THE UPC'S DIGITAL CAMPUS AND THE PROJECT BASED LEARNING: A COMPATIBILITY EFFORT

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Abstract. The Digital Campus is a project developed in the Technical University of Catalonia (Spain) to build an asynchronous collaboration platform in a educational environment. The Digital Campus is a set of applications with a unique and simple interface that helps to improve the interaction between professor and students beyond the limited relationship in classroom. These applications are developed in Lotus Domino (a documental database) and the user can access them through a web browser or a Lotus Notes client. Since 2001, one of its school, the Polytechnic School of Castelldefels, offers a Master's degree in Telecommunication Engineering using the Project Based Learning (PBL) methodology, where the student as an individual become a student as a member of a group. The aim of this paper is to explain the overall functionalities of the Digital Campus and the experience of the adaptation of this collaboration tool to this new learning methodology.

Keywords. Asynchronous learning, distributed learning environment, collaborative platform, Lotus Notes, project based learning..

1. INTRODUCTION

The introduction of Information Technologies (IT) in education is an open and active area. Several universities and higher education institutions offer courses or even complete degrees for non-present students. This way, universities can reach some new markets such as retired people or workers who want to recycle their knowledge. It also allows universities to compete for students outside their geographical framework. Finally, from the managers' point of view, the use of communication technologies applied to education can reduce maintenance costs and enhance efficiency. Therefore it is not surprising that there is a lot of activity and projects around Computer Aided Distance Learning.

In the field of distributed learning two kinds of collaborative environments can be distinguished: the synchronous collaborative learning (SCL) and the asynchronous collaborative learning (ACL) [1]. The latter is also known as Asynchronous Learning Networks (ALN) [2].

Asynchronous collaborative is a type of communication that occurs with a time delay, allowing participants to answer at their own convenience. Literally means "not synchronous"; in other words, not at the same time. An example could be an e-mail based system for discussion and learning material distribution. Asynchronous capabilities give learners access to course materials, including readings, embedded and streamed multimedia, and external Web sites. They also allow students to participate in facilitated interactive discussions, complete assignments individually and collaboratively, and launch live sessions.
Synchronous collaborative is a type of two-way communication that occurs with virtually no time delay, allowing participants to respond in real time. Synchronous capabilities add a living, breathing dimension to online learning. A virtual classroom is created, where learners and the instructor interact in real time using tools supported by standards-based data, audio, and videoconferencing — such as a whiteboard, application-sharing, and question-and-answer. Chat tools or collaborative applications such as Microsoft NetMeeting are good examples.

The Technical University of Catalonia (UPC) has developed the Digital Campus under Lotus Notes (a documental database), becoming an **asynchronous** collaboration platform that allows users to participate not at the same time in the learning process. This tool consists of a set of applications with a unique and simple

interface that helps to improve the interaction between professor and students beyond the limited relationship in classroom. The user can access through a web browser or a Lotus Notes client. The Digital Campus is accessible inside the University facilities, but it is also connected to the UPC network, accessible from the Internet. This means that anybody can access the Digital Campus **anytime and anywhere**, just with an Internet connection.

The general capabilities of the Digital Campus are the following:
- To store information of the subject in any kind of document, which are classified in different categories decided by the professor of each Intranet/subject.
- To facilitate the track of the student performance, through the marks the professor can introduce in the Digital Campus. Each student can see only his/her marks, but professors can see all of them.
- To interact to the student, receiving solved assignments and inquiries, and sending comments.
- To announce events, through a diary of the subject

The challenge behind the Digital Campus project is the design of a system capable of efficient management of educational information, and this can be not only text, but also hyperlinks and attached documents (even multimedia files such as MPEG videos).

