Towards eLearning 2.0: Case Study of an eLearning Environment

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Abstract: In these days the learning experience is no longer confined within the four walls of a classroom. Computers and primarily the Internet have broadened this horizon by creating a way of delivering education that is known as eLearning. In the meantime, the Internet or, more precisely, the Web is heading towards a new paradigm where the user is no longer just a consumer of information and becomes an active part in the communication. This two-way channel where the user takes the role of the producer of content triggered the appearance of new types of services such as Social Networks, Blogs and Wikis. To seize this second generation of communities and services, educational vendors are willing to develop eLearning systems focused on the new and emergent users needs. This paper describes the analysis and specification of an eLearning environment at our School (ESEIG) towards this new Web generation, called PEACE – Project for ESEIG Academic Environment. This new model relies on the integration of several services controlled by teachers and students such as social networks, repositories, libraries, e-portfolios and e-conference systems, intelligent tutors, recommendation systems, automatic evaluators, virtual classrooms and 3D avatars.

Keywords: eLearning, higher education, learning technologies, collaborative work

1. Introduction

Since the mid 90s, the spreading of technologies such as the Internet, e-mail, notebooks and mobile phones has caused several changes in the teaching and learning process in the majority of educational institutions. With an easier access to knowledge and information, academics needed to find new ways to study, learn, teach, research and even communicate (Gras, 2005). Learning Management System (LMS) plays an increasing role in this context, since it aims to making available educational resources and allowing communication and collaboration among teachers and students (Babo et al. 2010; Harman, 2007).

To understand the needs of our students we based on a survey (Babo et al. 2010) conducted by a group of teachers of several schools of the Polytechnic Institute of Porto within a study to gauge the Internet usage habits of our students. The aim of this study was to know the Internet usage habits of the Portuguese higher education students, in order to select the suitable tools and techniques in the teaching-learning process (Babo et al. 2010). Based on the survey and in several case studies (Gras 2005; Misko et al. 2004) of others educational institutions we obtained the basis for the PEACE system architecture. This system supports several tools and services, integrated in a transparent and personalized environment, which includes repositories, social networks, intelligent tutors, recommendation systems, automatic evaluators, virtual classrooms and 3D avatars.

The remainder of this paper is organized as follows: section 2 details the evolution of eLearning towards the new Web generation. In the following section we present the system architecture for our eLearning environment at ESEIG, more precisely, its main components and contribution model. Finally, we conclude with a summary of the major contributions of this paper, our current work in this project and future work.

2. ELearning evolution

The evolution of eLearning systems in the last three decades was amazing. Starting with the early monolithic systems developed for specific learning domains to new systems featuring reusable tools that can be effectively used virtually in any eLearning course. This is the case of the LMS that, nowadays, plays a central role in any eLearning architecture.

In their first generation, eLearning systems were developed for a specific learning domain, had a monolithic architecture (Dragger et al. 2007) and had no notion about standards. Gradually, these systems evolved and became domain-independent, featuring reusable tools that can be effectively

used virtually in any eLearning course. The systems that reach this level of maturity usually follow a component-oriented architecture in order to facilitate tool integration. An example of this type of system is the LMS that integrates several types of tools for delivering content and for recreating a learning context (e.g. Moodle, Sakai). In this type of system, students can plan their learning and collaborate with colleagues, while teachers may associate educational content and monitor, analyze and report progress of their students.

The present generation values the interchange of learning objects and learners' information through the adoption of new standards that brought content sharing and interoperability to eLearning. In the eLearning context, standards are generally developed with the purpose of ensuring interoperability and reusability in systems. In this context, several organizations (IMS 2010; IEEE 2010; IOS 2010) have developed specifications and standards in the last years (Friesen 2005). These specifications define, among many others, standards for eLearning content (IMS-Metadata 2010; IMS-QTI 2010) and interoperability (IMS-DRI 2010; Simon et al. 2005).

Despite their common use, these types of eLearning systems lack some important features such as the creation of learning content that implies the need to use third-party tools for the production of educational content and the content orientation (most LMS are divided into courses, rather than being learning object oriented, not promoting content reuse). These systems based around pluggable components led also to oversized systems that are difficult to reconvert to changing roles and new demands such as the integration of heterogeneous services based on semantic information, the automatic adaptation of services to users (both learners and teachers), and the lack of a critical mass of services to supply the demand of eLearning projects. These issues triggered a new generation of eLearning platforms based on services that can be integrated in different scenarios. The trend is now create eLearning systems based on to Service oriented architectures (SOA) and seize the new web 2.0 services that allow a more rich interaction experience between the actors of a learning instruction.

