LMS Software study and a practical application in Language and Literature Didactics.

Aplicación práctica en Didáctica de la lengua y la literatura del software LMS.

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Summary: On-line tecnological Innovation on education using Web Content Management System Platforms has involved a teaching-learning process advance in students. The wide variety of software platforms requires a comprehensive analysis allowing to locate the appropriate Learning Management System (LMS), which combines organization's needs with hardware and software requirements for the system to be deployed. Additionally, it is crucial the fact of bearing in mind other demands , such as rewriting, adapting contents or interchange educative materials or information with other organizations. Along these lines LMS platform must be adjusted to international standards and specifications like SCOMR or IMS. In this sense, LMS Atutor provides accesibility, adaptability, and installation and configuration facilities required for contents and on-line utilities to be put into production in a open source environment. This platform can contribute to teaching work in Language and Literature subject courses development and even offer comunication facilities to student related to information access and online self-study.

Key Words: On-line learning. Learning Management System. LMS. Virtual Learning Environment. VLE. Content Management System.

Resumen: La innovación tecnológica en la educación on-line a través de Plataformas Web de Gestión de Contenidos ha supuesto un avance en el proceso de enseñanza-aprendizaje del estudiante. La gran variedad de plataformas software precisa de un análisis pormenorizado que permita localizar el apropiado Sistema de Administración de la Enseñanza (LMS) que compagine las necesidades de la organización con los requisitos hardware y software del sistema a implantar. Además, es crucial tener en cuenta otras demandas, como reescribir, adaptar contenidos o intercambiar materiales educativos o información con otras organizaciones; por ello la plataforma LMS debe adecuarse a estándares o especificaciones internacionales como SCORM o IMS. En este sentido, el LMS Atutor proporciona la accesibilidad, adaptabilidad y facilidad en instalación y configuración requeridas para la puesta en producción de contenidos y utilidades online en un entorno de software libre. Plataforma que puede contribuir a la labor docente en la elaboración de cursos de la disciplina de Lengua y Literatura además de proveer al estudiante de facilidades para la comunicación, acceso a la información, y autoaprendizaje online.

Palabras clave: Aprendizaje on-line. Sistema de Administración de Enseñanza. LMS. CMS. Gestión de Contenidos.

1. Content Management System and E-Learning Platforms Background.

On-line learning process enables to reach competences, skills and knowledge related to a specific study object without involving space and time limitations as befits in-class training.

Platforms for on-line learning provide a framework for this educational development, being Content Management System, a software application which makes possible contents administration by participants.

Documentation and information on the Internet has improved and there has been exponential growth from the nineties, when static web pages showed the same information on every user request to dynamic pages which provide interactive experience by responding to different conditions.

The complexity of systems and services for information management supporting has produced in the 2000 decade an evolution in methods and techniques for administration[1]. In this respect there has been a unification among several platforms. So currently global solutions which provide the whole information management process are easily found. These are known as Content Management Systems (CMS). Web Content Management System, WCM, is (MILLER y DAVID, 2002) centered in web environment and its main goal is directed to produce digital information, especially to portals and corporative webs.

Under the term CMS, different applications and platforms appear with several provisions and objectives focused on various types of users. In this sense we are bearing in mind e-learning platforms and specifically Virtual Learning Environment (term adopted in Europe) or Learning Management System (term for USA). Technologically, American authors establish a distinction between Content Management System and Learning Management System, being the last one centered on software to manage corporate training programs. Otherwise VLE term in Europe is considered as a subcomponent of the wider systems which support the larger infrastructure of information systems in an organization[2].

In addition, the term Learning content management system (LCMS) appears as a software which employs web-based, self-contained and re-usable resources to

[1]URL de esta página: http://www.hipertext.net/web/pag258.htm Citación: Jesús Tramullas. *Herramientas de software libre para la gestión de contenidos* [on line]. "Hipertext.net", núm. 3, 2005. <http://www.hipertext.net> [Consulta: 24/01/109].
[2] From Wikipedia, the free encyclopedia.

support learning. Moreover LCMS adds tools for authoring and re-purposing content. Apart from this, LMS is often used to refer to both an LMS and an LCMS[3].

