LEARNCOM – A SYSTEM FOR SETTING UP AN ELECTRONIC LEARNING COMMUNITY

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Abstract

In this work we present the architecture, design and implementation of a distance learning system called LearnCom, currently providing 8 computer-skill courses addressing novices. Following the initial phase of contents specification and course structuring, the final design of the system derived from specific communication requirements, with the objective to develop the feeling of a virtual Learning Community among registered users. The system supports three distinct front-end interfaces corresponding to students, teachers and administrators. System architecture is modular so that additional courses or new topics of courses can be generated dynamically and language support can be extended in a straightforward manner. The system not only incorporates the advantages offered by the new technologies, but it also maintains the sociability development role of the traditional educational model.

LearnCom – A System for Setting Up an Electronic Learning Community

1.   Introduction

The traditional educational model assumes that people willing to learn are obliged to visit a training center which may or may not be close to them. This model takes for granted that knowledge is located at a certain place and people have to reach for it. Nowadays this model is considered outdated since it is feasible to have knowledge transferred to people via the Internet. During the last years, there has been a significant growth in the learning sector in parallel with the rapid development of the Internet. Learning on the Internet has played a major role as it features as an ideal way of reducing many of the teaching expenses while at the same raising many of the place and time restrictions imposed by traditional teaching scenarios.

Distance Learning has the potential of even bigger growth and wider acceptance. According to *"The Digest of Education Statistics 1999" [1]*, education expenditures account for over 7% of the GPD, making it second in size behind the healthcare industry.

Distance learning or e-learning provides information to "anyone, anytime, anyplace". An even more representative phrase about the significance of e-Learning is that "it brings the *right information* to the *right people* at the *right time*". Web-based learning environments revolutionize e-learning by enabling personalized, interactive, just-in-time, current and user-centric learning tools. These systems will soon be able to simulate or coordinate every stage of the learning process such as the pre-assessment of the student knowledge, the progress referring to completed courses, exams and student-teacher

cooperation. Adjustments can then be made to the learning process to make it more effective and straightforward for learners to monitor their own progress.

Web-based learning environments are implemented for the delivery of learning courses. These are integrated software packages that offer all the appropriate characteristics and functions for building e-learning applications. Recently, there has been a variety of e-learning environments in the market such: Lotus Learning Space [5], Librarian [7], Blackboard [4], webCT [2], TopClass [3], Embanet [10], Intralearn [9], Ecollege [6], eduprise [8], etc.

Based on this realization we implemented a system that encapsulates various knowledge topics, allows remote access to it, as well as communication among its users and currently provides 8 courses on computer related skills addressing novices. Following the initial phase of contents specification and course structuring, the final design of the system derived from specific communication requirements, with the objective to develop the feeling of a virtual Learning Community among registered users (both trainers and trainees). Thus our system not only incorporates the advantages offered by the new technologies, but also maintains the sociability development role of the traditional educational model.

In this paper we present the architecture of LearnCom, an e-learning collaboration environment that supports the operation of a learning community. A learning community is defined as a group of trainees that share the same social exclusion from the life long learning process. The architecture of this system is described in section 2. Section 3 presents the functionalities of LearnCom grouped by user levels. Expectations and future development is the subject of the last section.

2. Architecture

The prime and ultimate objective of the system is the creation and the support of a learning community. The notion of an electronic learning community indicates a virtual place where various learning modules are hosted and can be reached by people from different and remote physical positions, while retaining the community concept as people can communicate with each other. The LearnCom system should not be merely perceived as a distance learning application in the sense that people can remotely access information. The focus is rather placed on setting up a virtual electronic community of learners and teachers that are provided with the necessary IT tools for communicating with each other.

The system assumes three discrete profiles: *students*, *teachers* and *administrators*. Administrators are responsible for system configuration and maintenance, as well as for managing user accounts. Teachers create and determine the structure of the learning modules and incorporate them in the system. Students are the main target group, as they are to use the system for learning and communicating.

