

DELIVERING INSTRUCTION AT A DISTANCE AND DEVELOPMENT OF A E-LEARNING TOOL USING WEB: A CASE STUDY IN HIGHER EDUCATION

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Abstract $\frac{3}{4}$ In the expanding and transforming world of higher education, the use of technology for instruction and training has become a challenge for colleges and universities that try to serve a changing learner population and workforce. These challenges have appeared, in part, due to the inability of higher education institutions to respond to change in a timely fashion. Therefore, higher education faces pressure of a competitive market. This pressure has forced institutions to strategically rethink ways of delivering instruction.

With this scenario in mind, the authors explain how their school, the University of Brasilia, developed its distance learning program and a e-learning tool using primarily WEB, applying them to instruction.

The rise of e-learning is dividing its use in three streams: use of WEB in the support of conventional classroom instruction, use of WEB for the delivery of a totally on-line course and use of a blended technologic solution. The University of Brasilia is exploring the use of new technologies in these three streams.

Additionally, we will explain the development of our learning management system using the facilities of an authoring tool. This option makes the system easier to customize, reducing the content development costs by the use of an internal authoring tool.

Technology has the potential of bringing a new dimension to interaction in the classroom, plays a key role in a student's learning, retention, and overall perceptions of the course/instructors effectiveness. Technology can enhance presentation, communication, and teacher-student interaction as they determine how it works and learn to expand upon its possibilities. With the appropriate use of the technology, these relationships and interactions can not only be developed, but also maintained. It can also decrease interpersonal distance and create camaraderie among students to enhance learning.

Therefore, through the case study courses developed at the University of Brasilia, we will show a number of techniques used for improving student-student / student -instructor interaction and having students at all places feeling that they are an integral part of the classroom during a course.

Index Terms $\frac{3}{4}$ distance learning, Internet, Multimedia, systems development, Web

INTRODUCTION

This article presents the standards for learning systems development based on previous papers from the Institute of Electrical and Electronic Engineering – IEEE, as well as the description of a system in development using those standards as a reference.

The IEEE is an institute whose mission is to support the development of the global prosperity by promoting the engineering process of creating, developing, integrating, sharing and applying the knowledge concerning information technologies and electrical sciences for the mankind's benefit.

The Institute acts on fourteen areas, one of them referring to information technologies. The information technologies area is formed by other sub areas, one of them being the technological learning. This sub area has currently twenty groups and is defined as IEEE – learning Technology Standards Committee – P1484.

Considering the groups associated to this committee, we will focus on the general activities of IEEE 1484.1 Architecture and Reference Model and IEEE 1484.11 Computer Managed Instruction.

STANDARDS

This section presents a summary of the “Education and Training Systems Reference Model and Architecture” standard and the rules that promote the web-based learning management systems interoperability.

This section is organized on the following way: in the 2.1 item there is a brief explanation on systems architecture on learning. In the items 2.3 and 2.4 a summary of the IEEE 1484.10 group standards for data exchange and the IEEE

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1484.11 group standards for computer exchange in web environment are presented, respectively.

The IEEE information technology standard – Architecture and Model of Learning and Education Systems (LTSA) – P 1484.1 covers a wide variety of systems.

Learning Systems Architecture – P 1484.1

The architecture of learning systems based on information technologies is described, according [IEEE P 1484.1/D7] to five layers of refinement, from the greatest to the minor, according to Fig. 1.

