A Virtual Campus Project on a Polytechnic Institution - e-Learning Platforms and Tools Analysis, Implementation and Certification

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Abstract: In order to select an e-learning platform to implement on a Virtual Campus Project context we have to consider several factors. We present a e-learning framework "paradigm". Then we present possible criteria, for a real scenario, to analyze e-learning platforms and tools where we cover aspects like selection criteria, language support, standards and specifications compliance and the importance of usability and accessibility to the analysis of platforms and tools. We aim to give a perspective of the methodologies used for analyzing e-learning tools, since there are several aspects to take into account when selecting e-learning platforms and tools to implement like the budget you have available and the goals you wish to reach when using the platform.

Keywords: e-Learning, Virtual Campus, Certification Strategies, Platforms and Tools.

1. Introduction.

In resemblance with other countries, e-Learning in Portugal emerged as training systems on enterprises and on education only appeared as small pilot projects.

With the Virtual Campus Project, also know as e-U, through its content component, the promotion of e-learning gained a national importance, since all the higher-education institutions adherent to the project have to implement it. The case we present reports to the implementation of this project on a Polytechnic Institute that has about 7500 users, located on an interior region of Portugal.

Through this project, we try to use e-learning as a mean to seek and catch new audiences for the polytechnic education, showing to the public what is taught in these institutions, being not just a mean of teaching but also a way of spreading and sharing information and knowledge.

As we know nowadays there are several e-learning platforms and tools, some commercial and others open source/freeware, so it's very difficult for an institution to choose the best solution to fit their need, always dealing with several problems.

If you want to buy a platform you have to deal with issues like the cost of licensing, installation, maintenance and extensibility of the platform. On the other

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hand if you choose an open source and freeware solution you'll deal with issues of lack of/few documentation, support and maintenance.

One of the things that also interferes with the choice and should be considered is the know-how of the future users of these tools, where you have to consider main target of these tools, their previous knowledge and their IT skills.

In order to clarify how to make an analysis of e-learning systems we will present some strategies we have defined, taking into account factors like standards compliance, accessibility, usability (Nielsen, 1993) (Shakel, 1991) and the language support.

First we are going to see some current approaches to e-learning platforms both freeware/open source and commercial and also some authoring & packaging tools. Then we will present a proposed e-learning framework and enter in the process of analysing platforms presenting the factors and criteria we use to evaluate them.
Finally we present some analysis examples of e-learning platforms and tools.

2. Implementation Process.

The implementation of an e-learning solution should contribute to the success of education, becoming an effective complement or alternative to presential classes and should assure synchronous and asynchronous collaboration with application sharing resources and messaging among other functionalities allowing real time interaction between students and teachers.

The institution wants a solution based on technology that allows the expansibility of the functionalities, the assurance of the level of availability, the importation, exportation and integration of information with other applications already developed.

In order to embrace this new educational/training approach and to implement the e-learning component of the e-U Project we propose a flexible implementation process which is divided in the following great phases: Inquiry about the necessities of the schools that form the Polytechnic Institute; Initial phase to identify the available e-learning techniques, tools and softwares; Development/Aquisition Phase; Production phase, where the contents are inserted in the platforms; Evaluation phase

We will now focus on the strategy to choose platforms and tools we have followed.

2.1. Platforms and Tools.

We propose two distinct temporal strategies to implement e-learning. In the first strategy – e-U Project Certification strategy – we define the iimplementation of the chosen platform defining the installation phases, the functional architecture, training and the certification process. In the second strategy - Post-certification strategy – we avail the impact of the usage of the platform and start to plan different scenarios so it can best fit our needs in terms of adaptability and extensibility.

e-U Project Certification strategy. For this phase we have defined the following strategy. In a first phase, when users of an institution do not have any kind of experience on e-learning environments, we technically advise the adoption of an e-learning platform that has consistent functionalities, already applied to several other educational institutions with success, with a wider spectrum of implementation, so the number of errors can be minimal and users can acquire knowledge and get familiarized with e-learning.

By adopting this kind of platform we can benefit from all the engineering project already made for other national institutions on the Virtual Campus context besides all the information, documentation and events, making easier the beginning of the process.

Regarding the certification process we must cover the e-U Project objectives and a set of requirements that are going to be tested on the content verification process. These requirements are: 1 - Assure the conformance with the level A directives of Accessibility on Web 1.0 contents (W3C, 2005); 2 - Support of Portuguese language and provide information in foreign languages (at least English), regarding some basic contents like the institution identification, contacts and brief description of the courses; 3 - Assure data interoperability through the compliance with SCORM 1.2 and pass the tests of compliance with SCORM 1.2 CTS v.1.2.7 (Totkov, Krusteva & Baltadzhiev, 2004).

Current Approaches. Nowadays, there are several solutions to support e-learning, where most of them are content-centred neglecting some important educational issues. We have done an analysis of reference commercial and freeware/open-source current approaches to e-learning platforms/systems, like Blackboard, WebCT, IntraLearn, Angel, Atutor, Moodle, Sakai and DotLRN like shown on table 1. Our goal in studying these platforms was to identify strong points and weaknesses, so we could try to use them in order to choose the best platform (Colace, De Santo, & Vento, 2002) (Graf & List, 2005).