The social requirement of the learning community concept is two-fold: synchronous and asynchronous, with each mode contributing to various scenarios of communication and collaboration. In order to facilitate asynchronous communication, the system provides the means for message exchange through the *Forum*, the *Questions & Answers* or the *Submit a Question* facilities. On the other hand synchronous communication was also considered essential for creating a sense of directness, thus the *Chat* facility was incorporated.

In a system like LearnCom, where diverse learning modules co-exist, language should not be an obstacle. English is the basic language but the user interface and the modules content can be easily adjusted to support any language provided that an equivalence glossary is available as well as the respective content files.

System architecture (as depicted in Figure 1) is composed of three distinct layers. The core layer provides basic system functionality such as data storage. The intermediate layer utilizes the functionality implemented in the core layer in order to support the services appearing at the interaction layer of the system. The interaction layer is the web interface accessible to the user by a web browser.

Core layer

The core layer provides basic system functionality and in this framework it facilitates the file system, a database system, a web server and a chat server. The file system is used to store the primary learning content and more specifically all the files that compose the learning modules. The learning modules are divided into lessons and topics, which are stored as separate files, in order to achieve higher downloading speed. Except for the learning modules files, help and glossary files are also maintained in the file system.

The database system is used to store a variety of data. It holds personal data on the user profile and user authentication. It also contains the required information for describing the schema of the learning modules. Finally, it holds data relevant to both the design and the content of the *Forum*, the *Questions & Answers* and the *Announcements* services.

The chat server synchronizes the communication among users that takes place via the *Chat* mechanism. It manages the messages exchanged between the users, making sure that all messages are delivered to the appropriate recipients.

The web server accepts user requests returning the corresponding data back to the user. The returned data are not statically stored in web pages, but are constructed on demand by information maintained in both the file and the database system.

Intermediate layer

The intermediate layer interconnects the core layer components and provides all necessary information to the interface layer. ASP scripts are used in order to retrieve data from the database and the file system and create the HTML pages that are served back to the user; a process that is executed on the web server. The JavaScript code is embedded in the HTML pages in order to provide dual functionality; one part is used to provide assistance to the user when interacting with the system through online forms, and the other part to ensure a user-friendlier environment.

Interaction layer

The interaction layer is the system's front-end. The web interface is the part of the system that comes to direct contact with the end user providing access to system content and services. Users can interact with it using any commercial web browser. An advantage of this approach is that it is widely accessible without requiring the use of some specific software on the user side. It also enables the communication and the collaboration among users, since they all share common resources.

3.   Services

The functionality supported by LearnCom (also depicted in Figure 2) can be divided into system services and user services. System services intend to meet system requirements. The web interface transforms the system services into user services and vice versa.

System services

Directory services

The LearnCom system manages documents, such as pictures and web pages that are represented as files arranged in folders, using directory services. The directory supports file upload and download.

Security services

An important system feature is the security module responsible for managing authentication and confidentiality. The former identifies users that access the system and the latter verifies that parts of information are restricted to specific user groups. Authentication service is a group based service as far as access to resources is concerned.

Remote Management services

Remote management grants specific user groups several administration tasks that can be performed using any web browser. For example, the system offers administrators the ability to accept or reject a new user account request and teachers the ability to modify the schema of their learning modules.

Communication services

The system offers both synchronous and asynchronous communication between the groups of users, via several alternatives such as the *Forum*, the *Chat*, etc.

Search services

The information included in the LearnCom system is both diverse and constantly increasing. Thus, in order to enable the user to easily locate information of interest, search facilities are incorporated. Searching scans both the content of learning modules and the information supplied by the users in the form of questions submitted to teachers, messages exchanged in the *Forum*, etc.

Assistance services

The LearnCom is a learning environment and should assist users in the learning process. A *Questions & Answers* section is available for students. The system provides special forms to students for submitting a question. The system forwards questions to the corresponding teacher/s, allowing them to be informed for the pending question. Teachers can then provide an answer directly to the student. In the case where the teacher believes that the question is of general interest and might be useful to many students, a mechanism available in the teacher interface allows the posting of the question and the answer in the *Questions & Answers* page.

