

Comparative Study on LCMS, LMS and CMS

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ABSTRACT

A Learning Content Management System (LCMS) is an integrated multi-user administrative, authoring, and delivery platform. It allows administrators to host, schedule, manage registrations, assess, test, and track online training activities. These systems also allow Instructional Designers to create and house course materials, and learners to access course schedules, register for training, take assessments, and manage transcripts. The tools may base on content management or learning content management. Presently a composition of Learning Management System (LMS) and Content Management System (CMS) is used in eLearning. This paper helps you to understand the basic functionality of LMS, CMS and LCMS and how these are helpful in eLearning.

Keywords: Learning management system (LMS), content management system (CMS), learning content management system (LCMS).

Effective training and education creates costs for organizations in terms of direct and indirect costs and employee time. Decision-makers require information on how much and what kind of training is being delivered in their organizations, the results of the training, student progress and employee qualifications, and training requirements to support organizational goals. As all forms of learning become more costly, management will want more information not only on the performance of the learners, but on who is learning what, how many qualified (or certified) employees are available for any specific assignment. Organizations benefit from focused applications that manage learning, administration, tracking, and reporting functions. At the same time, employees need easy access to information to plan and manage their professional development. A variety of applications are available to help organizations manage course and learner administration, content, and key organizational information. In response to requirements such as those previously listed, three categories of enterprise applications have emerged.

Finding a way to organize, present, store and efficiently update these learning experiences is what has promoted the evolution of three enterprise-wide applications:

- ❖ Content management systems (CMS)
- ❖ Learning management systems (LMS)
- ❖ Learning content management systems (LCMS)

There are several challenges in supporting students' learning activities in e-learning systems. As there are constantly change in collection of course materials composed by author or instructor and course material also commented and edited by student too. So the collection of course materials in e-Learning should be flexible and adaptable in content representation. For the purpose of content management of learning resources and management of rights of learner and author, there are various tools available.

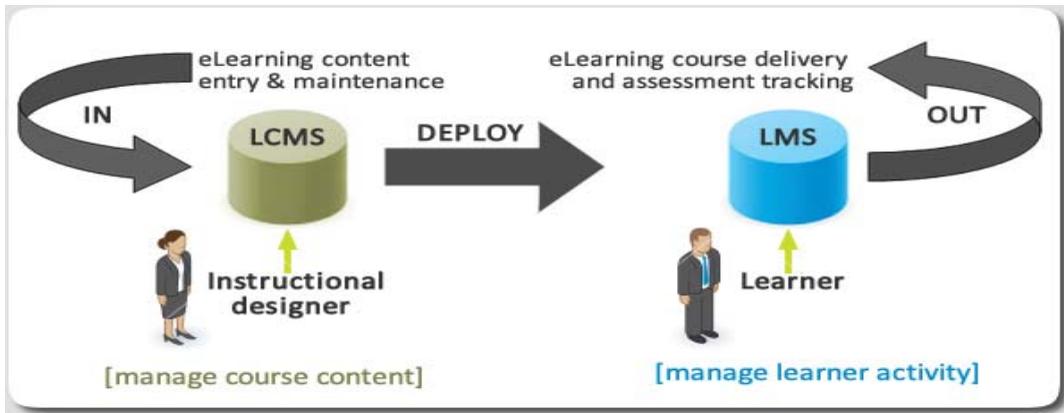


Fig. 1: LCMS

E-LEARNING

The “e-learning” was defined in alignment with a definition by Rosenberg. According to Rosenberg, the first and most important feature of e-learning is that it takes place in a networked environment. This means that computer of the learner is in constant communication with a central server. Also e-learning materials are accessible via an Internet browser on a personal computer. The growth of e-learning has also affected the way people learn and communicate in a learning environment, be it a traditional academic institution or in a corporate training setup.

