MIGRATING TO MOODLE: A CASE STUDY REGARDING A DEPARTMENT-WIDE IMPLEMENTATION

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Abstract

This paper presents the rationale behind the utilization of the Moodle Learning Management System for blended learning in our Informatics Department and examines the steps followed, to replace the prior decentralized course organizational structure which consisted of a multitude of different systems. Our main goal was to implement a single, easy-to-operate, easy-to-maintain system, able to support students' and instructors' needs in all the courses. Further-more, we present data which describe the pilot study of the Moodle implementation for the first semester and make evident the success of the department-wide migration.

Introduction

In the past years the instructors in our Informatics Department, at the Aristotle University of Thessaloniki, were allowed the freedom of choice on whichever Learning Management System they thought was appropriate for supporting their courses. The decision between the available LMSs was often based on factors such as the instructor's familiarity with a specific system and the available technical infrastructure at the instructor's computer lab.

This resulted in the concurrent operation of a number of different systems, each supporting only some of the department courses. This distribution of the courses into several different systems proved ineffective and unproductive for both the teachers and the students. The instructors were having difficulties using their material across different systems, and the students had to cope with having multiple user accounts and using partitioned interfaces for their courses.

In order to rectify this situation, the decision was made for a single LMS that would substitute for all others, provide a centralized organizational structure for the department courses, and support the benefits of blended learning pedagogical models. Benefits include the spatial and temporal flexibility of both instructors and students and the ease in the distribution of educational material (Francis & Raftery, 2005).

A single system solution presents many advantages. For example, it provides: (a) a central technical infrastructure that's easier to manage and operate; (b) the ability to migrate learning material easily from one course to another; (c) individual user accounts that can be efficiently managed; (d) collective technical reports (e.g., number of logins, visits, used bandwidth, etc.) useful for system evaluation; and (e) performance reports for each student (e.g., grades, projects, pending submissions etc.), and others. However, in order to utilize the advantages mentioned above and to ensure that the LMS solution we would adopt could substitute the previous systems successfully, it had to be selected through a detailed, multi-layered process.

The process we followed for selecting an appropriate LMS consisted of three phases: (a) recording the characteristics of the pre-existing systems, (b) identifying the instructors' needs for the new system, and (c) evaluating a range of available systems, according to the instructors' needs determined in the previous phase. The selection process also took into account factors such as the estimated cost of implementing the desired system, and its ability to be customized and managed using only department staff.

In the first phase, we recorded the functionality of the previous LMSs used by the instructors. The purpose of this phase was to enumerate the tools (e.g., whiteboard, mailing list, forum, etc.) that were already available, through different systems, to the students. These same tools would have to be supported by the new system. In the second phase, we created a comprehensive list of the necessary and desired tools and services of the new system, according to instructors' answers to questionnaires. Based on the previous phases, a detailed list of requirements was formed. This list was used for the evaluation of a set of popular LMS solutions. The final results showed that in supporting our needs, Moodle had an advantage over the other examined systems.

We implemented an instantiation of Moodle according to the instructors' needs and made it accessible to them. A significant number of instructors chose to move their courses to Moodle. After a semester of operation, a preliminary evaluation was conducted based on access logs and questionnaires completed by instructors and students.

In the following sections, we (a) discuss the advantages of blended learning, (b) present in detail the LMS selection process, (c) analyze the major issues we had to address during implementation, and (d) describe the situation which has now emerged due to the first semester operation of the Moodle platform.

Blended Learning

In this section, we justify the use of "Blended Learning" practices and our requirement for their support by the chosen LMS solution. Initially, there is a description of the pedagogical models of blended learning and a study of the theoretical background, on which they are based. There is also discussion of the advantages which emanate from using these models in the organization of educational activities. Following that, the prior condition of the curriculum of the Informatics Department is presented based on the statistical results of submitted questionnaires. From this statistical analysis, we can gather the most popular teaching, evaluation, communication and working practices of our department's staff.

Blended Learning Goals

Blended learning courses combine the use of distance learning methods with the interactions which occur within a traditional classroom. Instructors mention that the blended learning model enables them to complete their educational goals more effectively than the traditional model. Most instructors note increased interaction with students and of the students between them. Students' contact with the department increases through the blended learning model, as does their thoughtful participation in the educational activities (Garnham & Kaleta, 2002).

The main goal of blended learning is to combine the best features of traditional education with the most prominent characteristics of online teaching, so as to encourage independent learning and decrease the required classroom time. In order for the above goal to be accomplished, it is of vital importance to guarantee the correct ratio in the use of the different educational means (Trasler, 2002).