2. The Virtual Learning Environment Context, SCORM, IMS and HACP Standards.

E-learning platforms make up solutions to offer on-line contents and interactive tools like chats, forums, tasks, question papers and tests for evaluation, by means of which students can develop some actions as is the role of an in-class learning process.

According to Pierre DILLENBOURG from University of Geneva, there are some aspects to be achieved in order to speak about Virtual Learning Environment, such as:

Information for educational interactions, produced by several authors, with an information maintaining, a space for the student to socialize where they are not only receivers but also information transmitters. *An application which integrates heterogeneous technologies and multiple pedagogical approaches*[4].

Roxanne HILTZ, Distinguished Professor in The New Jersey Institute of Technology of Newwark, defines "The Virtual Classroom software as a teaching and learning environment located within a computer-mediated communication system"[5].

Furthermore, there are new features in these platforms which include wikis, blogs, RSS and 3D virtual learning spaces.

Actually most E-learning platforms follow a classic scheme class transferred to web environment, instead of virtual proactive learning, being contents adapted to digital resources. This way, teaching material is convenient to be packed in SCORM, IMS format or HACP (HTTP-based AICC/CMI Protocol), a set of standards designed for web-based e-learning.

Since e-learning beginnings, a great variety of platforms were developed and a huge quantity of contents were produced using software designed for that aim. Due to this wide range of platforms, problematic situations appeared when organizations:

[3] From Wikipedia, the free encyclopedia.
[4] EUN CONFERENCE 2000:«LEARNING IN THE NEW MILLENNIUM: BUILDING NEW EDUCATION STRATEGIES FOR SCHOOLS».
[5] Collaborative Learning: The Virtual Classroom Approach. Journal article by Starr ROXANNE HILTZ; T H E Journal (Technological Horizons In Education), Vol. 17, 1990.

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-Tried to change their platforms, so it was necessary to rebuild or unless to adapt contents.
-Needed to interchange information with other organization which had a different platform.
-Or just the compatibility aspect for the solution to be sold.

Accordingly, the Advanced Distributed Learning (ADL) initiative from the United States Secretary of Defense developed SCORM (Sharable Content Object Reference Model) as an International Standard with open and free specifications. Thus SCORM defines how content may be packaged into a ZIP file, so contents fulfill SCORM conditions if they are:

- Designed for a web browser.
- Described by meta data or metainformation (data about other data[5]).
- Arranged as a structured set of smaller objects.
- Packed for being imported from every compatible SCORM platform.
- Portable, so it can be hosted in every Web Server, in every Operating System.

Moreover SCORM establishes how client side content communicates with a host system and run-time environment which defines a standardized information interchange and compatible with Internet technologies. With this aim a JavaScript API (*Application Program Interface*) has been specified for providing a general manner to communicate a user with a Learning Management System.

On the whole, a SCORM platform fulfills a SCORM specification model when it:

- Accepts any SCORM content and is available for being displayed to the platform users.
- Is provided by a run time environment where contents are showed by a web browser.
- Run time environment keeps certain technical requirements like accessibility, adaptability, durability, interoperability and reusability.

SCORM Standard also uses XML (*E**x**tensible **M**arkup **L**anguage*) standard to allow defining grammar in specific languages.

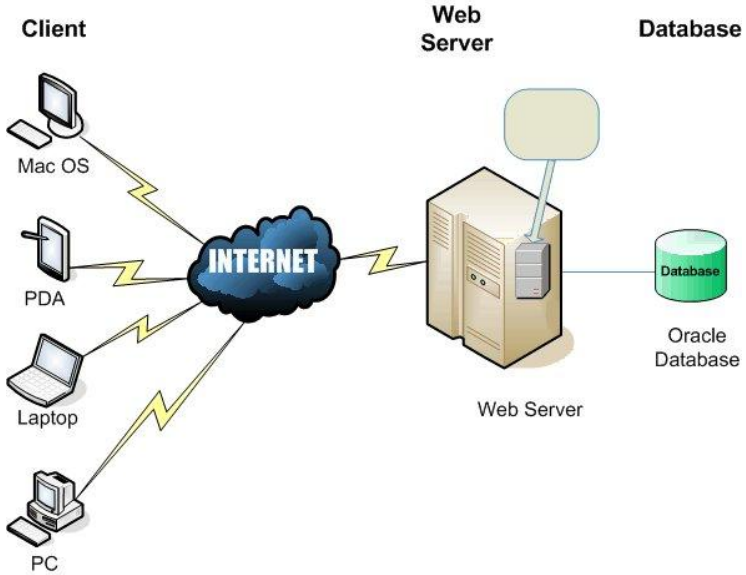
In addition, it is convenient for Virtual Language Environments to observe IMS regulations. IMS is a specification designed to support the use of pedagogies in online learning. It tries to do this by providing a generic language. *This language is designed to enable many different pedagogies to be expressed*[6].

