The ICT in the Polytechnic Institute of Setúbal
The Beginning of a New Phase

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ABSTRACT

The main subject of this paper is to present and discuss a technical solution based on the Information and Communication Technologies (ICT) that is proposed to be implemented in a Higher Education (HE) institution in Portugal.

It is believed, that this project will change profoundly the administrative organization and the teaching-learning paradigm inside the Polytechnic Institute of Setúbal (PIS). This project will cover three different and complementary areas: a Wireless LAN area, an Administrative and Informative area and an eLearning area.

Other relevant aspects and remarks, regarding eLearning issues, will also be taken into consideration, illustrating the most significant activity of the PIS academic staff in what concerns the eLearning field.

Keywords: eLearning, virtual campus project, ICT, wireless LAN.

1. INTRODUCTION

The Lisbon European Council of March 2000 [1], was an important mark concerning the definition of an European Union policy for ICT in education and training. The conclusions pointed to place education and training systems at the top of the EU political agenda. It was settled that Europe should become, by 2010, *'the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater cohesion'*.

The following Councils of Stockholm, in 2001, and Barcelona, in 2002, have confirmed the importance of improved and effective use of ICT for the European knowledge society.

The eEurope 2002 and 2005 Action Plans identify eLearning as a top priority [2]. The eLearning initiative [3] reinforced the need for innovative pedagogical approaches and for objectives regarding quality and easy access to eLearning resources and services.

In the domain of Higher Education (HE), recognizing that universities play a key role in the production and dissemination of knowledge, in the development of social, pedagogical and technological research, some experiments in the field of eLearning were settled related, for instance, with University organization or curricula, or with the assess of the impact of ICT for interactions among teachers and students.

The EU Member states were encouraged [4] to continue their efforts concerning the effective integration of ICT in education and training systems.

Many other initiatives and resolutions have been taken by EU and Member states concerning the purposed settled in the Lisbon Council.

In Portugal, there is still a low penetration of computers in society. People in general are not very keen with Internet. However the number of Internet users has been increasing in the last years, being, nevertheless, below the average number of users in EU. The Portuguese government has taken some initiatives to promote the increment of Internet users. For example, there are tax benefits for those who are Internet users. Nevertheless the communication costs, regarding Internet, are still too high, compared, for instance, with the USA.

It is in this context that appears the PIS Virtual Campus project.

2. PIS CHARACTERIZATION

The Polytechnic Institute of Setúbal (PIS) is one of the around thirty public HE institutions in Portugal. It has more that six thousand undergraduate students, about five hundred teachers and almost one hundred and fifty administrative and technical staff.

PIS has five schools [5], and twenty eight main courses, in the areas of engineering, business administration, health care and education. Three of the Schools are located in the same campus.

Besides education and training, PIS's objectives include activities such as research, applied research and experimental development, cooperation in national and foreign projects, and cultural initiatives.

Nowadays almost all teachers in PIS have a PC at School, with Internet connection. Students have PC rooms at their disposal, also with connection to Internet. The total number of PC's in all the institution is around one thousand and three hundred, which means that, excluding the PC's that are allocated to teachers and administrative personnel, there are about eight hundred PC's for students' common use. The number of portable PC's among teachers and students is not yet significant.

3. VIRTUAL CAMPUS PROJECT

The contribution of ICT for the development of HE and for changing the teaching-learning paradigm is not questionable, particularly in modern and recent HE institutions like PIS.

We are living in an edge of great transformations, namely in the organization and management of HE and also in the teaching-learning process, particularly in the relation between students and teachers.

It is a reality that our focus is moving from the teaching process to the learning one, and a correlation can be established between this and the emerging of ICT. A change is happening in the learning way, with new challenges and new opportunities particularly for learners. The life long learning is a concept with growing importance. It is an opportunity, primarily, for continuously improve people's education, but also for the development of HE institutions. ICT is a fundamental partner for life long learning.

In the PIS we are trying to be aware with these opportunities. Some institutional initiatives have been implemented. A large project, involving ICT, is being launched, and will affect the way of living of our academic community and also will change the relations between us and our partners, HE institutions, enterprises and the general community. The project is based on a national initiative called Virtual Campus and is financially supported, partially, by the European Union through its framework programs.