Blended Learning Advantages

According to Voci and Young (2001), effective blended learning is balanced learning. This balance is accomplished through the combination of the advantages of two forms of teaching, traditional classroom education and self adjusting distance learning. Some of the advantages of traditional classroom education are: (a) social interaction through personal contact and the exchange of ideas, (b) familiarity, customary method, and (c) an environment which supports multiple communication channels. On the other hand, some of the advantages of technologically supported education include: (a) respect towards student differences and preferences in style and rhythm of learning, (b) self adjusting learning is more flexible, since the virtual (online) classroom is available 24 hours a day and seven days a week, and (c) the educational material, which is available online, is not influenced by human weaknesses, such as instructor inability (e.g., sickness).

So, to recapitulate we could say that the advantages of blended learning include: (a) an ease in functionality and student time organization, (b) increase in interaction between students, or students and instructors, (c) spatial and temporal flexibility, (d) increased learning, (e) decrease in student drop outs, and (f) adjustability to each student's preferences (e.g., personalized learning) (Singh & Reed, 2001).

Analyzing the Prior Situation

The first step towards a new system was to identify and analyze the prior situation. For this, a questionnaire was formed for the instructors, focusing on: (a) general information, (b) teaching methods, (c) evaluating methods, (d) communicating methods, and (e) tools and services used. A sample of fourteen instructors answered the questionnaires.

The general information section of the questionnaire was about the courses each instructor teaches in the curriculum and the number of the respective participating students. Results showed that each instructor teaches 3 courses on average, with the minimum and maximum number of courses taught by one instructor being 2 and 5, respectively. The average number of students in each course is 109, with the minimum and maximum number of students in one course being 10 and 250, respectively. The large number of students in many of the courses poses a management overhead to the instructor. The new system, therefore, should provide facilities that will help the instructor in their teaching, communicating, and evaluating tasks.

Regarding the teaching methods, all instructors declared that they use the traditional face-to-face method of teaching. In addition, half of them utilize computer aided learning in their face-to-face teaching sessions, but almost no one uses integrated educational activities such as forum, chat, teleconference etc. Nearly all instructors declared that they use the web to distribute educational material (e.g., notes, presentations) to their students. The web-based distribution sets two requirements. First, the educational material must be in an electronic format, and second, all students must be able to access the material. The main issue here is the percentage of students with internet access. Any student without internet access is automatically excluded from the learning process, making the distribution of learning material, solely on the web, problematic. Of course, internet access is provided freely for all students at the university campus, although this solution restricts the spatial flexibility of blended learning.

Concerning the evaluation methods, all instructors declared that they use final written exams to evaluate the students, while only a small percentage (14%) uses written mid-semester exams. In addition, only 14% of the instructors use aural

exams and 28% evaluate their students in a computer laboratory. Finally, almost everyone uses project-based evaluation; while in contrast, no one uses research activities, self evaluation or specific software.

The communication methods section of the questionnaire focused on the ways the instructors prefer to interact with their students outside the classroom for course-related issues. The two predominant communication methods that all the instructors use are face-to-face office meetings and emails. A small percentage of instructors (14%) use the telephone, while almost no one uses any of the other available communication methods such as discussion boards, chat rooms, etc.

Finally, the instructors were asked about the tools and services they use in their courses. Results showed that a variety of different tools and services are used with printed books being used by everyone. Presentations in electronic format (92%), software applications (92%), electronic submission of students' projects (85%), and lecture notes in electronic format (78%) are also used by many instructors. A smaller percentage of instructors use printed notes (57%), printed presentations (23%) and e-books (53%).

The above depict the pre-existed conditions in our department. The new system had to support all the methods for teaching, communicating and evaluating used by the instructors. Furthermore, it should be able to support all the tools and services that had been used in the courses. In sum, the features and requirements of the new system situation were heavily based on the prior situation.

Features and Requirements of the New System

The analysis of the prior situation resulted in a comprehensive list of necessary features and requirements for the new system. However, a large section of the questionnaire answered by the instructors was focused on recording any new features that the instructors would like the new system to have. Due to the breadth of the conclusions derived from the answered questionnaires, we will mention only the most important here:

- electronic books are considered an important tool for the majority of faculty members.
- electronic notes and presentations are very popular and they should be supported by the chosen system.
- integrated LMSs (e.g., Blackboard, eClass, etc.) are used by 57% of the faculty. In addition, members request better training, and more technical support.
- the use of a static web page for the distribution of educational material is a very popular approach and should be required of the chosen solution.

- forum, chat room and bulletin board support is considered necessary since many members would like to use these tools in their pedagogical approach.
- tools such as wikis, teleconferences and simulations are not considered necessary.

Another important requirement for the new system was to be able to cooperate with various environments developed, mainly for research purposes, in our department. A typical example of these environments was the eCASE environment, a web-based environment for case-based learning in ill-structured domains (Demetriadis et al., 2007). As most of the environments developed in our department, eCASE was based on open-source technologies such as MySQL and PHP, favoring in this way the selection of an open-source LMSs.