[6] From IMS project http://www.imsproject.org/learningdesign/

Besides the AICC HACP standard is commonly used by Learning Management Systems and other systems to apply content or evaluations. It is said to be robust although a pre-XML standard and considered more secure than SCORM.

3. Virtual Learning Environment Technique Architecture.

Technical sketch for a Virtual Learning Environment is based on a Web Server, an interpreted language and a Database Management System (DBMS).



Picture 1. Web Server, Database System and Programming Language.

A Web Server will make it possible to provide HTTP content to a browser client. DBMSM will be required for managing dynamic data, so DBMS constitutes an interface between Data Base, Web Server and clients (teachers-students). Furthermore, there is one more component, Interpreted Programming Language, also called script language, designed for being executed by means of an application which translates high level language to machine language instruction by instruction.

Thus, Virtual Learning Environment usually employs the following schemes:

LAMP (Linux-Apache-MySQL- PHP/Python/PERL). Referred to the system composed by open source applications. LAMP has got a de facto standard and prepares

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four needed components (Linux as an Operating System, Apache as Web Server, MySQL for data administration and some script programming software: PHP, Python or PERL) for developers to serve dynamic information to applicants.

WAMP. Referred to the system consisting of Operating System Windows plus DBMS MySQL, Web Server Apache, and PHP/Python/PERL as script languages. Difference here is a non open source component by using.

Although there are also other combinations, such as MAMP for MAC clients or XAMPP available for Windows, MAC OSX, GNU/Linux or Solaris, we have mentioned these two ones for being the most extended solutions to place a Virtual Learning Environment.

4. Tools in LMS.

LMS is designed to make easy pedagogical communication among participants in an educational process providing a variety of tools. In a virtual environment purpose they will be addressed to support teachers and students for the teaching and learning flow. These tools are able to be classified within:

- Tools targeted at learning:
    - Forum, files interchange, multiple formats, tools for synchronous and asynchronous communication.
    - Multimedia presentation services (videoconference, video, digital blackboard).
    - Individual and group Weblogs where students have to write periodic posts related with the established subjects, styles and procedures.
    - Wikis.
- Tools for teaching materials management: User authentication, privileges based on user role, student registration, audit.
- Tools for participant management, monitoring process and progress evaluation:
    - Personal notes, scheduling and progress revision.
    - Help in the platform use.
    - Possibility for the students to work off-line with synchronization mechanism.
    - Updated or expired pages and broken links control.
- Tools for courses, content publication and work program design:
    - Test and automatized results, course management, support for course creation, on-line qualification tools and student tracking, competence management.

- Accessibility, reutilization, contents share, system environment personalization and accordance with standards.

5. Software Solutions for Learning Management System.

Despite the market for LMS being relatively new, it is possible to locate; 300 platforms available distributed on commercial and open source solutions: WebCT, eCollege, Moodle, Claroline, Learning Space or e-ducativa are some of the most commonly used at University and School field. It depends on the standpoint of the client to decide upon advantages and inconveniences of each kind of developments and licenses, among which we will mention:

- Costs to be invested for maintaining licenses.
- Scalability as computing system ability of being adapted on size and configuration.
- Technical assistance or management in case of commercial LMS.
- Add-ons and progress to stay product relevant.
- Environment presentation, hardware and software systems requirements.

Besides these criteria others related to communication, productivity, student involvement, functionality and course development tools exist.

