Investigating the Need for a Learning Content Management System

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INTRODUCTION

Many businesses and institutions have fully embraced the world of eLearning. They have added a Learning Management System (LMS) and they are building up their repository of courses. Now they face the possibility of adding a Learning Content Management System (LCMS). They are asking, "What is an LCMS, and do we really need it?"

This is not a question that can be answered with a simple "Yes" or "No." The answer will vary from one group to another. Before an answer for this question can be obtained, research into the background, role and use of the learning management system as well as its interaction with the learning management system must be conducted.

Before the arrival of the LMS and LCMS, authoring tools were being used to develop computer-based training (CBT) for delivery on data CDs. Authoring tools led the way in the development of web-based training (WBT). Corporations and academia started developing their own learning management systems to track student progress and manage their learning objects. One major problem for these learning objects was the lack of reusability among different learning systems. In 1997, the U.S. Department of Defense, through its Advanced Distributed Learning initiative (www.adlnet.org) developed a reference model to standardize and modernize training and education management and delivery. This was known as the Sharable Content Object Reference Model (SCORM). It became the standard for all LMSs.

LITERATURE REVIEW

Learning Management System (LMS)

LMS is software that automates the administration of training events. All LMS systems should manage the login of registered users, manage course catalogs, track user activities and results, and provide reports to classroom training and student collaboration tools such as chat, discussion groups, etc. (Hall, 2011). Many educational institutions use an LMS to manage either courseware and/or the entire student records system (Douglas & Schaffer, 2004).

Although the implementation of an LMS is an important tool for strategic deployment of learning and the long-term benefits are important, it doesn't guarantee that a company will actually deploy eLearning. Many organizations with extensive, well-established classroom training functions use the LMS to enroll students in classroom-based events, manage face-to-face training, and report on progress. The LMS will typically launch a library of custom or generic eLearning courses, but it doesn't provide any mechanism to easily create and deploy internally developed courses (Robbins, 2002).

Repository

An effective LMS is independent of the course content leaving the courses to reside in a repository. This independence gives the courseware flexibility to move from one LMS to another with little effort.

The purpose of repositories is to support courseware developers, students or problem solvers by providing a centralized location for the storage and reuse of learning objects.

The intent of providing users with a repository is to create an easier, adaptable, and reusable analysis, design, and development process. This process would also support the development of organizational problem-solving capacity and ultimately link to the identification of solutions (Douglas & Schaffer, 2004).

Many times the bridge between the LMS and the repository is the LCMS.

Learning Content Management System (LCMS)

LMSs are to manage learners, tracking their progress and performance while LCMSs manage content or learning objects to "serve up to the right learner at the right time" (Chapman & Hall, 2001). LCMSs typically include content-development tools, being in effect a new iteration of the long series of attempts to bring authoring tools into mainstream use for computer supported learning. "Content assembly" and "publish learning" into different "output formats" are key tasks of LCMSs (Chapman & Hall, 2001).

There are dozens of LCMS packages with diverse features. Some of them are commercial software while others are free, open source (Itmazi, 2005). Examples of open source include the Burrokeet LCMS, the Basic e-learning Tool Set (BELTS) and to some extent Moodle. The commercial products can cost from $100,000 to $500,000 (Chapman, 2001).

LCMSs are the corporate version of traditional course management systems that were initially developed for higher education. These systems are designed to enable subject matter experts, with little technology expertise, to design, create, deliver, and measure the results of eLearning courses rapidly. LCMS applications offer organizations a scalable platform to deliver proprietary knowledge to individual students without bearing a prohibitive cost burden (Robbins, 2002).

Courses don't necessarily require the use of a LCMS. Many authoring programs are now SCORM and/or AICC compliant. These authoring programs package the course and can load it to the repository. Many other software applications (such as Adobe and several Microsoft products) support SCORM standards as well.

Where do LCMSs fit between the LMS and the authoring tools? What is hype and what is reality?

