

SPREAD OF AN E-LEARNING SYSTEM IN A POLYTECHNICAL UNIVERSITY

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ABSTRACT

This work details the dissemination and implantation process of an e-learning system in the Universidad Politécnica de Madrid. AulaWeb is an interactive web-based teaching and learning system with password authentication, web publishing facilities, self-assessment,... More than two thousand of teachers and twenty thousand of students at this University have taken advantage of its functionalities since 1999 as a didactic support in presential courses. Implantation strategy and remarks as well as profits and difficulties for all kind of users (system administrators, teachers and students) are illustrated.

KEYWORDS

e-learning, b-learning, University

1. INTRODUCTION

AulaWeb is a WWW-based interactive e-learning system which assist students/teachers to learn/teach subjects (García-Beltrán and Martínez, 2002). This web-based tool has been developed by the División de Informática Industrial of the Universidad Politécnica of Madrid (UPM). From the beginning the AulaWeb development staff has been driven by two assistant professors that, in 1999, used the system with one subject and seven hundred students (Martínez and García-Beltrán, 2001). The results were good enough to start the implantation of the software application in other UPM faculties, with other users, other courses and other subjects. UPM is a public University that has not a common guideline to use this kind of software tools, so it is necessary to carry out a dissemination strategy with the corresponding academic staff in order to convince them (a) that the use of ICTs can improve their tasks effectiveness and (b) to incorporate the most valuable item in a e-learning system: the contents. There are several obstacles for this task implementation: no technology knowledge, no economical or curricular motivation, faculties self-government and teachers autonomy, some courses have already their own websites... and preparing online resources is normally an expensive time-consuming process. Furthermore, the online publishing might affect the teachers' control over intellectual property.

1.1 The University

UPM is the largest technological university in the country, with almost 50.000 students, 3.400 professors, around 800 financed research assistants and an annual budget over 200 million Euros. It is organised in 20 Engineering Faculties, 110 Departments and other Units and provides engineering programs (from 3 to 6 year curricula) in Civil Engineering, Industrial Engineering, Computer Science.... Since its foundation, the institution is strongly research-oriented and has an enormous amount of research facilities, from thousands of computers to large scale laboratories such as Si and GaAs chips fabrication, material-testing, mechanical fabrication, etc. More than 20% of its total income comes from research, with comparable shares from National Agencies, EU and other international Programs and Private Companies. The majority of its professors are involved in some research or consultancy activity but very few of them are experts in

Information and Communication Technologies or are trained and motivated to employ ICT tools in teaching tasks.

1.2. The e-learning system

One restriction in the implantation of educational online systems is the lack of technology knowledge and experience teachers have (García-Beltrán and Martínez, 2003). Most of them, even in a Polytechnical University, are not familiar with the required technologies. So, the first step is to get an easy-to-use and accessible technology to all kind of users. Very few of the commercial e-learning systems have suitable features in this way, so a Computer Science Department in the University began to design a new e-learning platform. The following system specifications were performed:

- Very simple system requirements for all kinds of users (system administrator, teachers and students): a computer connected to internet and a web browser.
- Providing an easy-to-use and intuitive graphical interface based in a combination of a menu bar and icons with different colors and facilities depending on the user type.
- Implementation of a secure and personalised user access with password authentication.
- Supplying a system online help.
- Incorporating educational contents is very flexible and does not required of high-level knowledge of software applications. All kind of online resources (documents, hyperlinks, questions...) can be integrated by means of an step-by-step assistant.
- Development of a complete support documentation: tutorials as visual guides for the three kinds of users (System Administrator, Teacher and Student).

The result was the simple architecture system and graphical user interface of AulaWeb. The system includes a password authentication (for students, teachers and general administrator) and four modules:

- Subject information database: syllabus, theoretical contents, documentation, references, external links, related software, timetable, calendar, previous exams and problems and solutions.
- WWW-based collect and deliver module of practices, homeworks and exercises.
- Self-assessment module with multimedia questions and several types of answers: true/false, single or multiple choice, numerical, string or programming code.
- Communication tools: news publishing system, frequently asked questions board, chat room, forums and user on-line questionnaire.

The system environment facilitates students to get course contents, to deliver practices and homeworks, to do self-assessment exercises, interactive communication... Furthermore, the application provides teachers with the possibility of contents web publishing, exercises generation and configuration and students learning progress tracking. In addition there is a System Administrator in order to carry out users management and administrative tasks.

2. STRATEGY FOR THE PROPAGATION

The AulaWeb dissemination was driven with the following strategies:

- Inside the first Engineering Faculty:
 - o Teachers that employ and take advantage of AulaWeb facilities (students data access, web publishing, homework collect & deliver system, self-assessment tests...) act as a catalyst for encouraging other teachers to use the system.
 - o Students that use AulaWeb also persuade other *obstinate* teachers to publish online resources. Students are even more efficient than teachers as catalyst for introducing AulaWeb in the educational process.
 - o Introducing, *motu proprio*, all the courses, teachers and students in the AulaWeb system database. So, if a teacher decides to use AulaWeb, he can do it immediately. The biggest problem, the students data (more than 3000), was solved by the implementation of a tool that imports the required students data from the academic management application (called AGORA) of the University.