In every respect, CMSMatrix.org investments show comparatives bearing in mind available tools for instructors and students, security, hardware, software requirements and others. A sample viewed from some angles could be:

In most frequent use and appearance order:	General characteristics, Security, Systems Requirements and Cost.
Blackboard: Bb Learning	WebCT
Aspen Asymetrix click2learn Toolbook	FirstClass Collaborative
Docent	Lotus Learning Space
eCollege	eCollege
FirstClass Collaborative Classrom (FCCC)	Aspen Asymetrix
Lotus Learning Space	ClicktoLearn ToolBox

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TopClass	Docent
Virtual-U	Virtual-U
Web Course in a Box	WebCourse in a Box
WebCT	TopClass

Even though some Universities have their own platforms the majority of them tend to use WebCT and Blackboard in USA and Europe, both commercial LMS solutions.

Nevertheless, efforts will be centered on locate and study an open source LMS due to our Spanish regional government compromise *to migrate all computers in public administration and schools to free software back in 2002, choosing the Debian-based Gnulinex distribution*[7].

So, previously, it is appropriated to introduce Commonwealth of Learning: LMS open source, 2003 studies, where a demonstration refers how a great deal of classified "Learning Management Systems" are actually poor in a functional way.

For this reason, there is a JOIN Proyect evaluation[8], which establishes an initial check for the system to answer the minimal LMS description and it is based on the E-*learning Praxishandbuch: Auswahl von Lernplattformen*, Innsbruck, 2002, Peter BAUMGARTNER study. Some of these significant criteria to be cited are:

– System must be open source and accessible from standarized web browser.
– Authorization functions and the rest of the system functions must be used without plug-ins or additional displayer.
– Basic users administration, authentication functions and management access must be offered.
– System must be opened to localization.
– Student must be able to communicate through browser with teacher, system and other students.
– There must be students evaluation and progress tools as well as basic tools for test authorship and evaluations.
– There must be content and courses management functionalities.

[7] http://www.linux-magazine.com/online/news/debian_conference_2009_in_spain_s_extremadura
[8] http://www.guidance-research.org/sigossee/join/sp/lms/mindef

According to these criteria, some of the most frequently used LMS have been evaluated in order to put into practice contents, activities, tasks and evaluations from Secondary School, different courses in the Language and Literature area. Among different open source LMS, we have taken into consideration those which follow next rules:

- Open source license.
- Client Browser required.
- Active Development Community.
- Set of stable and periodic versions.
- Multiple Language.
- IMS and SCORM standards.

As a result LMS considered for the study and their comparison were:

LMS	**Browsers**	**Database**	**Additional Extras**	**Licensing**
Atutor 1.5.4	System functions with any browser. System functions on mobile technologies. System complies with XHTML 1.0 specification.	The system supports MySQL. The application requires only one database and can coexist with tables from other applications.	Developer & module documentation User contributed handbook notes Fully internationalized (30+ languages) Custom language editor. Theme manager Mac version of the software is available. Course fee payments CMAP concept mapping Photo Gallery Marratech live audio/video/whiteboard conference Elluminate Live audio/video conference UserPlane audio/video chat ATalker text-to-speech LifeType Blog WebCalendar	IMS Content Packaging 1.1.3 IMS Content Packaging 1.1.4 SCORM 1.2
Claroline 1.8.1	System complies with XHTML 1.0 specification IExplorer Any which use Gecko motor.	The system supports MySQL. The application requires only one database and can coexist with tables from other applications.		IMS Content Packaging 1.1.3 IMS Content Packaging 1.1.4 IMS QTI 2.0 SCORM 1.2 SCORM 1.3