Table 2. Analysis of e-learning platforms

Tools/Features	**Platforms**							
	Comercial				**Open Source**			
	BB	**WebCT**	**IntraLearn**	**Angel**	**ATutor**	**Moodle**	**Sakai**	**.LRN**
Technical Aspects								
Interoperability/integration	✓	✓	✓	✓	✓	✓	✓	✓
Standards and specs compliance	(1) (2) (3)	(6) (1)	(1) (2) (3) (4) (5)	(1) (6)	(1) (2)	(1)	(6)	(6)
Extensibility	x	x	x	x	✓	✓	✓	✓
Adaptation and Personalization								
Interface Costum. and personalization	✓	✓	✓	✓	x	✓	✓	✓
Choose Interface Language	✓	✓	✓	✓	✓	✓	x	✓
Students previous knowledge	x	x	x	x	x	x	x	x
Courses and Resources adaptability	x	x	x	x	x	x	x	x
Administrative								
Student Manage. / Monitor. tools	✓	✓	✓	✓	✓	✓	✓	✓

Database Access mechanisms	x	x	✓	✓	✓	✓	✓	✓
Produce reports	✓	x	✓	✓	✓	✓	✓	✓
Admin. workflows quality & functio.	✓	✓	✓	✓	✓	✓	✓	✓
Tracking users	✓	✓	✓	✓	✓	✓	x	x
Resources Management								
Content Authoring and Editing	✓	✓	✓	✓	✓	✓	✓	✓
LOs and other types of content Mng.	x	✓	x	x	x	x	x	x
Templates to aid on content creation	x	✓	✓	✓	✓	✓	✓	✓
LO Search and Indexation	x	x	x	x	✓	x	x	x
File upload/download mechanisms	✓	✓	✓	✓	✓	✓	✓	✓
Evaluation of quality of resources	x	x	x	x	x	x	x	x
Learning Ôbjects Sharing/Reuse	x	x	x	x	✓	x	x	x
Communication								
Forum	✓	✓	✓	✓	✓	✓	✓	✓
Chat	✓	✓	✓	✓	✓	✓	✓	x
Whiteboard	✓	✓	x	✓	✓	x	x	x
Email	✓	✓	✓	✓	✓	✓	✓	✓
Audio and Video Streaming	x	x	x	✓	x	x	x	x
Evaluation								
Self Assessments	✓	✓	✓	✓	✓	✓	✓	✓
Tests	✓	✓	✓	✓	✓	✓	✓	✓
Inquiries	✓	✓	✓	x	x	✓	x	x
Costs	H	H	H	H	N	N	N	N
Documentation	✓	✓	✓	✓	✓	✓	✓	✓

SCORM-(1);IMS-(2);AICC-(3);LRN-(4);Section 508-(5);Some IMS Specifications-(6);High–H;None–N

E-Learning Framework "Paradigm". Is in this context that we find out that it's important an e-learning framework that in a sequenced and structured process combine the different types of tools.

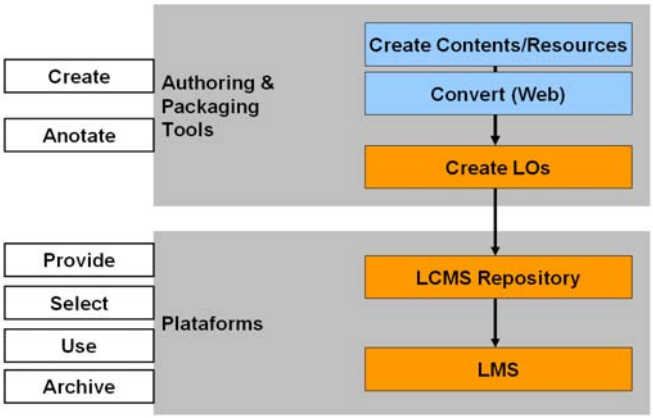

Fig. 1. e-Learning Framework

In this framework, we can create the resources and convert them to web format and then annotate them with metadata with the authoring & packaging and annotation tools. Then we can archive the LOs with the LCMS Repository and use them in the courses in the LMS, as we can see in Fig. 1.

E-Learning Tools Analysis Criteria. In the process of choosing an e-learning platform we have to choose the criteria to follow. This criterion is the base of a choice of quality but it's also for limiting the solutions to our requirements.

These criteria have weights for distinguishing the different factors and for deciding our choice in the basis of what is important to implement.

To make the evaluation of the platforms we propose the criteria presented on table 2. In the case of choosing a freeware e-learning platform the criteria price should not be considered and the execution team will be technical staff of the institution.

