HECACEJ: B-Learning Tool for Static Content Creation in Joomla![1]

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Abstract. In this work we have reviewed the concepts of Learning Managementystem (LMS), Learning Content Management System (LCMS) and Content Management System (CMS). Their main features are studied, and a comparison among them is presented, along with a summary of some well-known integrations between LMS and CMS. Another important point in this work is presenting HECACEJ, a B-learning tool designed to create static content in Joomla! This tool is a specific content manager for publishing the material for a subject, which does not need help from the administration menu of Joomla! (difficult to use by a non-expert professor) and is able to publish these contents in Joomla! main menu. This tool eases the publication of B-learning contents (class notes, past exams, professors' data, etc.) in a static web page that can be accessed from the main menu of the platform Joomla!, which provides facilities for manipulating the contents but it was not developed ad-hoc for our proposal.

Keywords: B-learning, LMS, CMS, Joomla!, integration of tools

1 Introduction

The group FERMAT is formed by professors of Mathematics who wanted to join all the subjects relative to Mathematics Applied to Telecommunications in a single point. Since 2002, students in Telecommunications Engineering School have a meeting point in Fermat website (www.fermat.uma.es). Every subject is studied and worked within a B-learning framework.
In a first version, FERMAT website [1] was a web page[2] maintained by several professors spending a lot of work and time. It became necessary to use a CMS tool in order to optimize resources maintenance and to take advantage of new learning tools.

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[2] Old FERMAT web (http://campusvirtual.uma.es/fermat/) was translated to six languages and it has been recognized as the second winner of the award for the III Inter-university competition in research and teaching in the web (http://www.campusred.net/certamen).

It is very well-known that e-learning presents big advantages on classical distance teaching, since besides allowing flexibility of timetable, it allows the students to interact and to instantaneously access to on-line resources and multimedia: text, graphics, videos, audio and animations, among others. We propose a blended learning model [2] for our subjects: normal classes are mixed with contents that we upload to the FERMAT web.

The professor, as an element to favour learning, should design a succession of motivational environments in which student's activity is developed in order to obtain the pursued purposes. When we are in the B-learning model, the good design and variety of these environments is much more important than in the classical model of teaching.

To design the learning environments in e-learning, the professor has diverse software tools. Among the most used ones we have:

- Learning Management System (LMS): also known as Platform or Virtual Campus, it consists on programs that allow to automate the administration of formative actions, it registers users, organizes a catalogue of courses, manipulates user's data, carries out reports, allows to provide and to modify contents, controls and evaluates student's participation, etc. It also offers tools for the interaction professor-student as well as professor-professor and student-student (mail, forum, chat, video-conference, ...).
- Content Management System (CMS): This type of programs [3] aims at simplifying the creation and administration of contents. Basically this is achieved by separating the creation of contents and their presentation. The program takes charge of locating titles, text, graphics, links to the material, etc. This type of programs has a wide incidence in periodic publications.
- Learning Content Management Systems (LCMS): They have their origin in LMS, but they are focused to the educational environment, also allowing the creation and management of content. This system type allows to create, to publish, to store and to administer educational resources, being their main users the professors. It is the appropriate tool to design learning situations in a B-learning environment.

Thus, it can be deduced that in an environment of e-learning, we should have a tool of the type LCMS, or a LMS and a CMS that should also be integrated, so that the designs and contents, created by the latter, can be presented by means of the former.

In this paper, we are interested in facilitating the design and management of B-learning tools in an university environment, so, besides the integration necessity, we should facilitate their use for professors that are not expert in computer languages, which not all content managers allow. For this reason, free content managers, allowing this adaptation, are needed.

2   Learning Content Management System

In this section we intend to describe and compare three types of management systems: LMS, CMS and LCMS.

2.1   Learning Management System

We have already indicated how this type of programs automates the administration of formative actions (users' registration, creation of a catalogue of courses, management of user's data, etc), gives the professor methods to distribute contents and to observe the participation of the students, as well as it allows the students to access to interaction mechanisms (forums, chats, mail, etc).

A LMS is an application residing in a web server in which formative activities are developed. All the LMSs consist of a `learning environment' to which students and professors access and of an `administration environment', where usually only professors and coordinators will access and where one will be able to enable courses, to register the students, to import contents, to enable or to disable services, to obtain statistics of the course, etc. However, a LMS will not include authoring possibilities (creation of contents). In [4] the author remarks the key of the increasing interest in LMS platforms: `The core purpose of the LMS system proposed in this paper is to help learners pursue proactive and self-oriented education by allowing learners to pro-actively configure their own content'.

Free LMSs and commercial LMSs exist. The most used ones are the free ones since this not implies that they have an inferior quality. In addition, they are more complete than the commercial ones. Nevertheless, some institutions prefer commercial ones since they are configured and supervised by the company. Among free LMSs we distinguish the most used ones: Claroline [5], Dokeos [6], Moodle [7].

