

Application of interactive course management system in distance learning of material science

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ABSTRACT

Purpose: This paper presents ideas and construction kinds of distance learning system based on course management system for distance learning and Computer Aided Teaching in the field of material science.

Design/methodology/approach: Paper describes content and composition of the system including virtual courses and didactic materials for lectures in the discipline of materials science and instructions for classes guided in scientific laboratories used as a supplement for traditional learning methods.

Findings: This study shows advantages, possibilities and features of already created and introduced e-learning system as a modern tool for distance education and interactive communication with students and between students. It's also used for publishing of scientific researches and other staff of the Institute.

Practical implications: As an example of such system is presented an educational platform applied in Institute of Engineering Materials and Biomaterials at Silesian University of Technology, Mechanical Engineering Faculty, Gliwice, Poland, with use of the "MOODLE" software in October 2004.

Originality/value: Article is valuable for persons and institutions, which are concerned with e-learning and distance education, as well for students and all users of such systems.

Keywords: Computer aided teaching; E-learning; Course management system; Moodle

1. Introduction

E-learning (also called electronic or distance learning) is a method of leadership and education. It's make the learning procedures possible in any place, any time and any speed.

E-learning means aided didactics by use of personal computers connected to the Internet and permits teaching and graduating the studies without necessities physical presence in lecture room.

The e-learning system is a purposely separated whole, composed from parts and connections between them, meaning, that it is an advisable composition (intentional by his creator), can realize aims in one or on many manners, doesn't have part isolated in relation to other of his elements, connections between parts and with whole (of system) rely familiar, that every part of system has to contribute to successes of whole.

E-learning systems are found as separating lectures from student in time and space for the greatest duration of lectures,

identity of technology of remittance for teaching and studying persons, disengagement of communication between lecturers and students, individualization of programs of student occupations, high level of self-observation and self-control of progress of studies by the students themselves (Fig. 1).

An advantage of an e-learning system is this same repeatable quality of education process. There are no limitations, if goes for time, place and number of studying persons. Estimations of results are made by the computer, always according to identical criterions.[1-5, 7, 8, 13]

2. The e-learning systems and its forms

E-learning can be realized on many different manners. The methods and techniques can be divided for regard on

- time accessibility,

- practical techniques,
- student - teacher cooperation,
- relations to traditional learning,
- level of formalization.

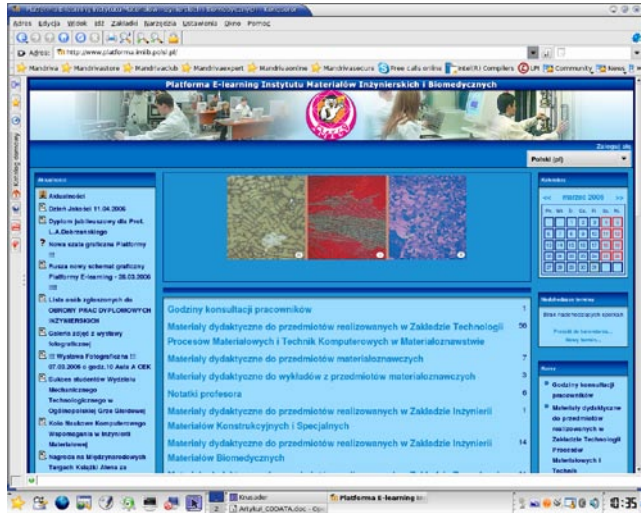


Fig. 1. Main Screen of the course management system "Moodle" applied in Institute of Engineering Materials and Biomaterials, Silesian University of Technology, Gliwice, Poland [1]

For regard on time accessibility two modes can be displayed: mode synchronous (online learning through electronic centers of communication, eg. of outlooks, communicators, audio and videoconference, virtual boards) and mode asynchronous (without exacting simultaneous presence of student and teacher, eg. e-mail, discussion forum, interactive courses, simulations, e-books and lectures recorded on video, manuals for self-instruction of programs, widely understood internet sources plus so-called browsers etc.)

