We believe that the purpose of the tests is to measure the success of students in a specific subject. With the intensive development of information and communication technologies (ICT) there is already a wide variety of electronic test systems, online, remote, adaptive/intelligent and so on, which provide objective measurements, automatic processing of test results and specified feedback. Simultaneously, we have implemented self evaluation tests that are usually included at the end of the module or other structural units (online tutorials, courses, lectures, collections of items and so on) in order to verify the level of knowledge acquisition. The response to such an item is displayed immediately and the answers do not always require recording/storage. Self evaluation tests serve to make the study material more interactive in order to motivate students. For the final control we think that it is more efficient to use a single common test. To obtain an objective assessment of the actual level, residual knowledge, the choice is oriented to adaptive testing benchmarks.

## 4. CONCLUSION

The implementation of project results of will improve the quality of teaching by providing all study materials and imposing a study discipline as well as for part-time studies, continuing education and full-time studies. Simultaneously, the project will also have a social effect: it will provide great opportunities for a larger number of students and raise the prestige of universities in Moldova. We proposed to use a variety of interactive media to facilitate learning within Moodle platform. The key of success is proper didactic approach in the design of the course.

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