Research on Virtual Learning Environments at the Research Laboratory on Information and Communication Technology of the Federal University of Rio de Janeiro

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Abstract

This paper presents some experiences conducted at the Information and Communication Technologies Research Laboratory from the Federal University of Rio de Janeiro, regarding development and research in the use of Virtual Learning Environments (VLE´s).

Among the projects presented and discussed in this paper, we give special consideration to the following initiatives: (i) the virtual environments development project, aimed to support undergraduate and graduate teaching at the Federal University of Rio de Janeiro; (ii) the CEDERJ/Quantum System platform development, which is an on-line internet based course management software, developed by the Distance Superior Education Center of Rio de Janeiro State, a consortium of public universities in the state of Rio de Janeiro; (iii) and the Project for Competence Development.

Key Words: distance education, virtual learning environment, research in distance education, corporate education, communities of practice.
Introduction

Technological advancements enabled a new educational reality: the computer-mediated learning. The introduction of computers in education has generated a change in behavior of participants engaged in the teaching-learning process. The amount of information available to students and teachers increased dramatically. In parallel, the possibility of remote contact among participants in this process emerged: the communication through the Internet. At the same time, the access to instructional materials became almost instantaneous. The classroom gradually eliminates its boundaries of time and distance.

This new scenario provides an opportunity for reflection and reformulation of teaching approaches used in schools and universities. It is a favorable moment to ransom a more active role for students in the learning process. The teacher is not in the center of the learning process anymore (the owner of all the knowledge) to become a mediator for learning activities, seeking to help the learner to learn. Learning strategies should consider more individualized approaches. It should address different psychological types, behaviors and learning styles of different students.

Virtual Learning Environments

A Virtual Learning Environment may be considered as a virtual classroom which can be accessed using the Internet, according the virtualization concept proposed by PierreLévy (1996).

From a technical viewpoint, most Virtual Learning Environments currently available are based on the client-server architecture. In general, the client (the portion that runs in the end user environment) is simply a web browser (such as the Microsoft Internet Explorer, Netscape Navigator or Mozilla Firefox). The browser is used to access html pages hosted on the server. On the other hand, the server, at a minimum, should be capable of creating and serving up dynamic html pages, allow messages to be posted up to conferences or notice-boards and maintain a database.
of information relating to students, groups, course materials and structure (BRITAIN e LIBER 1999).

From the functional viewpoint, Britain and Liber (1999) described the following features that are typically found in Virtual Learning systems:

- **Notice board**: this is an area where announcements are published by the course tutor or by any student. It may well be prompted when a student logs in to the system.

- **Agenda, course outline or schedule**: gives an overview of the course structure, and typically include dates for assignments, assessments, lectures, video conferences, etc. This feature provides hyperlinks to the course content. In a web-based platform, these are web-pages in html containing part of the course material. The system platform may also provide a structured means for course authors or tutors to create the course agenda itself.

- **E-mail system**: many systems include a built in e-mailer that allows message exchange between course tutor and student, as well as among students. The system user can select an e-mail recipient directly from the class student list provided by the virtual environment.

- **Discussion lists**: based on the e-mail service, this feature provides a broadcast type of communication, in such a way one single message can be simultaneously sent to a group of students.

- **Discussion forums, asynchronous conferencing or newsgroups**: they provide a means for asynchronous communication for students to engage in collaborative exchanges. This feature is considered the heart of many VLEs and works like discussion lists in some extent. However, instead of sending messages to inboxes, they are filed in a special server. A “news reader” software organizes the messages in a hierarchical framework by subject, according to the discussion progress.
• **Class list and student's homepages:** with this key feature, any user may get some idea of backgrounds, interests and aspirations of the students enrolled on a course. Many systems incorporate links to e-mail addresses and student's homepages. Some VLEs provide user friendly interfaces for homepage editing.

• **Metadata:** metadata is information about a learning object (physical or digital). They are used in categorizing and searching objects according to their intended use in a particular context. If a standard description of learning objects (e.g.: IMS Learning Resources Meta-data Specification) is adopted, the object can be used across different systems and platforms (based on Web, CD-ROM, DVD-ROM, etc.) rather than being local to a particular system.

• **Assignments or activities:** tutors create assignments for students to complete as they work through course material. VLEs should provide a means for students to return completed assignments to the tutor for grading and feedback.

• **Assessments:** VLEs may provide tools for creating quizzes for performing assessments and student self-testing.

• **Synchronous collaboration tools:** these features (such as chat, shared whiteboards and video-conferencing) have relative importance and depend largely on the pedagogical orientation and intended use of the system.

• **Multimedia resources:** multimedia resources can be easily accessed and stored within the VLEs as an integral part of the course package. As more and more sophisticated educational materials such as interactive simulations get published on-line, the importance of multimedia facilities will increase dramatically.

• **File upload area:** students should not just be recipients of content uploaded onto the system by a tutor, but should be able to upload their
own materials and objects they have found into the learning environment for other participants to look at.

- **Calendar:** it is a useful tool for task assignment and student course control.

- **Search tools:** search tools allow a student to jump straight to subjects of interest or a particular person. This is a useful feature when course structure becomes very large and navigating by browsing and hyperlinks alone can become quite cumbersome.