Customizability services

LearnCom was designed in such a way to enable easy and fast language customization. This customization enables the distinction of user groups based on the language of their preference.

<u>User services</u>

The services offered to the users are both synchronous and asynchronous. For example communication can be synchronous via the *Chat* and asynchronous via the *Forum*. Table 1 summarizes the services offered by the system to each user profile namely administrator, teacher and student.

<u>Student oriented services</u>

LearnCom focuses on students and for this reason it offers several capabilities related to the learning modules. It also offers diverse assistance methods, search facilities and a number of other services.

The learning modules are divided into lessons and topics. A student can read and download these topics. The system provides a print-friendly version of all the topics comprising a lesson as a separate file, so that the student can download or print it. In addition, the student can mark topics already studied to his/her personal progress record. Topics marked as read, display an informative message to the student suggesting him to move on to a topic not completed yet. Students can also view their individual progress, in order to have a more general view of the progress of the learning process.

The assistance methods that are offered to the student satisfy different needs. The *Help* module contains information on the LearnCom features and the suggested learning process. On the other hand, the *Glossary* module focuses on clarifying terms that appear in the learning modules and relate to the specific context. Students can *Submit a Question* that will be forwarded to and answered by the respective teacher/s receiving this way assistance on specific issues. Students can also view *Questions & Answers*, in order to find answers to frequently asked questions submitted by the community of students.

The system enables students to communicate and collaborate via the *Chat* and the *Forum*. Apart from the learning modules, students can watch lectures recorded during a face-to-face class session. Finally, students have access to announcements placed by teachers.

<u>Teacher oriented services</u>

Teachers can manage the learning modules through the web interface. They can structure and the upload a module or a part of a module. Teachers can also update the on-line glossary of the system while there are completing all the learning modules.

Recorded lectures (in any video format) can be posted to the system. Text announcements can be also posted by teachers.

<u>Administrator oriented services</u>

An administrator accepts new accounts from teachers and students. Both of them have to fill an online application form by supplying information concerning their educational level and preferences. Demographic information, such as age, sex, family status etc are being filled in for the statistical analysis of the community members. The applications are accepted or rejected by system administrators. The administrator can also authorize users to use different services based on their profile (students and teachers).

4.   Conclusions and Future Work

LearnCom system is a powerful tool for the support of the learning process in different communities. For the time being, national communities of students in four European countries have been created. Each community follows a different course based on the

characteristics of their members. Face to face communication is also encouraged since the target groups consist of people that have grown up attending traditional training. Gradually, students are encouraged to spend more time in front of the LearnCom web interface and communicate via synchronous and asynchronous means with their virtual classmates and teachers.

The first twelve months of this process has given us significant input for improving the whole process. Students got accustomed to using the system and communicated with each other despite the physical distance between them. As it was expected, their progress seems to improve as they are using the system more and more. At the end of this year the final exams are going to give us a quantitative indication of their actual progress.

Our aim is to try to enhance the communication via the system and transform the students into life long learners.

Future versions of the system are expected to focus more on allocating more power and flexibility on the teachers' part so that different –or even multiple- teaching scenarios can be realized for the diverse profiles of the students. We also intent to integrate an assessment and skills certification process that is expected to expand our community of learners.