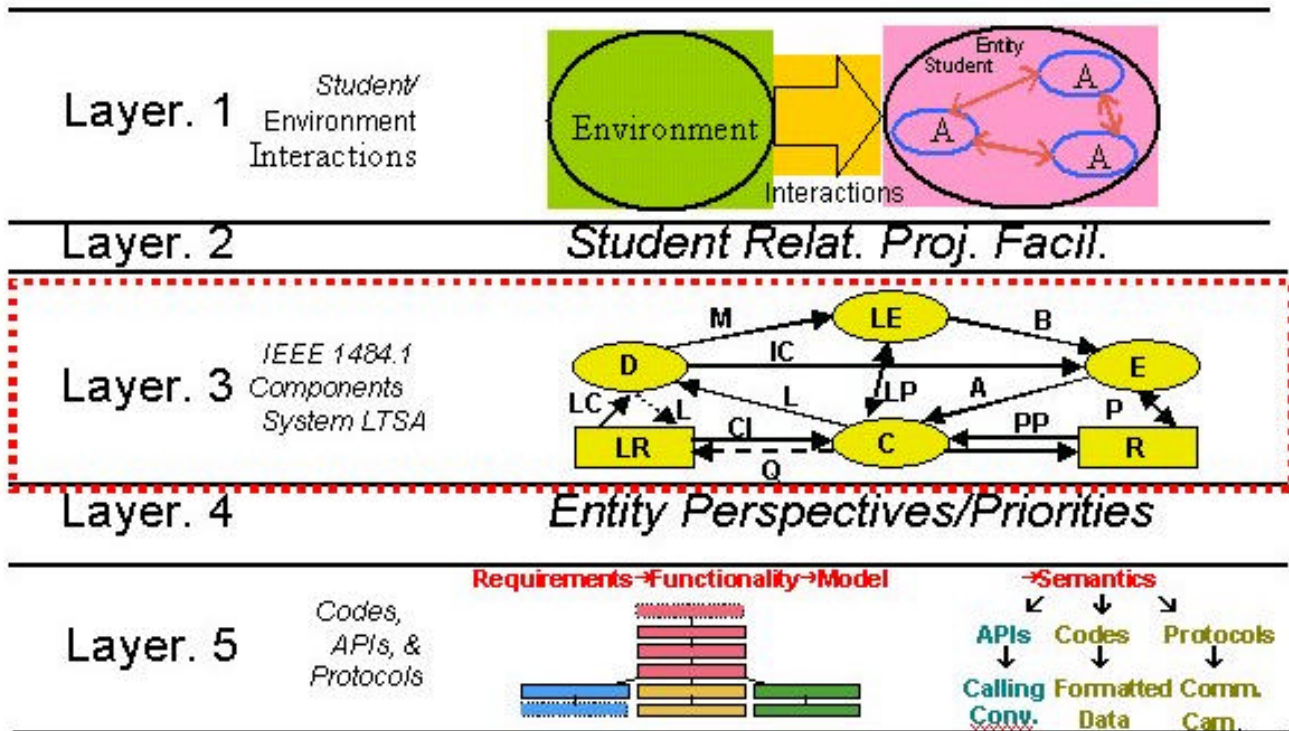


FIGURE 1 – THE ABSTRACTION/IMPLEMENTATION LAYERS OF LTSA. ONLY LAYER THREE IS ESSENTIAL IN THIS STANDARD

Standard for Web-Based Computer Managed Implementation Instruction – IEEE 1484.11

The computer managed instruction systems (CMI) are understood as the learning management systems that, besides running your own lessons, also manage computer based training lessons (CBT) and students’ progress in the environment.

An implementation according to the standards must include the following fluxes:

- Learning Management System on Computer => Computer-based Training;
- Learning Management System on Computer => Learning Management Systems on Computer;
- Computer-based Training => Learning Management System on Computer => Lesson Evaluation

In this section we will describe these data flowchart and their application on the Internet.

The following data stream must be included in a conformity implementation. The first one is created by the

Computer Management Information system (CMI) when a Computer Based Training (CBT) lesson is started. These data are then read by the CBT lesson so it can obtain information about the student. The second data stream is created by CBT lesson when the student finishes it. This data have information that a CMI system needs, as shown in Fig. 2.

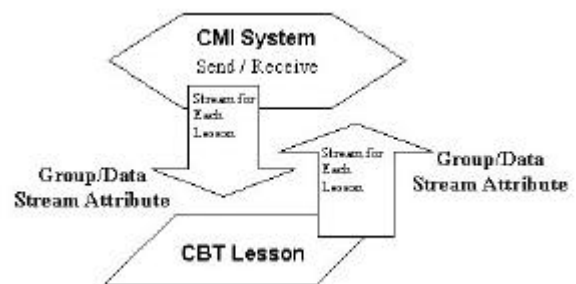


FIGURE 2 – CMI/CBT COMMUNICATION FILES

The course structure must be described in a file set. They can describe a course in details to allow the CMI

system to understand its structure and contents, as shown in Fig. 3.