- o Suppling all the academic staff with the AulaWeb teacher visual guide. The Engineering Faculty Director collaborated in this task taking charge of this delivery.
- o Surveys were achieved to collect users feedback in order to get suggestions, ideas and proposals for system improvements.
- In other Faculties (considering that this University is practically a federation of two dozens of Technical faculties):
 - o Giving courses for teachers from other faculties about AulaWeb through the academic activities organized by the Education Sciences Institute of the UPM. For the present, a dozen of courses (more than 400 people were present), has been given. These courses are brief (between 4-6 hours) and very practical: the attendance could use a computer to practice with AulaWeb system during the course and took a very good impression of the e-learning environment.
 - o Installing AulaWeb server and introducing the system facilities to the teaching staff in the petitioner faculties (the courses attendance asks for it!).
 - o Providing to the system administrator facilities a students data importation tool from the academic management software application of the UPM: this task can become into the real problem since some Engineering faculties have more than 2000 students.
 - o Integration with other University services, i.e.: the library services (REBUIN plan).
- In all the faculties:
 - o Transmitting the following messages:
 - anyone can use AulaWeb without being an ICT expert and there is no need to learn HTML to publish online resorces, configure online assesment...
 - using of AulaWeb, designed and developed inside the UPM, is not compulsory (in a public University, this kind of compelling could be a reason for teachers rejection).
 - there is a secure access only for registered users (both, teachers and students) and different levels of access to the resources that can be configurated by the teachers.
 - the system has been tested since 1999.
 - o There is no need for the teacher to install and manage a web server for his/her subject or course: AulaWeb server is managed by the Computer Support Department in each faculty for all the subjects and academic courses they give.
 - o Implementing a information web server (no restriction access) that includes tutorials, reports, hyperlinks and articles about AulaWeb (<http://www.dii.etsii.upm.es/aulaweb>). Since november 2002, there are more than 6000 hits to this homepage.
 - o Giving complementary courses for UPM teachers to learn how to generate electronic resources (PDF, Microsoft Word, Microsoft PowerPoint, audio, video...) that subsequently can be publish in the AulaWeb server as online resources. These courses are also very practical and included in the academic activities of the Education Sciences Institute of the University.
 - o Winning the "New Applications for Internet 2002" first prize granted by the Telefónica Chair in the UPM.
 - o Organizing a Conference about Using New Technologies in Education in september 25th 2003. The contributions were edited and published in a proceedings book. The main outcomes are: users contributions are good for AulaWeb dissemination and teachers' works about ICT & education are recognized. This acknowlegdement is very important for the teachers since they are required to demonstrate some kind of activities and practices in education quality enhancement by the Government authorities. Since march 2003, the Conference homepage had more than 10.000 hits.

3. SUPPORT

In the beginning, the economical support was found in the INDUS-net projects call of in the first Engineering Faculty for the development of educational projects with new technologies and Internet. The funds were used to pay grant holders and computers. Later, a collaboration agreement between the development team and the first Engineering Faculty was achieved to extend AulaWeb facilities. And finally the University library services department also supported the development in order to integrate some library services for teachers

and students. Moreover, AulaWeb use licenses have already been sold to other institutions and companies with e-learning system needs.

4. RESULTS

Table 1 summarizes the results of this challenge and shows the list of Engineering faculties with AulaWeb servers.

Table 1. AulaWeb servers in the faculties of the UPM

Engineering faculty	Installation date	Nº of students / academic staff (2003-04)
ETSI Industriales	December 1998	3122 / 305
F. Informática	October 2001	2480 / 165
EUIT Topográfica	July 2002	696 / 62
EUIT Aeronáutica	September 2002	1592 / 122
ETSI Aeronáuticos	November 2002	2021 / 161
ETS Arquitectura	February 2003	4302 / 421
ETSI Agrónomos	March 2003	2157 / 284
EUIT Agrícola	May 2003	1196 / 98
EUIT Telecomunicación	September 2003	1996 / 160
ETSI Navales	October 2003	656 / 83
EUTI Industrial	November 2003	2371 / 164
EU Arquitectura Técnica	January 2004	2772 / 146
EUIT Obras Públicas	January 2004	2128 / 100
EP Enseñanza Superior	February 2004	-- / --
EUIT Forestal	May 2002	974 / 67

5. CONCLUSIONS

A Web-based system with an easy-to-use graphic user interface has been developed by a Computer Science Department and disseminated to other Engineering faculties in the UPM. The system has been used since 1999 as a didactic support to the academic courses taught in these Engineering faculties. The main advantages are the system easiness and its adaptation to the users needs. Although the propagation was very laborious, the number of hits and the user feedback indicates that both, students and teachers, found it easy to use and a very useful learning tool.

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