To the practical techniques can be assign the radio and television broadcast and instructions, aided with computer, (eg interactive courses, manuals for self-instruction of programs, simulations etc) and send via internet as a gathering of information (www sides, browsers, educational films and instructions, electronic libraries, P2P programs etc), or across tools of communication (of outlooks, communicators textual and vocal, discussion forums, platforms of a group work, audio and videoconferences etc).

Student - teacher cooperation can be realized in courses with presence of teacher, (eg realized in modes asynchronous or synchronous), courses without participation of teacher, but basing on multimedia informations and instructions and as a independent learning, based on different kind of accessible informations in electronic form, in peculiarities content of www sides, but also with conversations with other persons, (eg discussion forums, e-mails, communicators etc.).

On relations to traditional learning can be regarded as a supplement for traditional learning, eg virtual campus or as replacement of traditional learning - of all programs or only for concrete object (fig. 2).

There are two levels of formalization: formal learning - strictly related with programs of learning of the university

(eg related with system ECTS) and unformal learning - not related with programs of learning of the university, but actively developed and valued supplement of the traditional learning performed by students themselves. [1, 4, 5, 9, 13-15]

3. The "Moodle" software used for creation of e-learning system in Institute

Moodle is a software package written in PHP language designed to help educators in creation of quality online courses. Such e-learning systems are sometimes called a Learning Management System (LMS), Course Management System (CMS), Virtual Learning Environments (VLE), education via computer-mediated communication (CMC) or just Online Education.

The word Moodle is an acronym for Modular Object Oriented Dynamic Learning Environment. It has been evolving since 1999 (since 2001 with the current architecture) and has been translated into 61 different languages.

Moodle runs without modification on Unix, Linux, FreeBSD, Windows, Mac OS X, NetWare and any other systems that support PHP, including most webhost providers. Data is stored in a single database: MySQL and PostgreSQL are best supported, but it can also be used with commercial databases, ADO and generic ODBC database access, since it uses ADOdb.

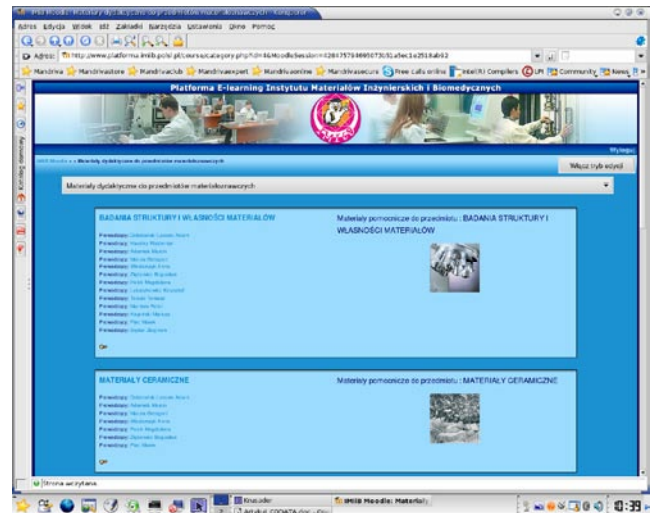


Fig. 2. Examination of structure and properties of materials and Ceramic materials – two of many internet courses managed by Institute of Engineering Materials and Biomaterials [1]

Moodle is easy to install and upgrade. There are some autoinstall packages to facilitate the installation including Fantastico and the Moodle package for the Debian Linux distribution. Moodle is free and has no license costs. It can be installed on as many servers as required at no additional cost [1, 7, 10, 11, 15, 16].