3. System architecture

In this section we present the design of the eLearning environment called PEACE. The architecture of the system is depicted in figure 1.
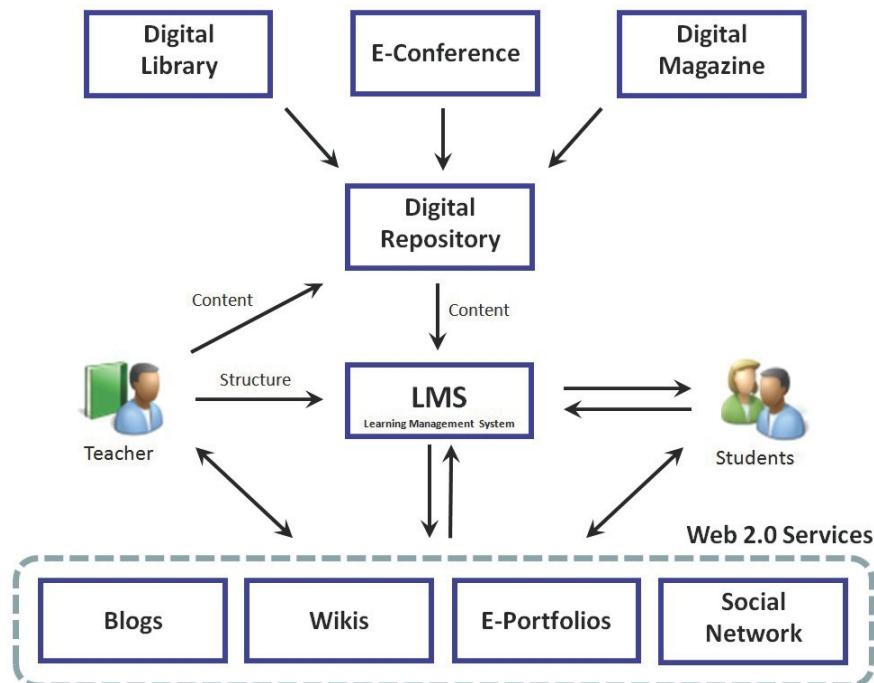

Figure 1: PEACE system architecture

The LMS occupies a central position in the proposed architecture, since is currently the natural place where students and teachers communicate. The LMS is fed by a repository that gathers information of several other systems such as, librarys, e-Conference systems, intelligent tutors, recommendation

systems, and others. To exploit the new web paradigm, the LMS interacts also with new Web 2.0 services. These services are well known by the students as they use it quite often in other contexts.

In the next subsections we enumerate some of these components trying to disseminate their significance in the overall architecture of the PEACE system and foresee interoperability issues that we need to address.

3.1 LMS

The LMS provides an web-based environment that enables communication and interaction with and among students. Teachers play the role of facilitator and mentor of the learning process through the educational content publication, monitoring and analysis of students progress, who can plan their learning and collaborate between them (Oliveira and Moreira 2008a).

The LMS component plays a central role in the PEACE system architecture, since it connects several tools and services, according the interoperability standards (IMS-QTI 2010; IMS DRI 2010). In addition of the typical features of an LMS, this component has the following objectives:

- Provide a transparent and personalized learning enviroment, according the user needs;

- Support integration between the different features offered, including LMS, digital repository and web 2.0 services, through interoperability standards (IMS-DRI 2010; Simon et al. 2005);

- Enable a transversal recognition to students and teachers profiles, so either the same profile can be used by different PEACE resources (IMS-Metadata 2010).

3.2 Repository

A repository of learning objects (LO) can be defined as a system that stores electronic objects and meta-data about those objects (Holden 2004). The need for this kind of repositories is growing as more educators are eager to use digital educational contents and more of it is available. The Jorum Team made a comprehensive survey (Holden 2004; Leal and Queirós 2010) of the existing repositories and noticed that most of these systems do not store actual learning objects, they just store meta-data describing LOs, including pointers to their locations on the Web, and sometimes these pointers are dangling. Moreover, the LOs listed in these repositories must be manually imported into a LMS. To solve the last issue we look to the beta version of Moodle 2.0 that is due in July 2010 and will include support for different types of repositories. Several API are already available to enable the development of plugins by third parties to access repositories, including:

- Repository API for browsing and retrieving files from external repositories;

- Portfolio API for exporting Moodle content to external repositories.

3.3 Web 2.0 services

Several studies indicated that integration of Web 2.0 applications and LMS improve the relationship between teachers and students and the contribution in the activities of these course units (CU) (Oliveira and Moreira 2008a; Siemens and Tittenberger 2009). The combined use of these applications will enable improvements in the following areas:

- Increased virtual interaction between teachers and students, without the constraints that usually occur in a face-to-face relationship;

- Increased participation in the CU activities promoted in the LMS, with the feeling that the teacher is present and available;

- The development of habits of research, study, writing and discussion of subjects.

However, the use of Web-hosted platforms poses difficulties in managing learning an teaching, especially in the assessment (Franklin and Harmelen 2007; Sankey and Huijser 2009):

- The service can be interrupted at any time (possibly unannounced) resulting in the loss of the content published that were not backed up by impossibility or difficulty;

- The previously free service can become charged;

- Reduced supervision by the teacher;

- Possible dispersion of the content.

Implementing Web 2.0 services in the PEACE platform allows us to offer the benefits of such applications while offering the security of the preservation of content published (Oliveira and Moreira 2008b).

4. Conclusion

This paper presents a work in progress to design an eLearning environment at ESEIG aligned with the current new Web paradigm. In the system architecture the LMS assumes an important and central role since it connects several other services complied with the latest interoperability standards.The main contribution of this work is the proposal of a new eLearning environment, more precisely, its architecture and components specification for a higher education institution. A secondary contribution is the description of the several services that will interact with the LMS. In this case, we enumerate its significance in the overall system and some interoperability issues that we need to address.

We are currently finishing the design of the system and future work will focus on the modelling and implementation phases. The system evaluation will take place at a later stage, and it will include a new survey, in order to evaluate the LMS usage habits and the students' satisfaction with the proposed eLearning system.

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