There exist many other free platforms as: Bazaar, Docebo, Eledge, Ilias, DattLNR, Ganesha, OpenUSS, Sakai, Spaghetti, ..., while among commercial LMSs we can find: WebCT [8] and Blackboard [9]. In general, all of them perform their functions appropriately, highlighting the platform Moodle due to its quick and extensive installation in the educational community, and it is the chosen by the University of Málaga for the installation of the Virtual Campus. Also, Moodle allows to compile certain mathematical expressions written in Latex, what makes it very appropriate for technical subjects.

In [10] the author remarks the process involved in the development of this learning management system. The author discusses the process of building a LMS evolving from the first experience in a subject with some basic learning material. The tools that a LMS system provides to the professors, normally is enough to translate the material to a LMS and to immediately develop new learning material for the students. In our experience, we move to Moodle the subjects and develop a lot of learning questionnaires, lessons, forums, cites, glossaries with hundreds of definitions added by the students, wikis, tutorials, books, etc. In [11] the authors explain all these learning tools developed in their subject.

2.2   Learning Content Management System

LCMSs [12] are software applications whose objective is to manage educational content. In general, they combine the courses management capacities of a LMS with creation and storage capacities of CMS. This way, LCMSs constitute an unique platform that allows students to personalize the resources and contents.

Contents can be re-used and published in several formats, being stored in a centralized database which can be accessed in many different forms. Data can be visualized in different ways, what allows to adapt them to diverse groups of students. In general, contents use XML tags and follow several standards like AICC and SCORM, allowing to export designed materials.

A good example of LCMS is Atutor that is easy to use. The demo version can be downloaded from [13].

2.3   Differences Between LMS and LCMS

The fundamental difference between both of them [14] is the objective that they pursue. While LMSs focus their attention on the administrative management and the student's performance (manages students' data and qualifications, programs events), LCMS platforms focus in contents management, allowing their adaptability and controlling the browsing among them. In the first case, the student tends to feel like observed and controlled, while in the second he/she feels that the important thing is the process of learning.

However, Brooks et al. [15] remarks that `Most popular learning content management systems provide poor collaboration support for learners'.

2.4   Content Management Systems

CMSs [3] are a group of tools, supported by a database located in a web server and, optionally, one series of client programs that allow the access to those tools. These tools allow to manage in an uniform, accessible and comfortable way a dynamic website with periodic upgrades and on which several people can act, each one with a certain purpose.

In [16] Sehring and Schmidt summarize the use of CMS: `Innovative information systems such as content management systems and information brokers are designed to organize a complex mixture of media content -- texts, images, maps, videos, etc'.

From the client's point of view, it is a dynamic website, with an uniform appearance, with design centered in the user and which, therefore, allows to easily carry out the tasks it has been designed for.

In summary, a CMS has two main functions:

- To facilitate contents creation: To create content becomes as easy as to fill in a form. There exists a single source for all them.
- To manage the presentation of those contents: It facilitates the publication of contents in several formats starting from an unique source, adds meta-data to contents in order to facilitate the browsing among them in multiple facets (timeline, categories, author, ...). It also manages the contents and their maintenance (creation, presentation, upgrade ...).

Their use is relatively recent and we can say that, at user level, they have extended since 1999.

There exist CMSs of different types, according to the contents to manage: Forums, Blogs, Wikis, Websites or Portal type systems. Those managing websites are the most interesting due to their modularity. We could also classify CMSs according to the license type: in some cases the source code is protected and it cannot be modified, while in other cases free access is allowed.

Using a CMS, users can elaborate and manage their webs obtaining dynamic pages with plenty of functionality. Thus, a CMS is useful due to:

- Inclusion of new functionalities in the WEB. With a CMS, new modules can be included without supposing many changes. So the web is able to grow and to adapt to future necessities.
- Maintenance of a great number of pages. Mainly, if they are maintained by several people with access permissions to different areas.
- Re-use of objects and components.
- Interactive pages. The static pages arrive to the user just as they are stored. However, the dynamic ones are generated according to the user's petitions. The CMS achieves this by connecting with a central database where all the data of the website is stored.
- Visual changes of the WEB. CMSs facilitate style changes, by using the existing standard CSS to design the style of presentation of the contents.
- Consistency of the WEB. The WEB presents an uniform aspect according to the style selected.
- Control of accesses to the WEB. A CMS allows to manage the access to different areas of the WEB to diverse groups of users.

In general, open code CMSs are more appropriate since they allow to adapt and to modify themselves to our necessities. A great quantity of free CMSs exist (Action Applications, Apache Lenya, ASP Nuke, DoorSoft, ...) but we would like to highlight Mambo, Joomla! and Xoops, which are the most extended.