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	Safari			
ILIAS 3.9.9	System complies with XHTML 1.0 specification IExplorer Any which use Gecko motor. Safari	The system supports MySQL.	Integrated authoring environment for creating learning modules and glossaries; Creative Commons support; Web services interface; Integrated evaluation tool; Integrated wiki;	AICC IMS QTI 1.2.1 IMS QTI 2.0 SCORM 1.2 SCORM 1.3
Moodle 1.9	System complies with XHTML 1.0 specification IExplorer Any which use Gecko motor. Safari	Oracle. MS SQL Server. MySQL. PostGreSQL. The application requires only one database and can coexist with tables from other applications.	Has a wide range of third-party modules that can extend functionality in different ways.	AICC IMS Content Packaging 1.1.3 IMS Content Packaging 1.1.4 IMS QTI 1.2.1 IMS Enterprise 1.1 SCORM 1.2 SCORM 1.3
OLAT 6.1	System complies with XHTML 1.0 specification IExplorer Any which use Gecko motor. Safari	Oracle. MS SQL Server. MySQL. PostGreSQL.	OLAT supports 14 languages: German, English, French, Italian, Spanish, Czech, Danish, Greek, Polish, Chinese, Lithuanian, Persian (Farsi), Portuguese and Russian. OLAT is Java based and used Apache/Tomcat to be running.	IMS Content Packaging 1.1.3 IMS Content Packaging 1.1.4 IMS QTI 1.2.1 SCORM 1.2
Sakai 2.3	System complies with XHTML 1.0 specification IExplorer Any which use Gecko motor. Safari	Oracle MySQL. The application requires only one database and can coexist with tables from other applications.	**LinkTool:** for calling external applications in Sakai (e.g. those written in PHP). **Blog:** for collaborative blogging among members of a particular site. **Podcasts:** a podcasting tool which takes advantage of the Resources tool for storage, but displays podcasts in a user friendly way and provides an RSS feed for access through one's favorite podcatcher. Melete Lesson Builder JForum Discussion & Private	IMS Content Packaging 1.1.4 IMS QTI 1.2.1 SCORM 1.2 IMS Common Cartridge - Sakai supports import of Common Cartridge materials. IMS Tool Interoperability - Sakai has a contributed tool

			Messaging **Under development:** **Goal Management Tool:** Enables an administrator or faculty-member to create goal sets within worksites. A goal set is a collection of defined goals; goals are hierarchically defined program or course objectives that students are expected to perform, and can be linked with various activities within Sakai (currently assignments and data points). **Polls:** The tool allows the simple and quick polling of users on an issue. **User Membership:** Allows one to search for site and group membership for a specified user.	supporting the IMS Tool Interoperability Specification. Sakai supports SCORM 1.2 using a SCORM loader and SCORM player from the contributed library (UC Davis) The Melete Lesson Builder supports IMS CP. The Tests & Quizzes tool supports IMS QTI.

Finally Atutor has been selected for our proposal because, despite providing similar characteristics to others LMS, it includes features regarding accessibility, assessment engine and personalized preferences.

6. Atutor LMS for Language and Literature area.

ATutor is a web-based Learning Management system designed with accessibility and adaptability in mind[9]. It provides an easy installation and configuration besides a rapid e-learning roll-out. There are facilities for educators to organize and produce instructional content and control their courses online. Its 32 languages supporting and IMS/SCORM specifications inclusions allow designers to develop reusable content for being interchanged among numerous learning systems.

[9] http://www.astd.org/LC/downloads.htm

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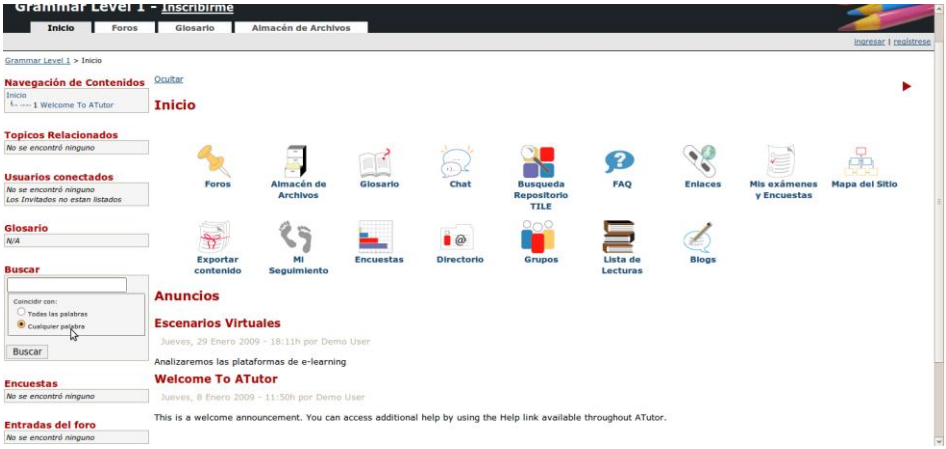
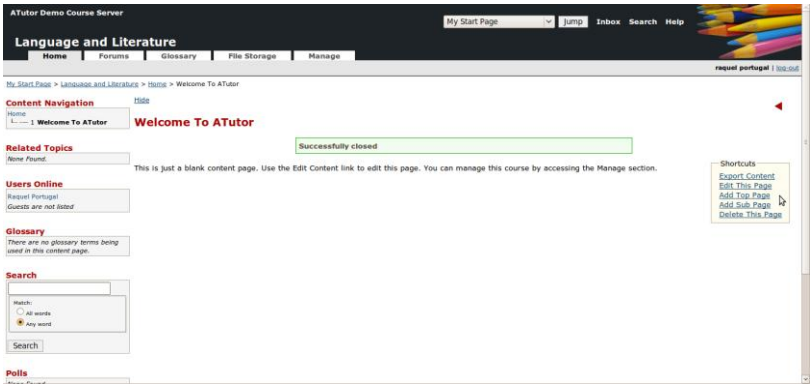