The Virtual Campus was created as a consequence of the application of the newest ICT to the educational system. Its target is to create a communication room between the educational community and the institution, which can be accessed by the Internet, anywhere and anytime [6].

The Virtual Campus operates at various levels, namely at the services level, the applications level, the contents level and the network level. Its target population is all the students and teachers of graduate schools in order to incentive and make easier to produce access and share information and knowledge.

The Virtual Campus Project will involve and affect all the five PIS Schools and is divided in three major areas:

✓ The wireless area, with the implementation of a wireless net in the campus (Wireless LAN);

✓ The Administrative and Informative area, with, for instance, the construction of a web academic portal facilitating and improving the academic management;

✓ The eLearning area, with the definition of an eLearning platform that will be adopted in all the institution.

The wireless area

A wireless LAN (WLAN) is a flexible data communication system implemented as an extension to, or as an alternative for, a wired LAN within a building or campus. Using electromagnetic waves, WLANs transmit and receive data over the air, minimizing the need for wired connections. Thus, WLANs combine data connectivity with user mobility, and, through simplified configuration, enable movable LANs.

Mobile WLAN users can access information and network resources as they attend meetings, collaborate with other users, or move to other campus locations. But the benefits of WLANs extend beyond users mobility and productivity to enable portable LANs. With WLANs, the network itself is movable [7].

The wireless area intends to give access to services of the institution through the Internet, in an anywhere/anytime manner, when people are either at the institution, or at home, or outside [8] [9] [10].

✓ In the Institution:
  o Wired network: laptop with Ethernet card
  o Wireless network: PDA, laptop with wireless card, WAP or GPRS mobile phone
✓ Out of the Institution
  o Wired Network: Laptop or personal computer connected to the Internet
  o Wireless Network: WAP or GPRS mobile phone

At this time, students and teachers can be connected to the Institution sites and services through a wired connection. The possibilities of a wireless connection are part of this project.

The wireless network to be installed is part of the Local Area Network of PIS, and is based on a set of Virtual LAN's linked to a unique point.
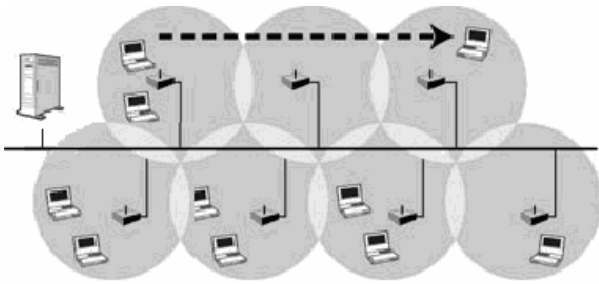
Fig. 1 - WLAN Infrastructure

The Virtual LAN's are linked to the Wireless Access Points, that will be located in important places in the PIS campus, like libraries, meeting points, canteens, gymnasium, study rooms, lecture theaters, etc., and provide access to a central point. This point is the interface to the rest of the wired Network, and provides all the authentication function to the users.

The authentication consists in two levels: the first is made by the Access point, and the second level by a RADIUS server [10].
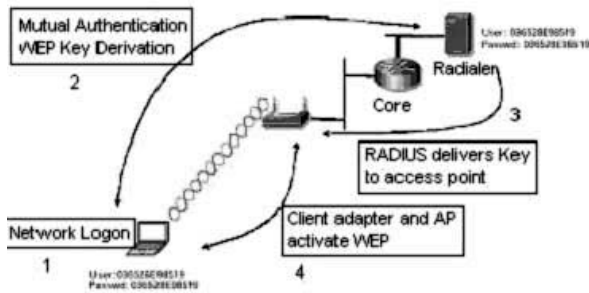

Fig 2 - Authentication process

The authentication server will control access to the network and will provide all the managements and statistic functions.

The wireless LAN project is complemented by a Portuguese national program that will facilitate the portable PC acquisition by the HE students.