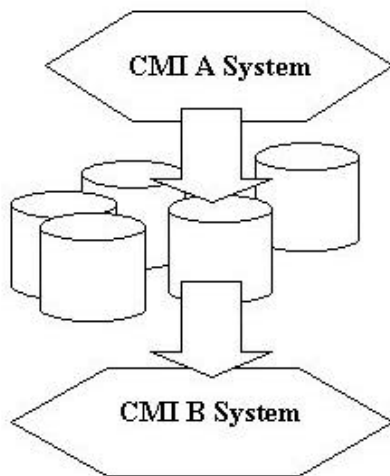


FIGURE 3 — MOVING THE COURSE STRUCTURE FROM ONE SYSTEM TO ANOTHER

The number of files generated to describe a course depends on the amount of information and detail that will pass from one system to another. The greater amount of files described in this pattern is seven, as shown in Fig. 4.

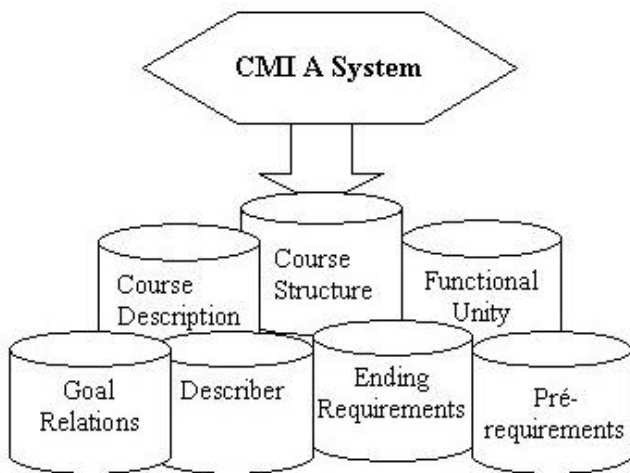


FIGURE 4 – COURSE STRUCTURE FILE

Lesson evaluation data include information that a CBT lesson or test generate in a students' behavior. It may include items such as students' answers, latency and lesson steps. Standardizing the student registry format, it can be display several tools for information usage, as shown in figure 5.

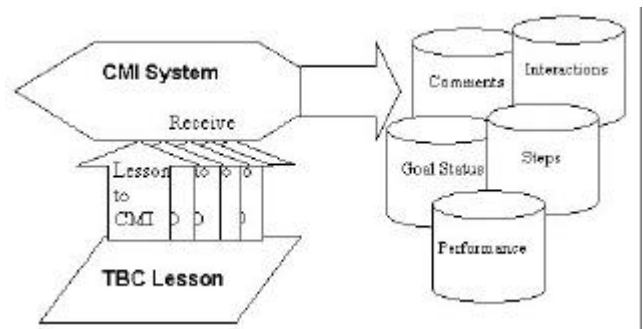


FIGURE 5 – LESSON AVALUATION FILES

This group has the participation of the Aviation Industry Computer Based Training Committee (AICC), which already has series of recommendations for interchange between computer based training courses.

CREATIO

The CREATIO is a system of authoring and learning management in development in the Center of Multimedia and Internet-NMI, which is a laboratory associated with the Department of Electrical Engineering of the University of Brasilia. The purpose of the considered system is to present a multimedia tool for distance and live education support via Web composed by environment of integrated medias, such as videostreaming, Internet and other complementary medias.