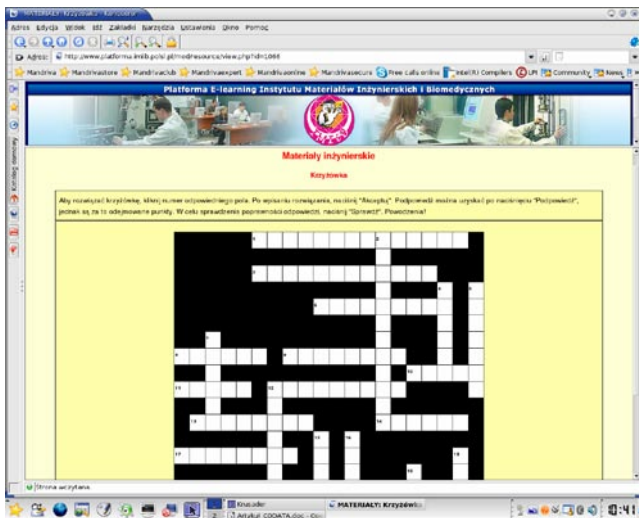


Fig. 3. The ingineur material crossword – an example of interactive resource [1]

4. Possible content selection in the Moodle system

Reaching out the growing interest for remote education Institute of Engineering Materials and Biomaterials started a distance learning platform based on the "Moodle" project. It has offered the access to electronic materials, that are addition for processes of traditional education the contents selection and the presentation manner depending on the teacher choice. He can choose from numerous modules integrated in the Moodle system.

First of them is the HTML or plain text internet sides - Thanks to editor WYSIWYG (What You See Is What You Get) formatting of text, putting tables or images is very easy and visually similar to services of MS Word Editor.

Assignment module embraces aims to realizations, dates of completions and maximum mark for it. Students will be able to send one file to fulfill the task. On single page the teacher can look through every file (together with information about this, with delay or with advance it was sent) and to record marks and comments. With a half hours delay the system will send to the students notifications with use of electronic post.

Forum module is probably the most important component - here taking place all discussions. At addition of new forum, teacher will have possibility of choice different type of discussion, such as straight discussion on one theme, general forum accessible for all, or one thread of single user.

Diary module extorts activity for all users for all courses. For every course teacher or student can formulate an open question, which is an advice for students, and period, in which the diary paper is accessible. Basic, checked method is creation of one diary for every week. Teacher should encourage students for use of a diary. The entrees should have a reflective and critical character, because access to them has only students and teacher. He can evaluate and comment all entrees for given week or for given theme, and students will automatically receive the comment by electronic post.

Quiz module makes possible creation and giving of tests in form of quizzes consisting from questions of multiple choice, of

questions of the yes/no type, and of exacting questions for giving short answers. Questions, ordered according to category, are placed in database and can be used again in frames of that course, or even transferred to other course. Quizzes can admit repeated tests of finding solutions. Every test is automatically checked and teacher can decide, whether to introduce he's own comment or to throw open correct answers (fig. 3).

Lessons deliver content in an interesting and flexible way. It consists of a number of pages. Each page normally ends with a multiple choice question. Navigation through the lesson can be straight forward or complex.

Questionnaire allows access to special defined questionnaire tools, which are help to recognize and for better to understanding of the course and participants. At present the teacher have access to COLLES and ATTLS tools, which can be accessible for students at the beginning of the course, for diagnostic aims and to the end of the course for estimation and evaluation of the course.

Resources determine content of the course server. As a resource can be any file upload by the teacher or indicated by address URL made to appear as apart of this course (fig. 4).

Presentation - enables teachers to quickly and easily create a resource that looks and acts like a Power Point presentation without using any software outside of Moodle. One advantage of this is that most users are familiar with this layout and will find navigation through the slides in the presentation intuitive. It is a comfortable environment for many users.

Wiki is a web page that anyone can add to or edit. It enables documents to be authored collectively and supports collaborative learning. Old versions are not deleted and may be restored if required.