Table 2. Platforms analysis, Criteria and weights

Tools/Features	**Relevance**	**Weight**
Technical Evaluation		**55%**
Technical Aspects	Takes into account some technical aspects that should be considered regarding the platforms flexibility	
Standards and specs compliance	The standards and specifications that the platform supports.	
Adaptation and Personalization	Takes care of issues regarding user personalization, adaptation and customization	
Administrative	Takes care of issues regarding the management of the platform	
Resources Management	Takes care of issues regarding the management the resources like creation editing and authoring	
Communication	Takes care of the communications tools provided by the platform	
Evaluation	Takes care of the assessment issues	
Usability	Usability of the platform	
Accessibility	Level of Conformance of the web content	
Documentation	Documentation provided	
Execution Team	Execution staff allocated	20%
Price	Price of solution	20%
Execution Time	Execution Time	5%

Post-Certification Strategy. Before the end of the first year of usage of the platform it is important to choose the strategy to follow as well as to analyse the impact of the platform.

In order to make this analysis we should consider the data that comes from the collection of data and statistics about the usage of the platform and inquiries to the community about the level of satisfaction of the usage of the platform.

After this analysis, a new strategy of e-learning should be chosen that may pass by the following scenarios:

a. Continue with the current platform
b. Start looking or develop a new one
c. Combine different solutions

In this way we have adopted the third scenario and we are developing an e-learning platform AHKME (Adaptive Hypermedia Knowledge Management E-learning Platform) that we are going to combine with dotLRN.

AHKME is an e-learning platform that is divided into four different subsystems: Learning Object Manager and Learning Design subsystem, Knowledge Management subsystem, Adaptive subsystem and Visualization and Presentation subsystem. These subsystems were structured taking into account the following. First we have the process of creation and management of learning objects (LO), which is followed by the process of course creation through the learning design (LD). In parallel with these two processes the Knowledge Management subsystem makes an evaluation of the quality of the available learning objects and courses. Then they pass through an adaptive process based on the students' characteristics to be presented to them, as we can see on figure 2 (Rego, Moreira & García, 2005). All the information in the platform is represented through XML (Bray, Paoli, & Sperberg-MacQueen, 2004).

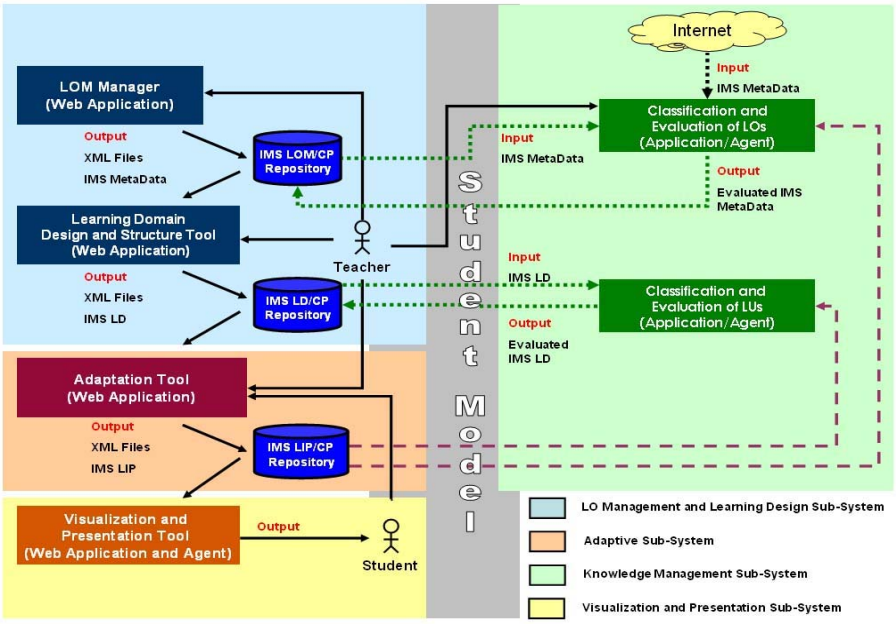

Fig. 2. AHKME's Structure

3. Conclusions.

In similar projects of campus Virtual like e-U project, the implementation of e-learning and more spherically the analysis of platforms and tools must consider the context. Preferentially you may choose a more reliable platform error free giving wide vision on e-learning. Gradually it should walk for the development of a platform that would best fits or needs.

As we have seen the paradigm of analysing an e-learning system involves a whole process and deals with many factors.

First we have to know the e-learning system and tools we want to analyse, because we have several LMSs, LCMSs and Authoring and Packaging tools. We have to make that choice regarding the architecture of the system we want to implement.

After choosing the framework we have to see we are doing an empirical analysis or if we are choosing an e-learning system to implement in an organization.

In real scenario, we have to consider the environment and the factors regarding the implementation of the e-learning system, so we have to define the criteria and its weights for selecting a platform that gives a good functional perspective of e-learning

In this analysis we have to take into account more context and project management factors than on an empirical analysis.

Another sensible factor that should be considered is the accessibility, where the system should respect the accessibility directives of Web contents (at least level A) regarding users with incapacities. It is important that the system is accessible to everyone.

Finally, the system should support several languages - the native language of the country where the platform or tool is being installed and provide information in foreign languages – preferentially English and optionally French or Spanish.

So, analysing and choosing an e-learning system requires planning and knowing very well the variables and factors of the choice.

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