CEID-PAD: A MOODLE-BASED COURSE MANAGEMENT SYSTEM

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Abstract

We present ceid-PAD, a course management system based on Moodle. Compared to existing Moodle-based systems, ceid-PAD contains four additional new modules (Doodle, Evaluation, Chat, Bibliography), supports both English and Greek languages and offers a new “send SMS” service exploiting wireless network technologies through devices like mobile phones and PDAs for promoting ICT in the teaching and learning process.

Keywords: Course management systems, Moodle, Moodle modules, wireless network technologies, ICT in education.

1 INTRODUCTION

Information and Communication Technologies (ICT) have influenced many aspects of modern life. By observing certain fields, such as medicine, business, banking etc., one can notice that the impact of ICT during the last decades has been enormous. In education, however, the influence of ICT has been much smaller comparing to other fields. Recently ICT tools have started being adopted and used in education. We have designed and implemented ceid-PAD, a Moodle-based, Course Management System (CMS) which forms a collaborative web-based educational environment intended for higher education institutes.

Course/Learning Management Systems (CMS/LMS) are web applications running on a server, accessible through web browsers. They offer tools for the design, implementation and management of online courses and a wide variety of features aiming to facilitate maintenance and exploitation of course material. Such features include: file uploading and sharing, online handling and grading of students assignments, use of new technologies so that users are posted for announcements and updates, forum and chat capabilities, use of social tools so that users can form online communities for the improvement and promotion of the educational/learning process [2]. CMS are the core of distance learning and can also be used as supportive tools in the traditional educational process. They have been increasingly used in educational institutions, business, governments, no profit organizations etc.

Moodle (Modular Object Oriented Dynamic Learning Environment) is a free, open source CMS that allows the creation of dynamic, flexible and attractive online courses. It was created by Martin Dugiamas, a computer scientist and educator, in order to boost the educational process.

Below, we briefly present basic characteristics of Moodle due to which we selected it to be the underlying platform of our system. Moodle [2] consists of separate parts of code called modules, which perform a specific function. New parts can be created and added separately on the platform. It is object-oriented in the sense that the software is driven by users’ actions on separate environment objects. Moreover, users are not required to have particular programming skills or being experts in using the platform. The growth of Moodle has been supported by the following facts: it is “open source”, it has a sound educational philosophy and that there is a huge community worldwide that supports it. The open source philosophy is gaining more and more supporters in the computer world and beyond since it allows users access to the source code of the software: users can read it, tinker it, use pieces of it in their applications and, above all, modify it to meet their needs. In education, the open source philosophy is important because it is related to the academic values of freedom, scientific review and knowledge sharing. Besides, unlike proprietary CMSs that require expensive license fees and maintenance contracts, Moodle requires zero cost for its installation as well as for upgrades or maintenance and everyone can download it and use it wherever and whenever they need it. Moodle is designed based on the educational theory of social constructionism. Social constructionism is based on the idea that people learn better when they are engaged in a social process of constructing knowledge through the act of constructing an artifact for others. This means that Moodle is learning centered unlike most CMS systems that have been built around tool-sets. The difference between a
traditional class and the social constructionist philosophy is the similar to the difference between a lecture and a discussion. Moodle accomplishes that in several ways, such as the user interface. While tool centered CMSs provide a list of tools as the interface, Moodle builds the tools into an interface that makes the learning task central. A course in Moodle can be organized per week, per subject or social contract. Additionally, while other CMSs support a content model that encourages instructors to upload a lot of static content, Moodle focuses on tools for discussion and sharing artifacts. The idea is not just delivering information, but sharing ideas and engaging in the construction of knowledge. The user community of Moodle is a large and active community of users from all over the world who use and develop the platform. We indicatively mention that there are more than 300000 users enrolled at Moodle homepage (www.moodle.org). This community consists of user groups that are dedicated in various tasks, such as: code debugging, developing new tools and scripts of code with new features, solving problems and answering questions about the platform through the user forums. Users worldwide use the new features and provide feedback to the developers. Whenever any new element meets the quality standards set by the developers, it is included in the next versions of the platform. This makes clear the significant interdependence between the system itself and the community using it: Moodle users actually upgrade Moodle pumping ideas for extending and enriching it through their experiences. Fig. 1 [13] shows how the number of Moodle-based registered sites has grown during the last decade; their number is currently estimated to be approximately 66,642. Fig. 2 [13] presents the top ten out of 216 countries in terms of the distribution of registered sites per country.