References

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[2] http://www.webct.com

[3] http://www.wbtsystems.com

[4] http://www.blackboard.net

[5] http://www.lotus.com

[6] http://www.ecollege.com

[7] http://www.click2learn.com

[8] http://www.eduprise.com

[9] http://www.intralearn.com

[10] http://www.embanet.com

Figures
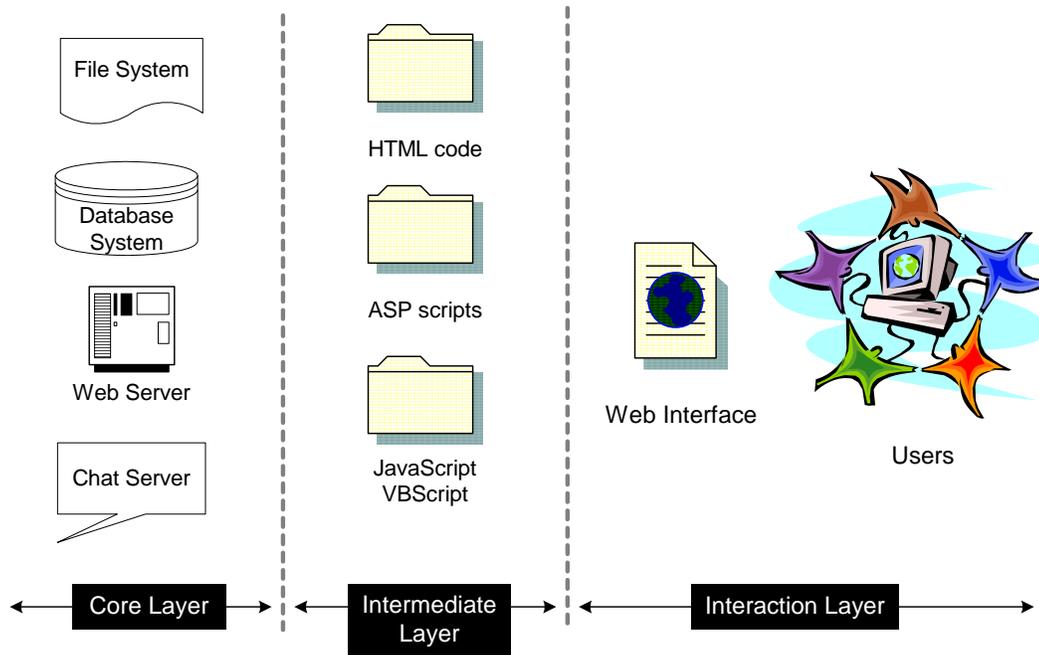
Figure 1: *System Architecture*

Figure 2: *Service categorization*
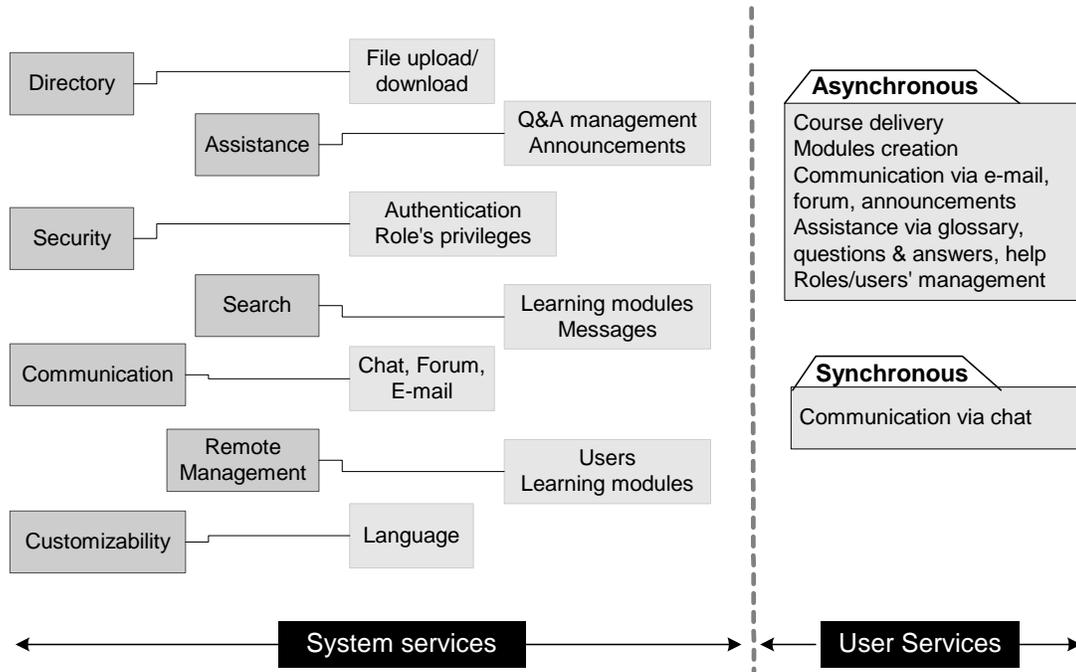
Figure 4: *System Interface Design*
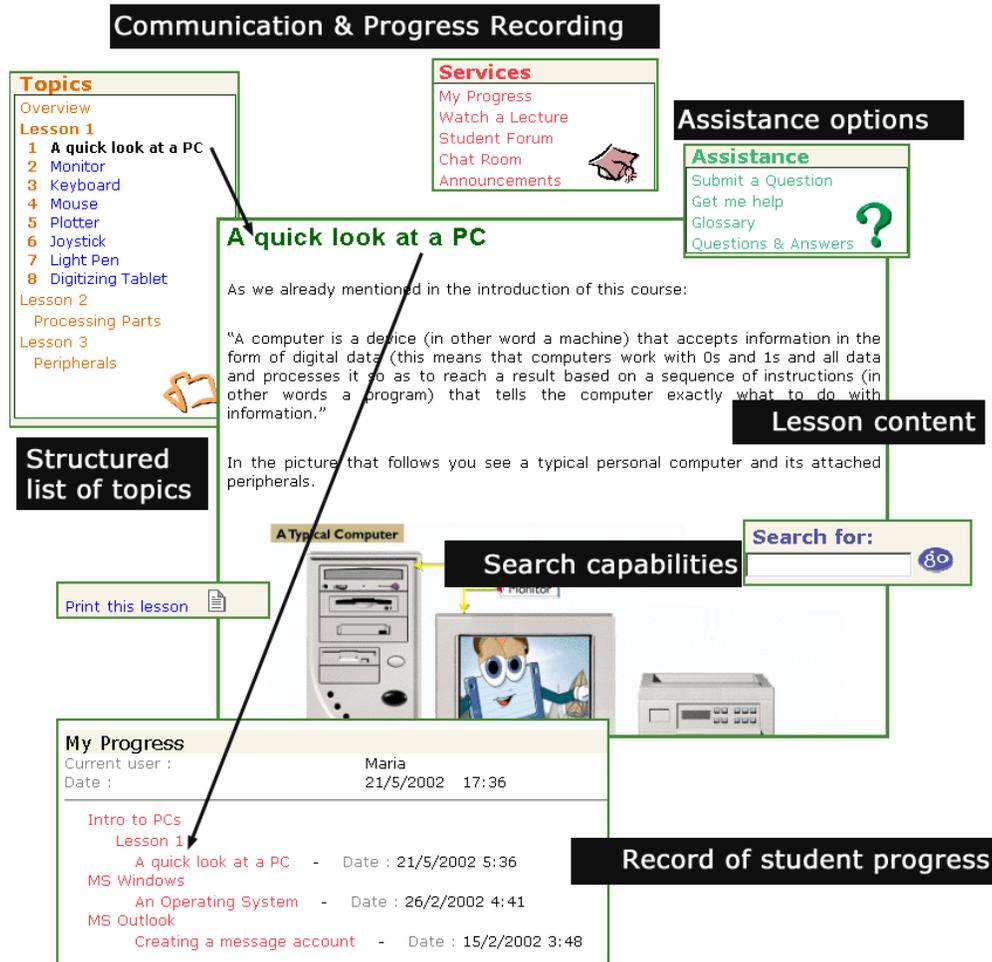
Table 1: *Services in proportion to the user profile*

Administrator	Teacher	Student
Manage Student and teacher accounts	Add and structure learning modules in lessons/topics	Read or download learning modules
Allocate profile privileges	Answer questions	Print lessons
Configure and customize the system	Exchange messages using Forum and Chat	Update or view individual progress
	Add and view announcements	Exchange messages using Forum and Chat
	Update glossary	Submit questions
	Upload recorded lectures	Watch recorded lectures
		Read questions and answers
		View announcements