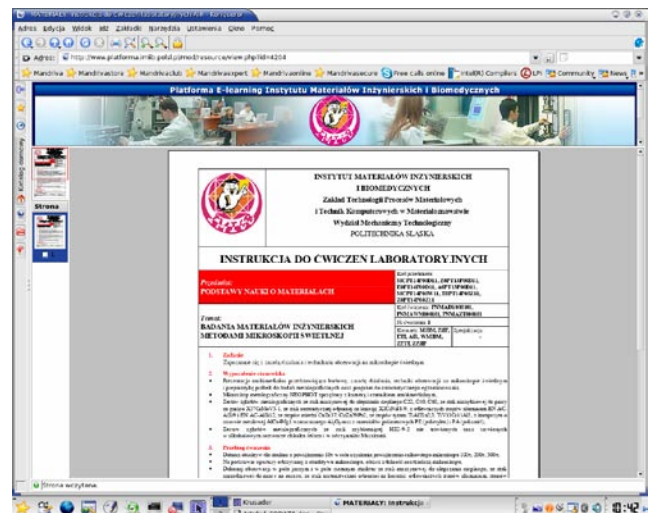


Fig. 4. Instruction for Fundamentals of materials science laboratory exercises – an example of resources, which support the traditional learning [1]

The object oriented construction of Moodle system provides, that each of elements is independent from the others parts and can be used many times in any course or even as independent educational material.

System Moodle supports such approach in two areas: builds of educational content by built-in tools and by import of prepared content with use of external application.

Contents introduced into system (without regard on method of introducing) can be transferred to other courses, can be imported and exported (in wholes or parts), and also archived in form of complete elaborations [1, 3-5].

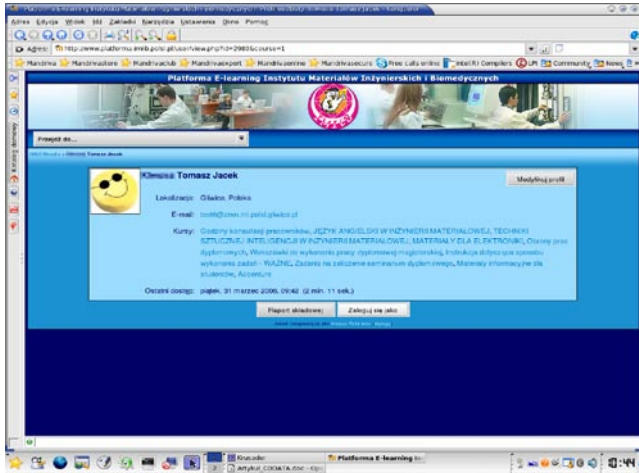


Fig. 5. Student account manager in the administrator panel [1]

5. Students account management

The administrator panel permits in straight manner to administer with system with mouse, from one place. Teachers and students can be by added as a member of the course and removed from them. Configuration of copy reserve and reproductions of courses is executed on one screen.

One click permits the view of all activity of participants. Students create personal profiles, which can contain personal data and photo, helping with communication with other students and to form online Moodle communities (fig. 5).

All participants assigned to groups have a general practice in education as well in business. Moodle allows creation of category of groups and qualifying, in which manner their members will enter in interactions with each other in different situations on the course.

Teacher or administrator can lock the course. The necessary access entry key (a password) can be given only to separate group of students, whose have interests in this course. This key is independent from system and is necessary only once (at sign-up for the course). The requirement of key is signaled by an icon close by the name of the course (fig. 2).

Users can log in always and from all places, to obtain access to supplies course. They can qualify time zone and language - one from sixty one [1, 8, 9-11].

6. Conclusions

E-learning systems are rapidly developed and is only matter of time, when such systems becomes an integral part of all Higher Education teaching and learning in the future. Lots of arguments speak for creation of educational platforms based on The Moodle

system. It is elastic, technically advanced, reliable and easy in use. World Moodle community counts already millions of users and constantly increases, what well indicates for further development of this system.

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