Roles in the Environment

In order to decide upon the main design features of the environments we had to first define the teams of users, the needs of which the e-learning environment would satisfy. The main roles in a typical LMS are: administrator, instructor, student, and guest.

The administrator is in charge of assigning user permissions and rights, and determining which users are allowed to create accounts. Also, administrators can create courses, or use existing courses as templates. On the other hand, instructors can recommend the creation of a course to the administrator, who must then accept it in order for it to be available. After creating their course, instructors have several tools at their disposal. They can organize forums, chat rooms and add announcements to the bulletin board. Regarding students, instructors can either decide who to enroll or let enrollments be open to anyone. Finally, it is the instructor's responsibility to organize the course and upload the necessary educational material.

Students can enroll in courses, upload project files and observe the progress of their grades. If they are working in groups, they can participate in forums, chat rooms or whiteboards where only team members have access. Finally, guest permissions are usually defined by the administrator and are restricted to exploring the system without access to the educational material or the community and communication tools.

Comparison of Learning Management Systems

Based on the necessary and desired features that were analyzed above, a final list of requirements was formed. This list was used in the selection process, for evaluating the potential of the various LMSs we considered for the new system.

The evaluation process had two phases. Firstly, candidates LMSs were evaluated according to the list of necessary and desired features. Depending on whether a feature was provided or not, a grade of 1 or 0 was awarded, respectively. The grade was multiplied by an importance factor (feature weight) varying between 2 (most essential) and 1 (least essential). The final score for each system was calculated as the sum of all the weighted grades. Secondly, the LMSs were evaluated based on five criteria: the adaptability, the cost, the extensibility, and the interoperability of the system, and also on our project team experience with the system. For this phase, a 0–5 scale was used and the score that each LMS got in this phase was the sum of each criteria score. The final evaluation score for each LMS was calculated as the sum of the scores in the two phases.

For the new system we considered nine LMSs that are commonly available, have been used effectively in similar situations, and have been analyzed in various studies in literature for their potential use in blended learning. The nine learning management systems were: ATutor 1.5.4 (http://www.atutor.ca/), Blackboard Vista 4.1 (http://www.blackboard.com/us/index.bbb), Claroline 1.8.1 (http://www.claroline.net/), Dokeos 1.8 (http://www.dokeos.com/), eCollege (http://www.ecollege.com/index.learn), FLE3 1.4.2 (http://fle3.uiah.fi/), SAKAI 2.3 (http://sakaiproject.org/), ILIAS 3.7.7 (http://www.ilias.de/) , and Moodle 1.8 (http://moodle.org/).

After the first evaluation phase, six of the nine LMS were very close. Specifically, ATutor 1.5.4, Blackboard Vista 4.1, Dokeos 1.8, eCollege, SAKAI 2.3, and Moodle 1.8 scored between 48 and 52, out of 54. However, in the second phase Moodle came first, mainly because of its adaptability and interoperability. Furthermore, the fact that Moodle is based on MySQL and PHP was seriously considered an advantage, since the project team had extended experience with open-source technologies, and it could be easier to connect Moodle with other open-source environments developed in our department.

Extending Moodle

The result of the selection process showed that Moodle was the most appropriate LMS for our needs. However, several configuration and extension tasks had to be carried out in order to use Moodle in our department. The two most important issues we addressed during implementation were the translation of the Moodle interface from English to Greek, and the connection of Moodle with eCASE.

Translation proved to be a difficult task, mainly because of the differences between the English and the Greek language, and also because of the way that Moodle manages terms that appear in its user interface. Regarding the latter, Moodle provides a facility that allows the system administrator to replace the

string of a term with another. For example, an administrator can change the term "teacher" with the term "instructor" or with a translated term. Moodle often uses the same term in various web-pages; hence the replacement of a term usually affects many pages. While this technique is efficient and has good results for English terms, it is problematic for Greek terms. Contrary to the English language, the Greek language is highly inflected, involves gender noun categories and four cases (nominative, genitive, accusative, and vocative), making it impossible to have an appealing and coherent appearance of the same translated term in every occurrence. Moodle may have various versions for each term (e.g. "teacher", "teachers", "teacher's", "Teacher", "Teachers", etc.), however this happens in a limited basis, and only for some terms. In our translation process, we firstly opted for a completely Greek interface. This often resulted in an incoherent interface. Finally, we were forced to leave many of the terms that appeared in various contexts in English. This solution had better outcomes, although it is clearly a drawback to have mixed English and Greek in the same page.