This as a consequence has created a major change in the way educational materials are designed, developed, and delivered to those who wish to learn in a typical learning environment, there are several groups of people involved: authors and learners, which are the main players, and administrators and trainers. Authors may be teachers or instructional/learning content designers who create e-learning content by using an authoring system. People often get confused regarding the actual functions of a CMS and an LMS. The source of this confusion lies in the similarities of the two systems. Both perform the functions of enrolling learners, communicating with them, assessing performances, and activating learning materials. In this paper we will discuss in detail the content management, learning management and learning content management system in eLearning system. The paper is organised as below: The second section describes the extensive literature survey required for the implementation of the systems. The third section explains our proposed model known as LCMS.

CONTENT MANAGEMENT SYSTEMS

CMS or a Content Management System is basically designed to support educative or academic courses. It allows the instructor to create a course website, where documents can be uploaded in popular formats such as word, power point, etc. Without having to convert them to a web format such as HTML. This requires few specialized skills, thus making a CMS the ubiquitous choice of instructors. Instructors post the essence of the course that leads students through varied learning activities, after which the instructors supervise course discussions through the discussion board.

These procedures are designed to manage:

- ❖ Data access, based on user roles
- ❖ Collecting and sharing information
- ❖ Data storage assistance
- ❖ Content redundancy check
- ❖ Reporting

In a CMS, data is a term representing among others documents, movies, pictures, phone numbers or scientific information. There are several researchers have given the different ideas about the use of CMS as E-learning. In paper^[5] the extension of CMS as component based system of E-learning was given. In^[6] the composition of course material based on ontology is discussed. Like these there are several scenarios in which we can use CMS of E-learning.

Learning Management Systems

While teachers can continue to be highly effective with the traditional lecture-style instructional method, a new technological resource, that of web-based learning management systems (LMS), is spreading out. Research results demonstrate that, although innovation may build upon the technical prospects, concrete difficulties arise, caused by problems of incongruity at the level of the educational model (Griffiths, 2005; Laurillard, 2002; Jonassen *et al.*, 1998).



Typical learning management systems (LMS) integrate most common e-learning functions in a single application. An LMS is an integrated set of software/programs that automate the administration, tracking and reporting of online courses/programmes. It provides a centralised organisational approach to learning for scheduling of courses and registration of learners, and assessment of their learning outcomes.

Functions of LMS are:

- ❖ Centralise and automate administration
- ❖ Use self-service and self-guided services
- ❖ Assemble and deliver learning content rapidly
- ❖ Consolidate training initiatives on a scalable web-based platform
- ❖ Support portability and standards
- ❖ Personalise content and enable Knowledge reuse.

LMS were created for tracking registration, attendance class lists, grades, test results, class scheduling, other administrative requirements of schools and instructor-led classes. An LMS helps in running a learning organisation. It does not help create or deploy content. It does not track students through a particular course. It does not enable Tutors to communicate with the students.

Learning Content Management System (LCMS)

Remember that the goal of an LMS is to help administer learning-related activities and is focused on the course. Learning content management systems (LCMS) allow online content to be stored, managed, and reused through integrated database functionality. The LCMS is a “complex piece of software that labels learning objects then organizes and delivers them in infinite combinations”.

The core components of a LCMS are:

1. An authoring tool suitable for non-programmers;
2. A dynamic delivery interface that delivers content;
3. an administrative component that manages learner records, launches courses, and tracks progress;
4. a learning object repository that is a central database that houses and manages content (Donello, 2002, p. 1).

An LCMS captures information in a variety of original formats and packages it in a way That facilitates modularizing, elaborating upon, sharing, re-using, managing and presenting it in the context of training courses, an online reference library, online jobaids, presentations and other forms of business communications (Williams, 2002, para 4).

The following figure depicts the elements that comprise a typical LCMS. The content is created and stored in a repository that is accessed by the learning management system and distributed to the users (i.e., learners). The individual learner data is also managed by the system and is accessible to the individual user. So one begins to comprehend the integration of content, managing the content for distribution, and managing learner data.