In parallel, since 2001 the Polytechnic School of Castelldefels (Escola Politècnica Superior de Castelldefels, EPSC[1]) school offers a Master's degree in Telecommunication Engineering using an innovating learning methodology, the Project-Based Learning (PBL). It is an instructional strategy that promotes active learning. The PBL is characterized, basically, in that the learning process is student centered and occurs in small student groups, basically using the project as a vehicle for the development of engineering problem-solving skills. The existing Digital Campus can cope with some of these new requirements of an asynchronous learning platform, although it needs a moment's reflexion, because the initial development was carried out with a classical learning methodology in mind.

The Master's degree syllabus has been structured so that in every semester the student must complete one of two sets of subjects that constitute distinct syllabus areas (each of which is evaluated as a whole). Using the PBL methodology, each of these areas consists of one or two face-to-face modules and one additional module, the project**,** which represents approximately half the student's activity in the syllabus area and is carried out in grups of 5 to 8 students. In this paper, we do not focus on the PBL as a new learning methodology. We will be consider it as a new methodology that propose new challenges to the existing asynchronous platform at the UPC.

This paper will present the overall functionalities of the existing Digital Campus and the experience of the adaptation of this collaboration tool to a new learning methodology, like the PBL. First, a brief history of the Digital Campus is presented. We will follow with the overall functionalities of the Digital Campus, focussing on those related to working groups. Then, the adaptation process will be presented and, finally, some conclusions will be outlined.

2.   THE DIGITAL CAMPUS AT UPC

In the day-by-day work at University there is a continuous interaction between teaching staff and students – probably less than it should be. For example, the students ask their teacher questions about the subject, the teacher publishes exercises and tests which have to be solved by the students, etc. The information flow between teacher and students is really important, and it could be even bigger if an appropriate tool would manage it. This tool should be accessible 24 hours / 7 days a week from the Internet (this would allow accesses from the University campus and from home). This is the basic functionality provided by the Digital Campus project: **communication** and **document sharing**.

a.   History
In the UPC, as in most Spanish universities, the first experiences of telematic assistance to teaching activities at UPC began in the mid-nineties as simple static web pages with information about the subject. The first important step was the introduction and testing of the "Docent Intranets" in 1997.

These Intranets were the collaboration tools for a concrete subject or course, and were tested during 1997 and 1998, when the final step towards an integrated, complete Digital Campus was implemented at one of the technical schools (EUPBL, now EPSC). During this phase, about 480 professors and 5700 students, in 180 different subjects used the Intranets and the Campus first prototype.

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[1] Web page. http://www-epsc.upc.es

The UPC initiated the Digital Campus project in 1997 with the specification of the basic functionality demanded by all the collectives of the University community: teaching staff, students and administrative personnel. The General Informatics Services Department assumed the technical direction of the project. In the two years of development, users and technicians interacted closely. Since 1999, the number of students and teachers using this tool has increased continuously (fig 1 and fig 2)
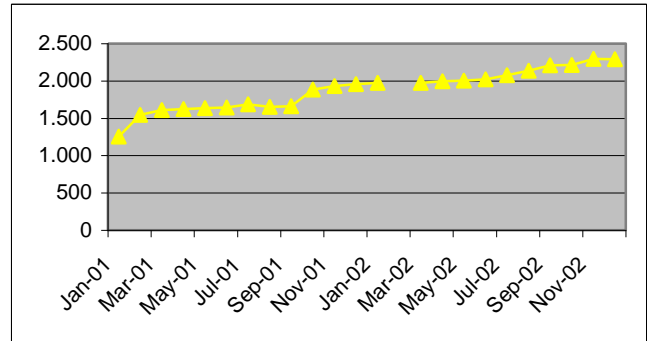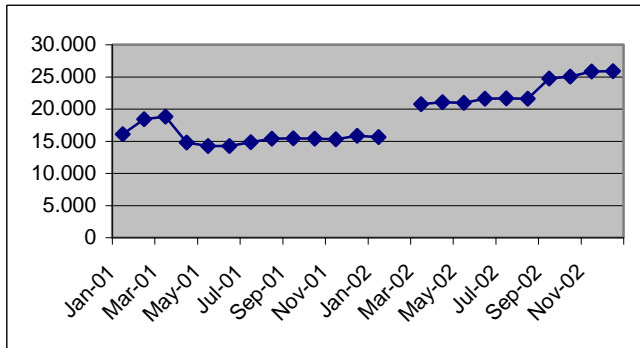