Fig. 1: Number of Moodle-based registered sites in the period 2004-2011 [13].

Fig. 2: Country registrations Top 10 list [13]: United States 11.595, Spain 5.801 Brazil 4.874 United Kingdom 3.870 Germany 2.856 Mexico 2.571 Portugal 2.080 Colombia 1.763 Australia 1.668 Italy 1.602

1.1 Related work

There are several examples of Moodle-based systems developed and currently used in higher education at an international and national level. More details can be found at http://moodle.org/sites. Below, we mention some indicative examples: the system used for the Scheller Teacher Education Program at MIT (http://moodle.mitstep.org/) which provides its users most of the pre-installed Moodle modules like forum, assignment and file uploading, the system for online courses of the Ruhr-
Universität of Bochum, Germany (http://moodle.ruhr-uni-bochum.de/), the course system of the London Graduate School of Management, UK (http://www.lgsm.info/moodle/). Furthermore, Moodle-based systems using default Moodle features such as fora, file uploading, online assignments, links to other websites, etc. are currently used in several higher education institutes as well as in secondary education in Greece: the Technological Educational Institute of Kavala, Greece maintains a Moodle-based system (http://axis.teikav.edu.gr/moodle/course/view.php?id=54) currently hosting 40 institute which provides educators almost all default Moodle features like file uploading, assignments, fora, links to other web sites etc. Other relevant systems are the course system of the Department of Education at the University of Thessaly, Greece (http://elearn.ece.uth.gr/e-class/), the system “eCOURSE” hosting courses for various departments of the University of Ioannina, Greece (http://ecourse.uoi.gr/), the Sch system of the Greek National School Network (http://e-learning.sch.gr/) offering online course creation facilities.

In Section 2 we present ceid-PAD and give details about its design, implementation and use. We conclude in Section 3.

2 CEID-PAD

We have designed and implemented ceid-PAD, an integrated Moodle-based educational web system. ceid-PAD (Fig. 3) has been developed using Moodle Version 1.9.16 and has been installed on a web server with PHP Version 5.3.3, Apache Version 2.2.15 and MySQL Version 5.1.61.
ceid-PAD is available online at: http://solon.ceid.upatras.gr/katsikart/moodle/. It supports all tools provided by Moodle and can fully host web courses used either for distance learning or as a supplement to the traditional educational process. All a user must do in order to experiment with ceid-PAD (both in English or Greek) is to create an account, log-in and subscribe to an existing course or even create a new one (Fig. 4).

**Fig. 4: ceid-PAD at a glance: a user has logged in (view mode).**

By selecting the “Turn editing on” option (Fig. 5), modifications can be made to all course components: user profile, site setup; in addition new resources (e.g., labels, text, webpages, etc) and activities (assignments, bibliography, doodles, quizzes, wikis, etc) can be added.
Compared to existing Moodle-based systems, the innovation induced by ceid-PAD lies in:

1. the modification, translation (in Greek) and embedding to ceid-PAD of four third party modules created by members of the Moodle community, namely Bibliography, Chat, Doodle, Evaluation (Fig. 6). Bibliography can be used by the course teacher in order to provide a reference list containing books, online resources, notes, etc to students. A Doodle can be initiated and used so that important course events (like, for instance, exam dates, or non-scheduled lectures) can be decided and planned as a result of cooperation among teachers and students. The Chat module provides a simple and fast communication environment for all people involved in some particular course. Finally, using the Evaluation module, students can provide valuable feedback on the organization and efficiency of the educational and teaching process.
Fig. 6: ceid-PAD contains Bibliography, Chat, Doodle, Evaluation Moodle modules.

2. the extension of the existing Greek version of Moodle by the addition of new terms so that ceid-PAD can fully host web courses both in English and Greek (Fig. 7). This practically means that the design and organization of a university course can be fully exploited and re-used no matter if the original implementation has been in English or in Greek. This two-language option refers to the system structure and, obviously, does not affect the included material related to particular courses.