COMPARING APPLICATIONS

Each of the three categories of enterprise-wide applications increases the amount of information available to decision makers. Applications in all three categories have individual. Capabilities that make them appropriate for specific situations. In addition, all of the applications should strive to meet certain criteria including:

- ❖ Authoring tool neutrality, meaning that content can be authored using any tool
- ❖ Vendor neutrality, meaning that the application can manage content authored by any vendor
- ❖ Browser neutrality, meaning that the application must appear and function the same no matter what browser is being used
- ❖ Platform neutrality, meaning that the application can run on any platform (PC, MAC, etc.) with any operating system (Windows, Linux, etc.)
- ❖ Scalability, meaning that the application can scale larger or smaller to meet the organization's needs; includes a firewall (hardware or software that provides security to a company's internal systems by blocking unauthorized access) and includes an intuitive interface.

The three categories of enterprise applications have many capabilities and features in common. Table 1 provides a summary of key features that organizations require to fully manage their content and learning function and indicates whether each is part of the functionality provided by a CMS, LMS and/or LCMS for LCMS and a limited (L) or no functionality for CMS or LMS. The list in Table 1 is a compilation of possible features from Donello (2002) and Hall (2003) and impact learners, content presentation, competencies, delivery assessment, and integration with other applications in the organization. Use this table as a guide to the information in the following sections.

Table 1: Features of CMS, LMS and LCMS

Feature	Functionality		
	CMS	LMS	LCMS
Manage Learners		R	L
Manage Content	R		R
Create Content	L		R
Manages Instructor-led Sessions		R	
Course Catalogue		R	L
Registration System		R	L
Competency Management		R	L
Launch and Track e-Learning		R	L
Assessment Creation, Evaluation, and Feedback		R	R
Searchable Library of Reusable Content	R		R
Collaboration / Synchronous Learning Tools		L	R
Integration with Human Resources Applications		R	
Locate and Deliver Specific Content to a Learner	R		R

4.1. COMPARING CMS AND LCMS

Recall that the focus of a CMS is on information storage and transfer, but not on getting Information to the virtual classroom door or managing experiences inside the classroom. In a corporate setting, a CMS “supports the creation, management, distribution, and publishing and discovery of corporate information” (Robertson, June 2003, p. 1). The CMS can streamline the authoring process, provide consistency, support decentralized authoring, and reduce duplication of information, which is similar to a LCMS. The difference is that the LCMS manages learning through a robust set of tools while the CMS manages discrete Pieces of information.

CMS create and manage content components defined as “the smallest self-contained piece of information” Recall that in the learning world, the smallest piece of instruction that makes sense on its own is often called a sharable content object or reusable learning object (RLO). These are managed as reusable learning content through a LCMS. Both CMS and LCMS can support knowledge management by capturing tacit and explicit knowledge in the form of examples, best practices, procedures, etc. sometimes called knowledge artifacts. These artifacts “are the currency for both knowledge management and learning/training work”. Knowledge artifacts (content components or sharable content objects) can be employed to ensure consistency of communication, information, and learning across national or global organizations. The use of a single content repository “ensures that organizations are consistent in spreading their learning messages to disparate audiences. Moreover, meta-tagging accounts for different languages when the audience is global”. With the content separated from the presentation layer, as the figures illustrate, localization of presentation is far more cost effective.

The primary difference between a CMS and a LCMS is that the former is a horizontal software application and the latter is a vertical market software application. The two are architecturally similar in that they take content through the entire process of organization, maintenance, security and protection. However a LCMS, as a vertical market application, requires development and deployment layers that cannot be addressed by the generalized content management features found in a CMS. A LCMS “combines the administrative and management dimensions of a traditional LMS with the content creation and personalized assembly dimensions of a CMS. The next section distinguishes the LMS from the LCMS.