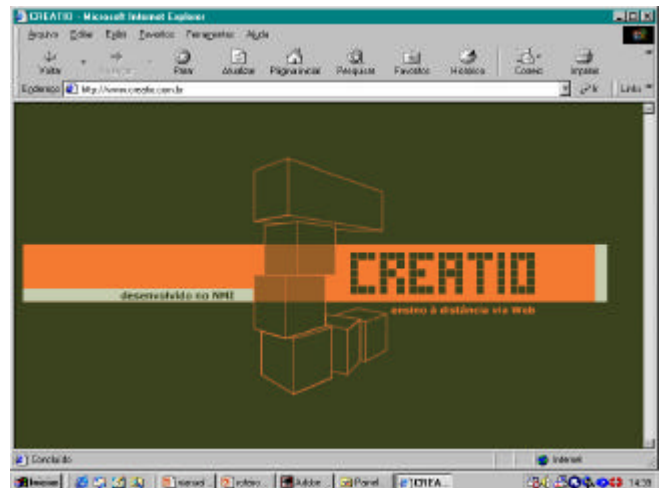


FIGURE 6: CREATIO – AUTHORIZING AND LEARNING MANAGEMENT SYSTEM
WWW.CREATIO.COM.BR

Student Environment

The student environment was projected so that the student could have access to the lessons, complementary materials of these lessons, communication tools, description of his

classmates and tutors profiles, his performance status, and others.



FIG. 7 – STUDENT ENVIRONMENT

The tools that compose the student environment are:

Linha Direta (Direct line) - It is a communication tool between students, tutors and administrative staff that makes possible to send information about the courses and to have individual orientation.

Forum (Forum) - Forum is an interaction tool for students and tutors, which aims the exchange of information and questions regarding on the content of the course. So it can complement the student's knowledge and improve the intermeshing among the participants.

Chat (Chat) - It is an internal communication tool that allows information sharing between the students and tutors.

Midioteca - the midioteca is a place where complementary material is stored in diverse formats (bibliographical references, slides, videos, audio, texts, animations and glossary).

Profile - In the profile, the student finds a description of other students registered in the course, and it is also possible to fill or to modify his own profile.

Manual - In student' manual, there are frequently asked questions and information on the functioning of the Creatio.

Secretaria (Office) - The secretaria environment is where the student will be able to follow his performance in the course, change his password of access and to take off his doubts about the system.

Curso (Course) - In this part of the system the student will have access to the course contents organized by modules. A X number of lessons composes each module. They are displayed in diverse formats (text, hyperlinks, images, animations, video, audio, slides, etc.), complementary activities (indications made by the tutor for better exploitation of the content) and exercises (multiple choice tests).

Tutor Environment

In this environment, the tutor has access to the lessons, the complementary material, the communication tools, the functions of student status and to the material and complementary exercises register session.

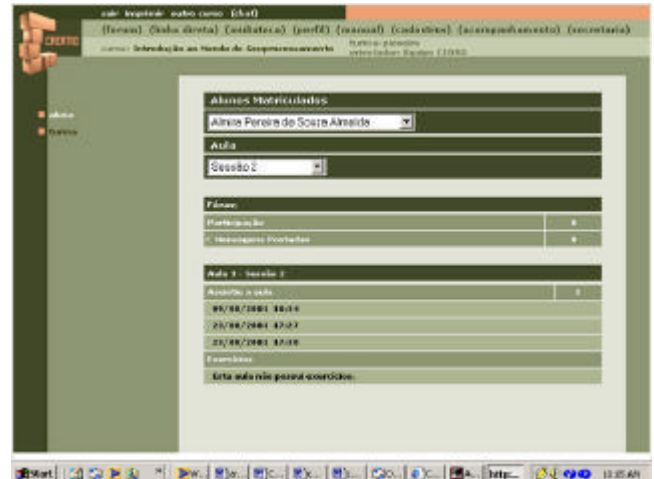


FIG. 8 TUTOR ENVIRONMENT – FOLLOWING A STUDENT

The tools that compose this environment are the same of the student environment, except for the specific students' status and register session.

Administrative environment

The administrative environment is composed by all the functions of other environments, and other functions related to administrative activities of the system.