Fig 2. Number of teachers using the Digital Campus at the UPC (Source: U

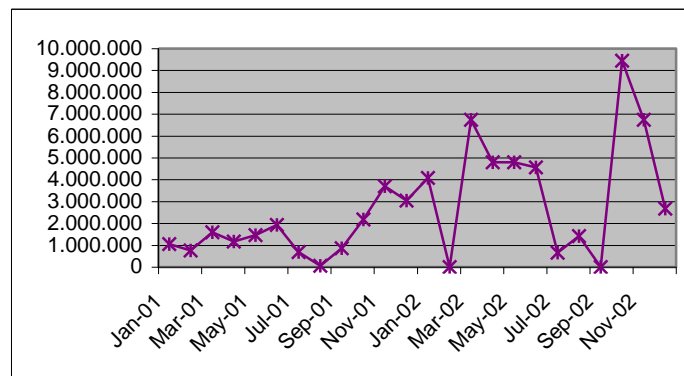Consequently, the number of http accesses to the Digital Campus has been increased as well (fig. 3)

Fig 3. Number of http accesses to the Digital Campus
(Source: UPCnet S.L)

b. The Docent Intranets

The basic piece of the system is the so-called "Docent Intranet". This tool is a group of Lotus Notes databases that include the following functionalities:

- Agenda: is a bidirectional communication from the teacher to the students, for announcements (deadlines for exercises, final exams, or any other message) (fig. 4)

- Documentation/Assignments: the main feature of the system is the capability of storing and managing documents in the database (fig 5). "Documentation" is a generic category of files created by the teacher, about general topics included in the subject. "Assignments" are exercises, practical sessions, etc that have to be answered by the students. There are two subcategories: "To Student", which are exercises given to students (as individual)., and "To groups", which are exercises given to a group of students (previously created by the teacher).

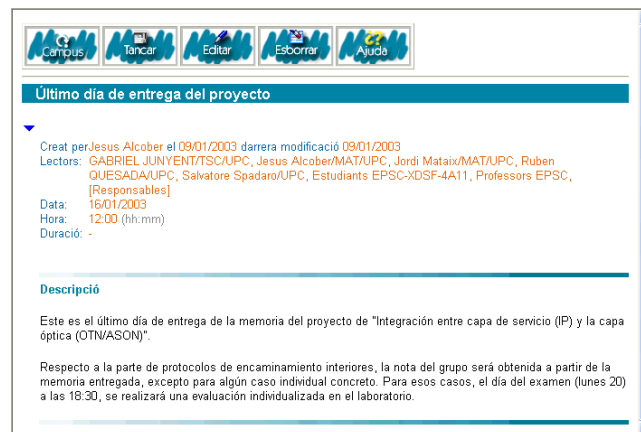*Fig 4 Agenda and the main menu (teacher access)*

Fig 5 Example of a document

- Tracing: this is the feedback from the student.
  - Mailbox is the centralised reception point of students' messages to the teacher.
  - Students/Qualifications: these are views accessible only to the teacher, since them contain information about marks. The student can only see his/her own information, not others.
  - Groups: it is the view where the teacher can create and edit the project groups. Documents addressed to a specific group are not visible to others.
- Study room: this is where it is possible to find and share docs with other people, regardless of the teacher-professor hierarchical structure
  - Who are we: this is the view where it is possible to find people, teachers and groups within the subject.
  - Bookcase: this is the view where all the members of the Docent Intranet can share docs.
  - Forum: this is an open forum where students and teacher can freely initiate a debate, write a message or reply it.

c. The Digital Campus

The concept of Digital Campus was born as a natural evolution: when the same student in the same school or degree uses several Intranets, is hard to keep them completely isolated, being nonsense if he/she have to log out from one and then log in to another. That's why it seemed logical to build a higher level, a kind of "umbrella", to group Intranets. This was the first idea of the Digital Campus: a unique access to all the Intranets used by the student.