Fig. 7: ceid-PAD supports both greek and english language options.

3. the implementation of a new “send SMS” service which has been integrated to ceid-PAD coupling and exploiting wired and wireless network technology. “send SMS” (Fig. 8) enables instructors to send short messages (sms) to students attending particular courses, informing them about various news and announcements. Short messages, once sent, are automatically posted as new threads to the “General news and announcements” forum on the course page; in addition, an email containing the short message is sent to all course participants. Given the widespread use of mobile phones and PDAs within student communities, such a service can successfully support student immediate update on course new material and important upcoming events.
Fig. 8: ceid-PAD offers a "send SMS" service.

Furthermore, specific groups of tools have been created so that an efficient and flexible course categorization is provided. Each such group embeds particular features which provide a corresponding functionality range. In particular, ceid-PAD provides three groups of tools, namely, "static course material tools", "interactive course tools" and "social course tools". Tools in the "static course material tools" group are used for adding course material such as web pages, links, files, IMS content packages etc. Besides static content, ceid-PAD supports the use of interactive material by means of two groups: the "interactive course tools" and the "social course tools". The "interactive course tools" group contains tools for adding interactive material to a course, i.e., material that facilitates and encourages interaction between teacher and students or between students and an active web page. The tools included in this group contain assignments to students, grade section, class polls, lessons, quizzes, Doodle (a voting tool allowing students to make a selection of a date out of a set of dates predetermined by instructors), course evaluation (allowing students to evaluate courses and instructors as well as to make comments and proposals for the course improvement). Apart from interactive course material there is social course material that facilitates and encourages student interaction. The system enables the instructor to add and associate chats, fora and wikis (i.e., collection of collaboratively authored web pages) to courses. Teachers can also create global or course-related glossaries where students can add new terms or modify existing ones. The use of Social course tools encourages students to contribute, share and evaluate.

The rights a user has in the system are determined by the user’s "Role". The basic roles in ceid-PAD are Administrator, Teacher and Student. A user can have multiple roles in the system. For example, a user can be a Teacher within a course A and a Student in the context of another course B. Or, a user can be a Student at a course level while the Teacher can assign this student the role of a Teacher at a forum level. Building on user roles can offer flexibility and efficiency in the management of the teaching hierarchy, in the process of task allocation and also in the management of educational material. Our system allows creation of new roles and editing of default (existing) ones.

2.1 Benefits from the use of ICT tools in education derived from the use of ceid-PAD

Below, we discuss benefits from the use of ICT tools in higher education as indicated by our findings through our learning experience with ceid-PAD.

ceid-PAD provides practice capabilities [3, 10] therefore helping students to increase their efficiency through training [8, 11] through the use of the Lesson and Quiz tools as well as through static material (web pages, uploaded files, links to relevant web pages) continuously accessible for practice and revision. Furthermore, it provides feedback to students through the Lesson and Quiz tools in the form of marking or correction of a mistake, suggestion of web sites for knowledge supplement, etc. thus enhancing learning and successfully supporting the improvement of student performance in a course [6, 7, 9].

It motivates students to actively participate in a course and increase the knowledge gained through the use of a wide range of teaching and learning methods which attract the student interest and attention like images, video, audio, web pages, different text files, presentation files, links to other web sites or...
embedded media players etc., as well as through the option to ask questions and answers offline without having to deal with time limitations, criticism or embarrassment in case of mistakes, etc (barriers that tend to appear in a classroom).

The use of ceid-PAD can improve student ICT skills thus making them more competitive candidates in a demanding labor market, where the ability to use ICT tools effectively and efficiently forms a key asset.

The use of ceid-PAD increases efficiency in time allowing teachers to provide course information online - 24 hours per day, 7 days per week. In this way, instructors can exploit additional time for providing new information to students, for covering extra parts of the curriculum or for giving more time to students for practice and questions.