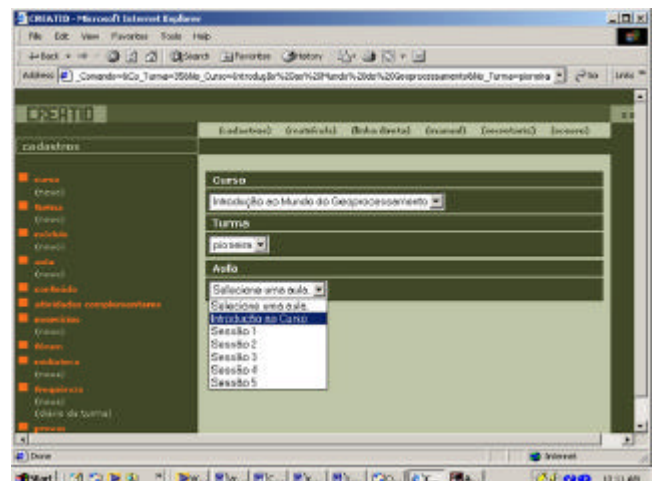


FIG. 9 ADMINISTRATIVE ENVIRONMENT – INCLUSION OF A COMPLEMENTARY ACTIVITY IN A COURSE .

The peculiar tools that compose this environment are:

Matrícula (School registration) - This tool allows the administrative staff to accomplish the registrations made by the users, modifying and/or saving the personal information.

Cadastro (register) - Here all the information is registered and made available for the tutor and the student environments: courses, group, module, lesson, contents, exercises, forum, live lessons, presence, tests, identification, notes, profile and midiateca.

Controle de Acesso (Access Control) - In this section the users are registered and receive access to login.

Secretaria (office) - This tool will assist the administration in the impression of the certificates and the emission of reports (students' status, evaluations, groups, etc.).

Authoring Environment

The authoring environment (Fig. 10) was based on pre-formatted pages, with sufficient flexibility and modularity.

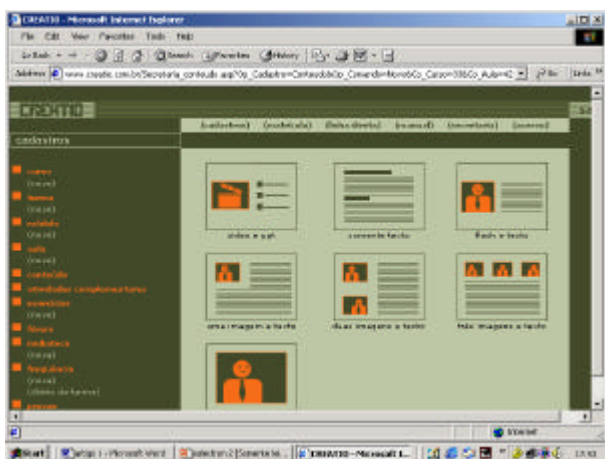


FIGURE 10 – AUTHORING ENVIRONMENT

With the modularity, the tutors will be able to create most of their courses based on modules that already had been projected, developed and widely tested.

Process Model - contents

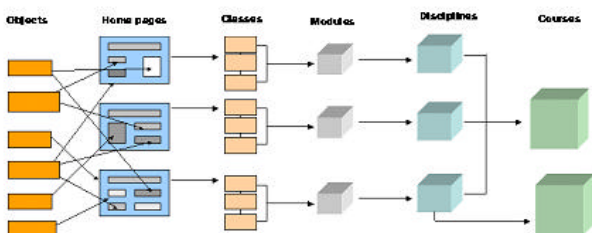


FIGURE 11 – REUSABLE MODULES

On this base designers of educational programs could use the pattern and contents of tested courses, unifying existing lessons or mini-courses. The lessons could be put together from daily pre-defined topics or Web pages, which could also be constructed from a library of standardized

animations, video clips, recorded audios, graphical and texts, as it is illustrated in Figure 10.

CONCLUSION

This project (project analysis, information architecture, navigation, development and interface) is being developed using international standards. Having this basis, the system CREATIO responds to its main goal, that is, being an authoring and learning management system for teaching activities via Web, uniting several functions like live and on-line courses assistance and web support for administrative and academic services.

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