Picture 2. ATutor main course page.

In broad terms ATutor course includes in its home web page a set of tools like forums, File Storage, Glosary, Chat, TILE Repository Search, FAQ, Links, Test & Surveys, Site-Map, Export Content, MyTracker, Polls, Directory, Groups, Reading List, Blogs.

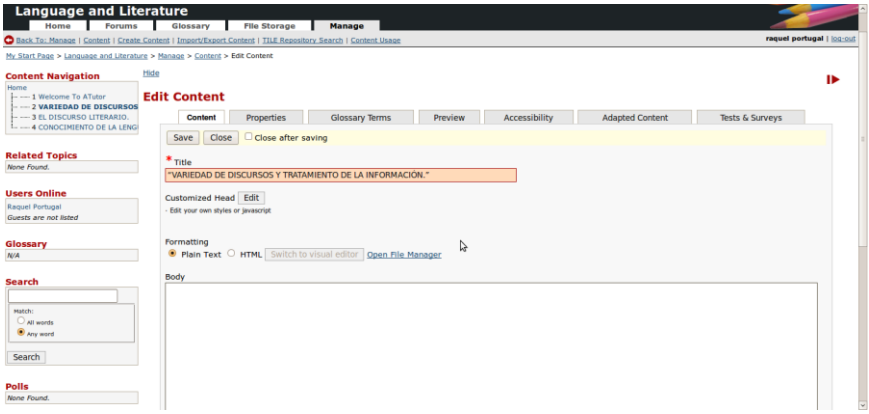
So we will make use of web Demo ATutor utility for creating a Language and Literature Course establishing in its Content Navigation block the three thematic groups in which "Currículo del Bachillerato en Extremadura" is arranged as a way to show how simple and effortless is for generating information in the LMS.

From Content Navigation we choose the option "Add Top Page" placed in the shorcuts area:



Picture 3. Creating a new Content in Language and Literature Course.

There, we have a new form for filling, where title, body in plain text or HTML can be edited. Here we will use HTML or Visual Editor to create the content structure for "*VARIEDAD DE DISCURSOS Y TRATAMIENTO DE LA INFORMACIÓN.*" Knowledge block title.



Picture 4. Editing new content "Variedad de Discursos y Tratamiento de la Información"

Once the content is finished, it is also possible to appoint some keywords for the document to be easily found.