We have chosen Joomla! [17] due to its great diffusion, good integration with Moodle and its `online' management, that is, via Internet and by means of the HTTP protocol. Joomla! works in Linux platforms as well as under Windows. The user does not need to know the HTML language or to access a WebMaster to upgrade something. Joomla! manages contents by means of the relational database MySQL.
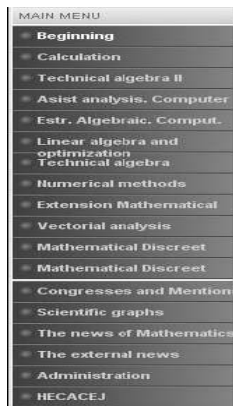
In [18] the authors pose some problems of the use of CMS: `However, learners' experiences of these systems are almost invariably static, with information being delivered regardless of their background or knowledge. Due to variation between learners, it is suggested that these web-based distance-learning systems would benefit from the capability of adapting their content to meet individual needs'.

In the same sense, the use of Joomla! by a FERMAT professor, even with computer science knowledge at user level, is complicated and justifies the development of a specific application that facilitates the use of Joomla! in our framework. Actually, FERMAT joins ten subjects and was developed using Joomla! but the process of maintenance of the information contained in each subject was excessively increasing. Joomla! provides facilities for manipulating the contents but it was not developed ad-hoc for our proposal.

2.5   Integrations of CMSs with the Platform Moodle

Once Moodle is chosen as the LMS to use, we should elect a CMS that can be integrated with it. The integration of a CMS with Moodle implies that Moodle can be accessed from the CMS (without necessity of identifying us if we have already made in CMS, and if we have an account in Moodle).

The official page of Moodle [7] informs us that Moodle integrates officially with Mambo, Xoops and many other CMSs. Also, Joomla! work-team has carried out the integration Moodle-Joomla! which can be downloaded from [19].

MAIN MENU
- Beginning
- Calculation
- Technical algebra II
- Asist analysis. Computer
- Estr. Algebraic. Comput.
- Linear algebra and optimization
- Technical algebra
- Numerical methods
- Extension Mathematical
- Vectorial analysis
- Mathematical Discreet
- Mathematical Discreet
- Congresses and Mention
- Scientific graphs
- The news of Mathematics
- The external news
- Administration
- HECACEJ

(a)

Years Curso	Exams of the subject Convocatoria		
2002-2003		Febrero	Septiembre
2003-2004	Diciembre	Febrero	Septiembre
2004-2005	Diciembre	Febrero	Septiembre
2005-2006	Diciembre	Febrero	Septiembre

(b)

Fig. 1. (a) HECACEJ integrated in the main menu of Joomla!, (b) Past exams table created by HECACEJ, an example of static content created by HECACEJ and associated to one of the subjects which were also created by HECACEJ.

3   Our Context

The group FERMAT[3] is formed by several professors of the Department of Applied Mathematics in the University of Málaga in Spain. These professors formed the group with the aim of making some resources of Applied and Theoretical Mathematics available to the students of this University.

Thus, in order to achieve better results, a web-page (www.fermat.uma.es) was created and all available resources were included in it. This website was developed with the help of the CMS Joomla!

The contents of this page are all necessary resources to study several subjects (Calculus, Algebra...) in the Engineering School of Informatics in the University of Málaga: professors' data, tutorships, exams, class notes... for each of the subjects.

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[3] 'Foro Experimental de Recursos de Matemáticas Aplicadas a las Telecomunicaciones', in English: Experimental Forum of Resources of Mathematics Applied to Telecommunications.

Information is shown in different web pages, which are called `Static Content' by Joomla!, meaning that they do not require constant updates. The information shown in those pages is conceived to last for a long time.

The current problem, which has motivated the development of the tool presented in this work, is the difficulty that carries the creation of a subject (page with the program of the subject, tutorships and listings of the professors, etc.) in Joomla!, which, as mentioned before, is the educational platform used by FERMAT to maintain the communication with the students.

Every time a professor wants to create a subject page, he/she had to enter into the complicated (for a non-expert user) administration menu of Joomla! and insert `by hand', using a Web editor, every content being a part of the subject, including designs, that is, colors, font shapes and sizes, tables which are used to represent the contents.

Obviously, it is not useful to create a page design every time for each of the subjects, when, actually, this design is going to be always the same, or very similar.

But, perhaps, the most time-wasting process is the creation of the static contents, since the professor has to repeat some listings of the corresponding professors' data, create links associated to the documents uploaded to the server, build tutorship tables... for every subject.

These drawbacks motivated the development of a Contents Meta-Manager, able to collect all the information only once, save it in the database and show it in a Web page every time that it is necessary.

Fig. 2. Main menu of HECACEJ: Subjects, Professors and Passwords.