The introduction of ICT tools – like ceid-PAD - in education is not enough by itself to increase the effectiveness of the course. Instructors not only need to know what to use but also how to use it. Knowledge of computers alone is not sufficient to allow teachers to maximize the benefits of these tools. The effective introduction of computers in the course requires up to one year along with support from groups of specialists or through collaborative work [10, 11]. Additionally, the knowledge, skills and beliefs of the educators affect the efficiency and the way they choose to use the ICT tools in their course [4]. Through this process, not only the students benefit and evolve but also the teachers. They have to evolve along with these tools, increase their knowledge of new technologies and make the course more effective with their use. ICT tools should also be used for the education of instructors (like the example of the institute CTTC (Cyber Teacher Training Center) where individual web-based courses are provided to teachers [5]) enabling them to improve their knowledge on new technologies.

A key feature of ceid-PAD and ICT tools in general, is their ability to transcend space and time in the sense that they can support a sort of asynchronous teaching/learning characterized by a time gap between the time that information is delivered and the time that information is received by students. Courses are available 24 hours a day, 7 days a week, a fact that increases learning capabilities even for people who previously could not afford it [12]. ICT aided instruction removes the need for students and teachers being bounded at a particular place. However, certain types of ICT tools, such as teleconferencing, chatrooms, etc. allow simultaneous attendance of a course by multiple spatially distributed users (synchronous teaching). With its chat module ceid-PAD provides such synchronous capabilities while through the effective use of its static, interactive and social tools an asynchronous form of teaching can be designed and performed. Also, exploiting wireless communication infrastructures together with the widespread use of mobile devices (e.g., phones, PDAs) within student communities, ceid-PAD offers a new “send SMS” service which can successfully support student immediate update on course new material and important upcoming events.

Proper use of ICT tools may revolutionize the educational process [1]. If planned and taught properly, courses supported by ICT tools can boost the acquisition of knowledge enabling new ways of learning and teaching rather than simply improving the traditional educational process. These new ways are included in the “Constructivism” learning theory which describes a transition from a teacher-centered teaching to a more student-centered form of teaching where dynamic construction plays a central role [12]: ceid-PAD, as a Moodle-based system, follows the principles of Constructivism and encourages active learning (through e.g., its glossary and wiki), collaborative learning (through e.g., collaborative management of wikis, fora, glossaries, assignments, etc.), creative, integrated and evaluative learning.

### 2.2 Comparison to other systems

**Comparison to Blackboard systems**

The Blackboard learning system is probably the world leading proprietary CMS and is developed by Blackboard Inc. It is used by more than 60 percent of the U.S. colleges and universities named to the Forbes.com Most Connected Campuses’ List. Its comparison to Moodle-based systems indicates that regarding tools and features, Blackboard offers almost the same capabilities as Moodle-based systems [10]. However, Blackboard imposes high operational and maintenance costs.

**Comparison to OPENeCLASS**

OPENeCLASS is a CMS developed by Gunet (a non-profit organization formed by members of 35 Greek academic institutions in order to research new technologies that can serve research and education in Greece, http://www.gunet.gr), it is based on the open source CMS Claroline and is currently widely used in academic institutions in Greece. OPENeCLASS successfully supports several features also supported by Moodle-based systems. Inefficiencies include: (i) OPENeCLASS provides only multiple choice quizzes, matching and short
answer questions while a Moodle-based system can support up to 9 different quiz types. Furthermore, result extraction is not embedded in OPENeCLASS while its assignment types include only the single file submission and the offline assignment. (ii) OPENeCLASS includes social course material, specifically chat, forum, wiki and glossary modules. However, the chat module can support only message exchange, the recently added Wiki module supports only plain text pages while the glossary module can be edited only by instructors.

3 CONCLUSIONS

We presented ceid-PAD, a Moodle-based, Course Management System (CMS) which forms a collaborative web-based educational environment intended for higher education and forms an excellent show-case for the benefits induced by the use of ICT tools in education. Compared to existing Moodle-based systems, ceid-PAD contains four additional modules, supports both English and Greek language and offers a new “send SMS” service exploiting wireless network technologies through devices like mobile phones and PDAs for promoting ICT in the teaching and learning process. It is within our future plans to study in detail statistics recorded from the use of our system and make necessary design and implementation updates.

REFERENCES