Every school of the UPC is able to have its own Digital Campus, and every Digital Campus have their own subjects in Docent Intranets. The Digital Campus integrates these Docent Intranets and it is an access to the rest of services provided by the school (fig. 6).
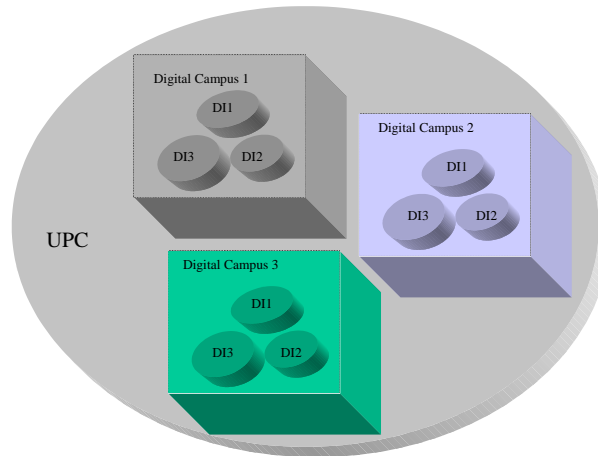
Fig 6. Intranets and Digital Campus.

Fig 7. Access to a Digital Campus. On the right, the accesses to the Docent Intranets.

What adds a Digital Campus to the existing Intranets, from the user's point of view? Apart from the integrated and unique access point to all the Intranets (fig 7), there are also new functions such as:

- Community room: includes a School Agenda (which is the intersection of the agendas from all the subjects of the student plus general announcements).
- School room: links to the services provided by Administration and the University (Digital Library service, information web pages, etc.).
- Personal room: includes a personal agenda (completely private), personal documentation (some disk space for documents and files), and Academical Information (file).

3. THE ADAPTATION PROCESS OF THE DIGITAL CAMPUS TO THE PBL

Almost at the beginning, the platform of the Digital Campus was adapted to accomplish the requests coming from teachers who were initiating experiences in workgroup assignments. Until then, the teacher-student interaction was performed in an individual level; i. e, exchanging documents between teacher and student, as individuals. This is the reason to have views like "assignments - to groups" and "tracing - groups". This was a very elementary solution to these necessities.

The new learning methodology required the possibility of exchanging documents between the professor and the student, as a member of a group, so that documents had to be seen by the rest of the members of the group.

In addition, it appeared another need, and it was the fact that the Digital Campus had to become a collaborative tool among members of a group. Lotus Notes, as one of the most succeeding groupware software, provides very powerful tools for the cooperative work, of which initially a small part has been in use. Under these circumstances, the results until then were good enough, but there were a need of efforts toward the PBL needs.

With the existing facilities, how can a teacher use the Digital Campus to apply the PBL methodology?

Overall, the teacher can create work groups from the set of registered students and can assign projects to them. The students, on the other hand, can work in a collaborative way creating and publishing documents and working with themselves. Once the group decides to classify a document as a Finalized, the group will not be able to edit it again. In that moment, the Project can be evaluated by the professor. All this documentation is sorted, classified and stored to be able to manage efficiently it.

a. "Tracing - groups" view

In this view the professor can consult, define freely work groups by grouping registered students, and access to the reports they perform. The Finalized docs are noticeable with the green icon, otherwise it is a red icon (fig 8).

Fig 8. Page of the view tracing- groups with its exercises and commentaries

It is possible to consult or edit a group by clicking on the name of the group and appears a document with its members (fig 9).