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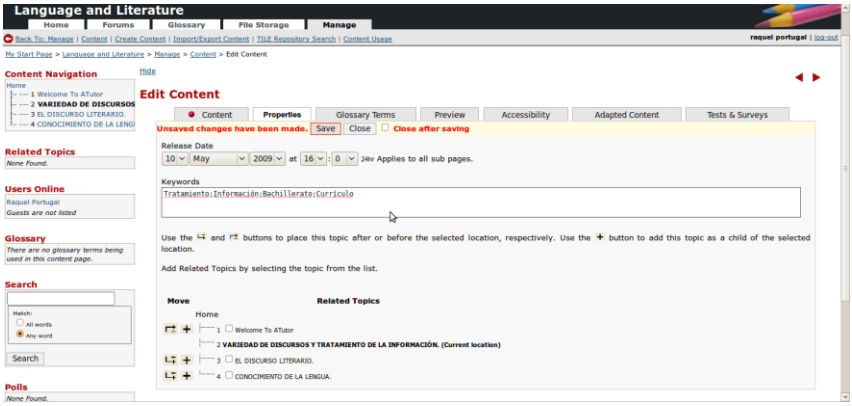
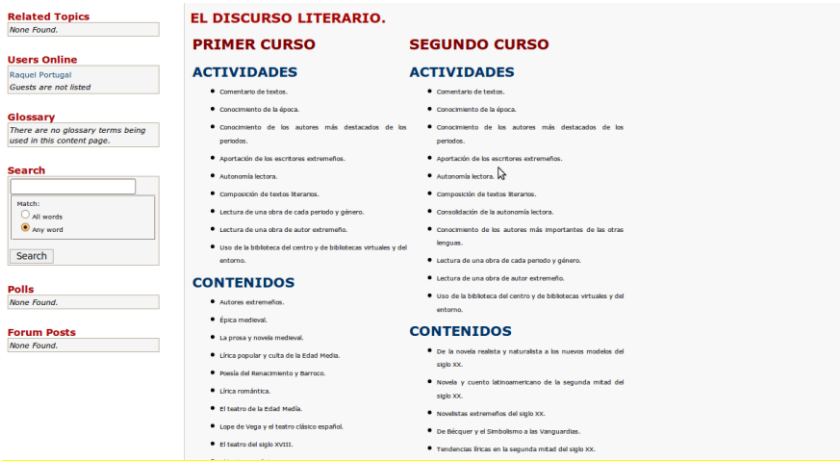


Picture 5. Adding Keywords to new content.

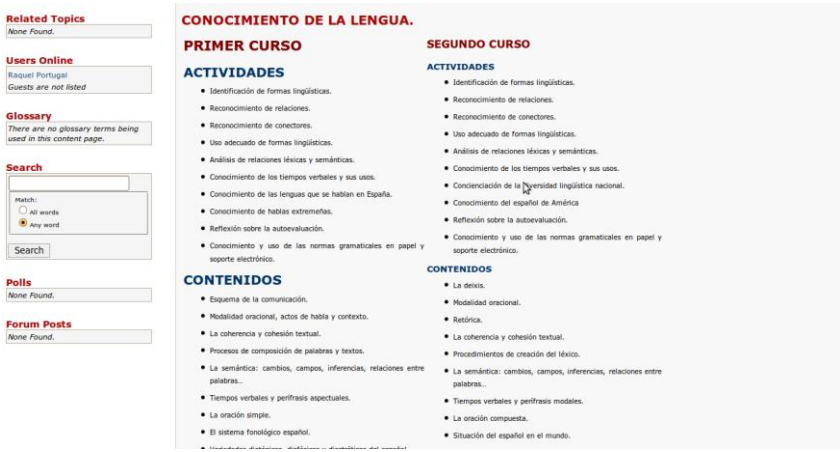
And finally using preview tool in Edit Content functionality, we can visualize the document:

Picture 6. Preview of "Variedad de Discursos y Tratamiento de la Información" content.

Along these lines the same is able to be done in order to conclude *EL DISCURSO LITERARIO* and *CONOCIMIENTO DE LA LENGUA* knowledge blocks.



Picture 7. Preview of "El discurso Literario" content.



Picture 8. Preview of "Conocimiento de la Lengua" content.

7. Conclusion.

Although LMS has been introduced and studied in the last ten years and is increasingly found in new niches, this kind of e-learning service has become a popular choice for education because it can be deployed in a few minutes and doesn't require instructors and institutions to run their own servers, mainly due to how LMS respects IMS and SCORM regulations, which allow a shareable content model among every

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development. Apart from that, *LMS* includes new emerging technologies, as well as specialized markets.

Secondly, despite the fact that several of LMS vendors appear, a highly growth in Open Source LMS solutions has been appreciated and, above all, facility for users to design and rebuild his own environments in order to adapt this new platform to their universe of discourse.

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