- **Bookmarking:** Like search tools, a bookmarking facility can significantly decrease the amount of time spent navigating to frequently used places or items within the environment. A more sophisticated bookmarking may allow participants to build up their own individual content base structure.

- **Navigation model:** Although navigation is not strictly a feature or tool within a VLE, it is intrinsically part of the experience of using a VLE. Although navigation is not strictly a feature or tool within a VLE, it is intrinsically part of the experience of using a VLE. The navigation facility allows a user to move around the environment and is extremely important as it defines in many ways how the system is used. In addition to using hyperlinks and page to page browsing which are common to the experience of using a normal web browser, different VLEs will present the tools available and course structure in different ways. Two popular models are to use a homepage for the course which is presented on log-in with hyperlinks that act as jump-stations to the various tools that are available or, alternatively, to use a hierarchical tree structure. The two are often used in conjunction with the tree structure providing a course outliner with links to the course content packed into the branches of the tree.
The Experience of the LATEC/UFRJ

The team from the Information and Communication Technology Research Laboratory of the Federal University of Rio de Janeiro – LATEC/UFRJ, are being developing research on Virtual Learning Environments since 2000 (Haguenauer, et al. 2000, 2001 a, b, c, 2002 a, b, c, 2003 a, b, c, d, e, 2004 a, b, c, 2005 a, b).

The projects, applications in instruction and products resulting from these researches are available at www.latec.ufrj.br (figure 1).

In the Projects section (“Projetos”) of the LATEC/UFRJ web site, the main research and development projects conducted by the team can be found, which include: the VLE (“AVA”) project, the Online Education (“Educação Online”) project; the CEDERJ Platform Development project, and the Evaluation and Comparison of Platforms project.
The VLE Project

This research focuses in the use of Virtual Learning Environments (distance education platforms using internet), supporting face-to-face classroom teaching in undergraduate and graduate courses of the Federal University of Rio de Janeiro (Haguenauer. 2001, 2002, 2003 a, b).

Virtual Learning Environments were developed to support subject contents in areas of Pedagogy, Engineering, Social Communication, Industry Design, Business Administration and Physical Education.

Issues concerning some difficulties in divulging and assimilating new technology trends by students and also by teachers justify the choice of a semi-presential approach. Another relevant issue is the high production costs of sole distance education programs. At the same time, it is necessary to divulge the culture of learning supported by Internet among the teaching staff of the University, beyond the boundaries of research groups involved with this subject.

Therefore, semi-presencial teaching encompass two main advantages: (i) extremely reduced costs and (ii) promotion of a new learning culture in the University.

Furthermore, the semi-presencial model is extremely suitable for this intermediate phase, when the need of divulging the use of new technologies to a broader community of teachers is recognized. In addition, the model also provides a relatively low cost space for methodological experiences and necessary evaluations.

This transition format does not chock the traditional model, the model that teachers and students are used to, and creates a favorable environment for introduction of new technologies.
Online Education Project

This particular project was conceived for the development of many professional competences and lifelong learning programs using multimedia resources and hypertext approach. Many competence programs were already developed (www.latec.ufrj.br – extensão module) including: the Competence Program on Safety, Health and Environment (www.latec.ufrj.br/smsg), the Quality Competence Program, the Transportation Safety Management Program and the Service Station Competence Program (www.latec.ufrj.br/frentista). Together, all these programs have formed around 2,000 professionals for the service industry using information and communication technologies (Haguenauer, 2003, 2004 e 2005).

Platforms Evaluation Project

In this project, many computer platforms commercially available were tested and evaluated. The project goals include the comparison of features, functionality and tools (Haguenauer, 2003).

Platform Development Project

The LATEC team has participou do processo de conception and development of the CEDERJ/Quantum platform, which is a management software for online courses, developed by CEDERJ (Superior Distance Education Center of the Rio de Janeiro State), which is a consortium of public universities of the Rio de Janeiro state (http://www.cederj.edu.br/cecierj). The role of the LATEC team was to perform functional testing, identify system malfunctions (bugs), in addition to study and test different applications for all platform tools aiming the pedagogical (Haguenauer 2001, 2002, 2003 a,b).
Conclusions

The Virtual Learning Environments are developing in an increasing rate and it is possible to find many alternatives for implementation, including solutions based on open-source and free software.

Key success factors for the use of Virtual Learning Environments are the change in students and teachers attitude and an effective pedagogical orientation. With an interaction of these factors, the virtual environment can promote a significant improvement in the teaching-learning process.

Both teachers and students need “literacy” in the new technology that emerges. The unbalanced knowledge in the use of technology is an important issue to be considered.

From the teachers viewpoint, mastery is necessary in both the use of tools available in the Virtual Learning Environment, and in the work methodology with these tools. Sometimes, this methodology should be still developed, refined and adapted to our reality and to the workgroup profile.

In general, it is observed that students are more open and eager to incorporate new technologies than most teachers. Nevertheless, it is important to emphasize that the serious barrier to teachers incorporate new technologies is related to financial constraints in their institutions, to provide technological resources and infrastructure, with consequences for both students and teachers.

References


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