The translation issue is important because it affects directly the appearance and the usability of the environment. With the current term replacement facility, the translation of Moodle to a highly inflected language is troublesome. In our case, a solution would be to have Moodle handle each term occurrence as a different term. In that way, we would be able to replace the English term with an appropriately translated Greek term.

The second major task in our Moodle implementation process was to extent Moodle functionality by creating a new block inside Moodle that would present information derived directly from the eCASE environment. Both environments were using the same open-source technologies (i.e., PHP and MySQL), but different character encodings. Moodle, in an effort to be more generic and to support more effectively different languages, uses UTF-8 encoding in its web pages and in its database. eCASE, on the other hand, uses ISO-8859-7 (also known as ISO Greek). This difference caused many conflicts between the two systems, both in the database connection and in presenting data from the two systems in the same page. Moodle has adopted UTF-8 as standard and it is not possible to change it easily (or at all). Thus, the solution was to change the eCASE code to use UTF-8 encoding.

To sum up, even in the case of using open-source systems, it is not always feasible to adapt any feature exactly to your needs. For our implementation, we would have to design a new term replacement facility and alter a significant part of the Moodle code in order to use a different character encoding. Instead, we chose more efficient middle ground solutions with acceptable outcomes.

Pilot Study

In this section of the paper, we will discuss issues which emerged during the first semester operation of the new system. Also, we will present the new centralized organizational structure of the department courses and informative data regarding user activity.

Our Moodle implementation supports 34 courses (as of February 2008), organized into 8 categories based on year, direction of study, and educational level (undergraduate, postgraduate). The number of courses, as well as their organizational clusters, was deemed more than adequate by the project team. From these 34 courses, 7 restrict access to specific students while the rest are open to all.

Also, from the 30 instructors in our department's staff, 14 support their courses through the new system. This is satisfactory, since most of the instructors migrated to the new platform from static web pages or other LMSs. The smooth transition of the instructors' courses is important, with regards to aspirations, concerning the support of all department courses in a centralized manner.

As of March 2008, 626 users have created accounts in the system. Based on data gathered from 5 months of system operation, we have determined that on average there were 138 logins each day. Table 1 presents the number of system logins ordered by month of operation. The substantial number of students and daily logins assisted us in the technical evaluation of the system, since the ability to support a large number of concurrent users while maintaining stable and dependable functionality was considered a necessity. Despite operating during an exam period (January 2008), where there is a substantial increase in user logins, no kind of unresponsiveness or instability was observed.

Table 1: Logins per month of operation (January is exam month)

Month	**Total number of logins**	**Average number of daily logins**	**Maximum number of daily logins**
October 2007	2105	68	162
November 2007	4238	141	364
December 2007	3125	101	177
January 2008	6360	205	389
February 2008	5077	175	328
Total	**20905**	**138**	**389**

During the first semester operation of the new system, the administrator maintained a log concerning communication with the users. The administrator was contacted 35 times in 5 months, mostly by instructors (82%). Communication was mainly regarding course creation requests. Finally, the preferred communication method seems to be that of emails.

Conclusion and Future Work

Due to the prior decentralized course organizational structure of our department, it was decided, based on a multi-tiered evaluation method, to exploit the advantages of blended learning through the installation and operation of a customized Moodle implementation. After a 5 month pilot study of the new system, we can surmise its success.

The pilot study consisted of the analysis of access logs, instructor adoption, and post-operation questionnaires. Overall, the project team was satisfied with the results and specifically with system efficiency, stability, and instructor content.

Although the majority of users were appeased by all the features of the new system, some suggestions were made regarding new services and functionality. Therefore, future work includes improvements in the system user interface and the analysis of the post-operation questionnaires to further augment the system with regard to required and desired features.

References

Demetriadis, S. N., Papadopoulos, P. M., Stamelos, I. G., & Fischer, F. (2007). The effect of scaffolding students' context-generating cognitive activity in technology-enhanced case-based learning. *Computers & Education*, (in press). doi: 10.1016/j.compedu.2007.09.012

Francis R., & Raftery J. (2005). Blended learning landscapes. *eJournal of Learning and Teaching*, *3*(1). http://bejlt.brookes.ac.uk/vol1/volume1issue3/perspective/ francis_raftery.html

Garnham, C., & Kaleta, R. (2002). Introduction to hybrid courses. *Teaching with Technology Today, 8*(6). http://www.uwsa.edu/ttt/articles/garnham.htm

Singh, H., & Reed, C. (2001). *A white paper: Achieving success with blended learning*. Centra Software at www.centra.com/download/whitepapers/blendedlearning.pdf

Trasler J. (2002). Effective learning depends on blend. *Industrial and Commercial Training*, *34*(5), 191–193.

Voci, E., & Young, K. (2001). Blended learning working in a leadership development programme. *Industrial and Commercial Training*, *33*(5), 157–160.