The Administrative and Informative area

This area has eight user profiles, dependent on the user functions:

- ✓ Administrator profile
- ✓ Administrative profile
- ✓ Guest profile
- ✓ Teacher profile
- ✓ Student profile
- ✓ Contents Supervisor profile
- ✓ Documentation Center Supervisor profile
- ✓ Courseware upload profile

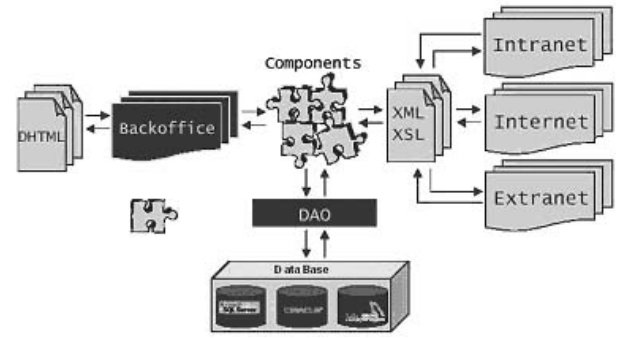Each profile has its rights and permissions in the Information system [11].

Fig 3 - Information process structure

This area will provide a wild set of services to the community. It will be the access point to the PIS web site, and from there the user, according to his profile, can surf on the site.

Available services are:

- ✓ General services: informative contents about the institution.
- ✓ Wireless service: how to connect to the wireless network
- ✓ Personal service: personal web pages
- ✓ Administrative service:
    - o Courseware inscription
    - o Personal students data
    - o Student academic past
    - o Timetables
    - o Courseware online
    - o Statistical data
    - o Online inquests
- ✓ Other services:
    - o Customized web pages depending on the user profile
    - o Password change
    - o Internal search engine
    - o Self publishing of personal web pages
    - o Self publishing of course web pages
- ✓ Personal services: web mail
- ✓ Electronic classroom
    - o Notes
    - o Quizzes
    - o Related links
    - o ePapers
- ✓ Library services
    - o Timetable
    - o Electronic books
    - o Photocopy
- ✓ Documentary management
    - o Documentary search engine
    - o Controlled search of documents
    - o Invoice notification

The eLearning area

The eLearning area is intended to provide a virtual space to students where they can access to different online classes. The classes can be taken offline or in real time.

In an eLearning system, it is primordial that the users feel like to be at classes. The application will emulate

our Schools, with corridors and halls, classrooms, secretariat and libraries [11].

Students are invited to different classrooms, where different courses are running. Students must log in onto the planned class, and all the activity will be recorded.

One of main stimulus for students using eLearning programs is to use an interactive and fun system, humanizing all the functions.

Human pictures indicate the main functions of the system, as if it was a real school.
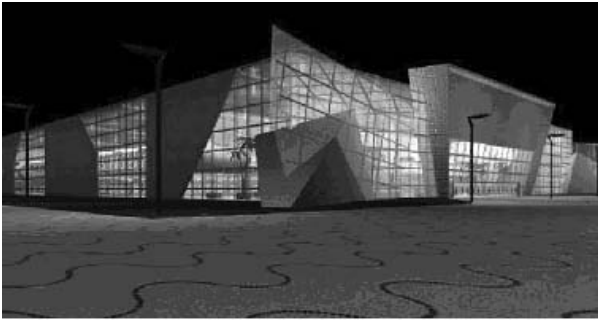

Fig 4 - At school

The system offers the following options:

- ✓ News
- ✓ Available courses
- ✓ Inscription
- ✓ FAQ
- ✓ Site map
- ✓ Contacts
- ✓ Entering classroom

The eLearning system will be developed with Macromedia Flash and Director, and allows the following components of eLearning:

- ✓ Web based:
  - o Self learning
  - o Associated Self learning (asynchronous)
  - o Virtual classroom (synchronous)
- ✓ CD-ROM based:
  - o Self learning
  - o Associated Self learning (asynchronous)

Training

The realization of all process (Information system, Wireless LAN, eLearning) will demand new tasks and skills regarding the new technology. To ensure the success of the project, it is primordial that the human support is effective.