Comparing LMS and LCMS

LMS focus on making learning available and tracking learners. LCMS focus on stored online content to be managed and reused through integrated database functionality. While there is some overlap in the functionality between a LMS and a LCMS, the two enterprise applications have a different focus:

LMSs make the process of scheduling classes, creating catalogs and registering learners more efficient. LCMSs on the other hand, focus only on delivery. In the broadest terms, the LMS helps get you to the classroom door and the LCMS manages the experience inside the classroom.

Table 2: Differences between LMS and LCMS

Learning Management Systems	Learning Content Management Systems
Used by training managers, instructors and administrators.	Used by content developers, designers and project managers.

Manage course catalog, schedule, student registration, and to capture learner profile data.	Author learning content as learning objects, practice and assessment items, simulations and other learner interactions.
Store data on courses and students.	Store content in a learning object repository.
Provide reports for training results and competency mapping/skill gap analysis.	Offer content management tools (e.g., search for learning objects, access rights and version control).
Support the launch to e-Learning courses.	Deliver learning content in multiple format (e.g. e-Learning, CD-ROM, paper-based materials and performance support).
Capture and track knowledge elements.	Develop multiple courses using RLO.
Share learner data with ERP system.	
Offer ability to create and administer tests.	Offer learning features (e.g. adaptive learning paths, skill gap analysis, asynchronous collaboration via email and discussion groups, assessment).

WHEN TO USE DIFFERENT APPLICATIONS

Understanding the functionality of the various applications enables one to make wise decisions about selecting the applications that best suit an organization's needs. Corporations and universities need applications to manage their learning administration, tracking, and reporting functions. At the same time, employees and students require easy access to the information needed to plan and manage their professional and educational development. In response to these requirements, enterprise applications have emerged over the last few years. Each of these applications focuses on addressing particular aspects of the challenge. The following table provides some ideas about when a CMS, LMS and/or LCMS may be the best option.

Table 3: When to use a CMS, LMS or LCMS

If you are primarily concerned with...	Then you ...
Managing student access and records for course ware that has already been developed.	Probably need LMS only.
Storing and disseminating content.	May be able to use CMS
Managing student records for courses developed within the LCMS.	May be able to use the LMS functions of your LCMS and may not need to purchase a separate LMS.
Capturing and tracking knowledge elements while reducing cost and increasing efficiency of classroom and e-Learning delivery.	May combine CMS and LMS
Developing multiple courses using RLO and needing to manage both online and offline learning events.	May need both LMS and LCMS in order to get the best system for both content authoring and course/student management

APPLYING CRITERIA TO SELECT AN APPLICATION – MANAGING E-LEARNING

The research department at Thinq (2003) believes that “Learning Management Systems (LMS) are critical

to facilitating the widespread adoption of e-learning”. To manage Learning on an enterprise-wide basis, an application would need to be able to store, launch, track, manage embedded learner assessments, and report on progress through e-Learning topics, lessons, and modules. An instructional designer analysed the needs of Think to first identify the e-Learning requirements and then match the requirements to the functionality of CMS, LMS or LCMS. The instructional designer reported possible options as shown in the following table. As can be seen, LMS had all the elements required to manage e-Learning effectively. LCMS had most of the functionality but were less robust, and CMS did not meet any of the eight requirements to manage e-Learning.

Table 4: e Learning Requirements

e-Learning Requirements	Functionality		
	R = Robust Functionality	L = Limited Functionality	
	LMS	CMS	LCMS
Manage Learners	R		L
Course Catalogue	R		L
Registration System	R		L
Competency Management	R		L
Launch and Track e-Learning	R		L
Assessment Creation, Evaluation, and Feedback	R		R
Collaboration / Synchronous Learning Tools	L		R
Integration with Human Resources Applications	R		

CONCLUSION

CMS, LMS, and LCMS could each be an appropriate solution depending on the needs of an organization. By clearly understanding the differences, the core functionalities of each, and the benefits of combining or keeping applications separate, training and education Professionals can help guide decision makers toward the best solution for the organization. Matching the right solution to meet the needs will help organizations effectively allocate their education dollars through focused applications to manage the learning, administration, tracking, and reporting functions.

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