4   HECACEJ: A Meta-Manager for Static Content Creation

As commented before, the platform Joomla! has a drawback for our proposal: its complicated administration menu for a non-expert user. The professors must browse the administration menus of Joomla! to introduce a news for the subject or search a previous news related a subject, etc. For instance, if a professor must change the timetable of the subject it is necessary to search in a lot of news stored for all the subjects.

We wanted to create a tool that could substitute the administration menu of Joomla!, and that could automatically create (with a more friendly interface) the

different subjects, that is, the contents of each subject. HECACEJ[4] is a tool with an educational purpose, associated to the platform Joomla!, used to create static web contents.

This tool is a Contents Meta-Manager, which means that is associated to a main CMS and operates `above' it. In our case, the main Contents Manager is the administration menu of Joomla!. In other words, HECACEJ is a tool that manages the contents of the platform Joomla! directly, without needing to use the administration menu, since it works in a higher level. The integration between the platform and HECACEJ can be observed in Fig.1.

HECACEJ has a very intuitive and easy-to-use interface (see Fig. 2.) which, step by step, leads us by several menus to collect all necessary information about the subject we are creating, and finally updates automatically Joomla! internal data base with all contents and therefore updates the external view of these data, making it public in the web page of FERMAT (see Fig. 1. (a)).

By entering in the subjects menu, we will be able to create a new subject or to choose one of those already existent, see Fig. 4. By selecting one of them, we will have a blackboard where to locate important news related with the subject (evaluation method, suspension of classes, schedule modification, practical classes, etc.). After it, we can give the description of all the aspects of the subject with an uniform format: program and class notes, professors, exams, presentations, available questionnaires, problems, practical classes, suggested bibliography (see Figure 5).

Fig. 3. Tutorships table created by HECACEJ.

Fig. 4. Subjects menu used by HECACEJ to create new or modify existing subjects.

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[4]HECACEJ - `Herramienta Educativa para la Creación Automática de Contenidos Estáticos en Joomla', which is the translation in spanish of B-learning tool for automatic static content creation in Joomla!. A full demo of HECACEJ is available at www.satd.uma.es/amora/hecacej

In Fig. 1. (b), we can observe an example of static content created by this tool, a table representing a repository of past exams. Each cell of the table is a link to the corresponding exam. If the professor has released the solved exam, the student will be able to open it with one click.
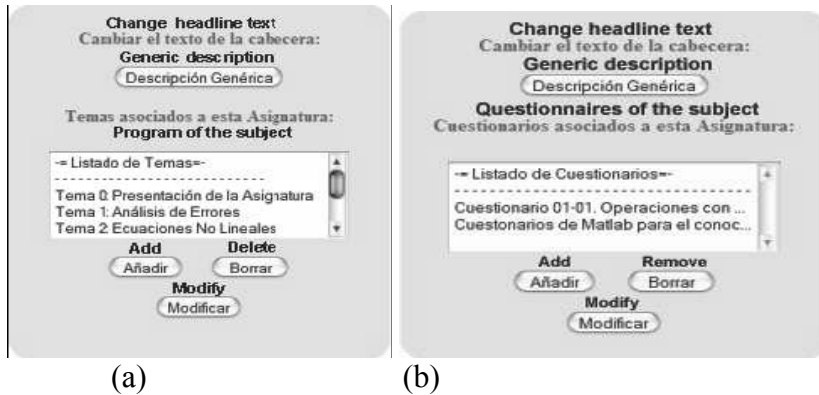

(a)   (b)

Fig. 5. (a) Dialog where to introduce the program of the subject and possible class notes, (b) dialog to modify or create questionnaires.

But not only subjects can be created. In addition, this tool has a menu to collect and store professors' information, see Fig. 6. Every authorized professor, can insert his/her own data (including tutorships...), which will be stored and later published in every subject page he/she belongs to, as shown in Fig. 3.

The integration of HECACEJ in Joomla! is rather easy. By using the administration menu of Joomla!, a link to the tool main page has to be created. Once this is done, we return to Joomla! main page and will find the link to the tool. Just clicking on it takes us to the main window of HECACEJ, Fig. 2.

Fig. 6. Professor menu of HECACEJ.

5   Conclusions

In this work, the concepts of Learning Management System (LMS), Learning Content Management System (LCMS) and Content Management System (CMS) have been reviewed.

The main features of each one of these systems are studied, and a comparison among them is presented, along with a summary of some well-known integrations between LMS and CMS (e. g., Moodle - Joomla!).

One important contribution of this work is to present HECACEJ, a B-learning tool designed to create static content in Joomla!. This tool provides a way to manage contents without the help of the administration menu of Joomla!, and is able to publish these contents in this main menu. Thus, this tool eases the publication of B-learning contents (class notes, past exams, professors' data...) in a static web page that can be accessed from the main menu of the platform Joomla!

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