So it will be necessary to teach the operators, who will work with the system, for all the new procedures, technologies, and operation rules.

While the people responsible for the wireless and information areas will work alone, the eLearning area will certainly be used by all the teachers. So, the preparation for this area will be taken in two steps.

First, the coordinators for this area in each PIS School will be trained and after that, they will teach the teachers in each School.

A final remark related with the PIS Virtual Campus, should be established. This kind of project creates an opportunity for the improvement of the relations between PIS and its partners, particularly the partners' institutions abroad. PIS has bilateral agreements, within the ERASMUS EU program, with almost forty HE institutions in Europe. It also has agreements with many enterprises and other social and cultural organizations. The relations with these partners can be facilitated with the Virtual Campus, without forgetting the virtual mobility, that may gain importance with this project.

4. E-LEARNING INITIATIVES

The American Society for Training and Development defines eLearning as the use of Internet and digital technologies to create experiences that educate our fellow human being [12]. The European eLearning Action Plan 2001 [13] defines eLearning as the use of new multimedia technologies and the Internet to improve the quality of learning by facilitating access to resources and services as well as remote exchanges and collaboration.

eLearning is changing the relations between teachers and students. The advent of ICT and eLearning are helping to move the usual central role of teaching to the new central role of learning and establishing with that a new paradigm.

In this new stage, the teacher can be seen more as a learning guide or a learning facilitator, rather than the usual 'knowledge' authority or information transmitter [14].

Otherwise, with ICT, students tend, in general, to have a more active, motivated, innovative and self-regulated learning role.

The PIS is not apart from this kind of challenge and is giving stimulus to the development of eLearning projects, involving teachers from different PIS Schools and also students. These projects should be innovative and give responses to problems that arise and remain in our education system.

One problem is the low success of students in engineering courses. The general low motivation, the insufficient mathematical background and skills and the absence to classes are important aspects that contribute significantly to the low success rate of those students. Perhaps a methodology change, using eLearning as a tool, may contribute to solve this problem.

Regarding this subject, a project, being directly financed by PIS and respective School, in the engineering field, and related to the development of eLearning contents using a commercial eLearning software platform, is in course.

The material will be developed in the Electronic and Mathematic fields, where the students' unsuccessful

rate is very high, particularly in the last one. It is expected that with this instrument, which is intended to be complementary to regular classes, students can be motivated for those themes. The problem of absence to classes can be minimized with the possibility of asynchronous learning. Also the assessment will be treated in a friendly way taking into account that assessment plays a crucial role in the learning process.

However, it is important to notice that, being eLearning a relevant tool, it could not be seen as an exclusive way for learning. An example of this can be given in the engineering field.

Everybody knows that the lab equipment can be very expensive in some areas and that some experiments are difficult to carry out in practice, but virtually feasible. So, virtual laboratories can be an important instrument to overcome these difficulties. Nevertheless, even in these cases, it may be very important, for the education process, that students have contact and practice with real lab equipment, and also that training, with real world systems, for instance in factories, may be a reality.

This means that eLearning should be often seen, only as a complement to the traditional learning process.

Finally, there is another project, directly financed by PIS and Schools, that involves all the five PIS Schools, and that is related with the development of an innovative software platform for eLearning in HE. This innovative approach uses different concepts, like social ones, and it is based on the Theory of Organized Activity created by A. Holt.

5. CONCLUSIONS

The future and the development of the Polytechnic Institute of Setúbal, like other HE institutions, go through the incorporation of ICT in its education mission.

In this way, the PIS Virtual Campus project, presented in this paper, is a complex system that allows students and teachers to access web based information and applications, increasing productivity and complementing traditional processes.

The main focus is the information system, with the academic and administrative areas, available on an anywhere / anytime base, supported on a Local Area Network.

Depending on the location of users, the information may be gathered by a wireless network, by a classic LAN, by traditional Internet or by a mobile phone with WAP or GPRS capabilities.

Finally, some considerations on eLearning practices and projects were established. One may say that eLearning is taking a major and growing part on the daily routine of the PIS academy.

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