Fig 9. Creation/edition of a new group

On the other hand, the student, when he/she enter to this view, can consult:
- documents shared by the members of the group
- the name of the components of every group, of which he is member, and to communicate with the professor of the subject in order to send a consultation. (fig.10)
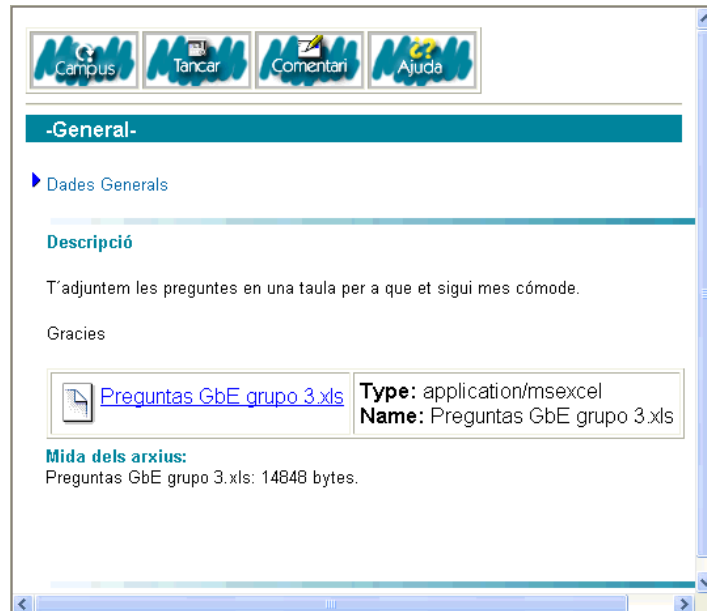
Fig 11. Snapshot of a group consultation

From this document it is possible to make tasks related to the work group: consultations to the professor (fig 11), to send documents, by using the buttons of the upper side of the screen.

b. Project view

This view is serves as a way to publish the project assigned to the work groups, decided by the professor.(fig 12)

Fig 12 View of assigned projects to work groups

c. Adaptation of the present Digital Campus to the methodology based on projects

In the first semesters of the new learning methodology at the EPSC, the explained facilities of the Digital Campus has been used in order to provide a asynchronous learning tool to the PBL.

During this experience it has been possible to identify, with its intensive use, the modifications required to the next releases. Moreover, it has arisen the necessity of a deeper reflection of the form in which the immersed students in this learning methodology must collaborate in an asynchronous way.

Another difficulty appears when we want to import an important concept in PBL, the portfolio, to the electronic world. The portfolio is a compilation of reports, products spreadsheets or brochures, photocopies, etc, which is used to evaluate de work group. All these documents are difficult to move into an electronic form in an ease way.

A student pointed out the idea that the work groups, to manage their information, needed a file server (FTP), but this scheme is too flexible and can difficult the evaluation and monitoring of the work. Another student pointed out the possibility of using the well-known BSCW (Basic Support for Cooperative Work) [3]. It enables collaboration over the Web. BSCW is a 'shared workspace' system which supports document upload, event notification, group management, among others. The major problem is that it is another platform, with the increased complexity it implies.

There is a trade-off between the flexibility of the organization of the portfolio and its evaluation. The Campus Digital tends to the last option, since it fixes the classification of the categories by the assignments sent to the groups . The present solution is not the best, but given the circumstances and the results, we are satisfied with this experience.

4.   CONCLUSIONS

This paper has presented the Digital Campus platform designed and used at the Technical University of Catalonia. The system has been designed and customized to engineering and science students (the degrees offered by the UPC). Although the introduction of such a system is not easy in institutions like the UPC [4], the tool is being used intensively, and the next challenge is that the tool is used extensively by all the members of the UPC. This tool was not designed to the PBL methodology, but we have noticed that the Digital Campus is able to provide some functionalities that the PBL methodology needs. In spite of this, the next releases of the Digital Campus had to consider this requirements.

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