Robbins (2002) defines a good LCMS is an enterprise platform that moves beyond simple content authoring, storage, and delivery to include:

- Easy-to-use content automated authoring applications
- Flexible course design and delivery and support of standard authoring tools
- Support of reusable learning objects
- Open interface with an LMS including the ability to download employee, member, or customer information and upload performance and completion data. These interfaces must support basic integration formats as XML and

industry standards (SCORM and AICC)

- Ideally, the ability for learner collaboration, coaching by subject matter experts, and the creation of learning communities.
- Enterprise security to protect content and user data.
- Facilities for content migration.

Robbins also included other features for the LCMS which would more accurately be delegated to the LMS.

The LCMS can help the instructor be aware of resources that are available (Collis & Strijker, 2002) by locating reusable solutions if any exist, or supporting the design and development of SCOs to be packaged into a performance support system (Douglas & Schaffer, 2004).

A major challenge to developing such systems has been the degree to which they are interoperable and the components within are reusable. Interoperable systems "talk" to one another and data or information developed in one will be recognized by another. Reuse of data or information for learning or performance solution development is considered the primary driving force behind the movement toward object-based architecture for such systems (Douglas & Schaffer, 2004)

The real separation between authoring programs and the LCMS is reusable learning objects. The LCMS provides a linkage between courses. How important is this feature and is it worth it?

Learning Objects

Learning objects are the raw material of the LCMS. They are a type of knowledge object. Objects, by definition, are self-contained and reusable. To be re-usable, its content and presentation are separated. Learning objects are types of knowledge objects in the sense that their goal is to provide knowledge in support of an associated learning objective (Cohen, 2006).

There are two kinds of learning objects defined in SCORM. One is asset, and the other is sharable content object (SCO). SCORM 1.2 defines a SCO as "a set of representations of media, text, images, sounds, web pages, assessment objects, or other pieces of data that can be delivered to a web client."

Assets are digital media such as text, images, sound, assessment objects, or any other piece of data. Each SCO is composed of assets or other SCOs. To increase reusability and interoperability of learning objects, metadata can be defined for each such as who created it, who owns it, to which standards version does it conform among others (Chou, Horng, Lu & Yu 2010; Ramnanan, 2006).

The Learning Objects are packaged into SCORM or AICC compliant content packages, providing a content manifest and support for metadata describing the course. This allows for optional metadata for the content objects and assets described in the manifest. It also includes metadata for the sequencing of content which can determine the order which a learner may experience content objects (Ramnanan, 2006).

Re-Usable Objects

The concept of "reuse" is not the primary aim is finding "instructional" content from elsewhere, but rather one with a strong orientation toward learning from experiences, both individual and others. This involves moving from thinking of learning as acquisition of predetermined content, toward incorporating learning as participating and contribution to the learning experience in a way that can be reused by others (Collis & Moonen, 2001; Collis & Strijker, 2002; Sfard, 1998).

The process technology that has lagged is the pedagogy and design thinking required to make all of this digital information reusable and value-added (Clark & Mayer, 2002).

When developing objects, it is not sufficient to have object-oriented technologies and standards alone; it is also necessary to incorporate analysis and design thinking. By integrating object orientation and analysis, a higher level of reusability as well as adaptability, interoperability and durability may be achieved (Douglas & Schaffer, 2004).

Metadata

To make a learning object reusable it is important to make it searchable. This is achieved by associating metadata with each learning object.

Metadata, generally defined as structured data about data, is helpful to the efficient discovery and reuse of digital assets. In the case of learning objects, metadata describes to the outside world the purpose the object serves, the way to access and activate the object, and the way to use it in the context of the desired knowledge. A learning object is generally defined as a digital resource containing content to facilitate learning (Douglas & Malaxa, 2005).

To ensure that the criteria exist within an object, metadata are "tagged" to each asset, SCO, and/or content aggregate to ensure that during the process of content creation, the information within each is reusable as well as discoverable (Douglas & Schaffer, 2004).

Discovery and reuse of digital assets, particularly non-textual assets, benefit from the availability of human-created metadata. The main challenges to human-created metadata noted in the literature is the potentially high cost of production in terms of human effort, time, money, and the errors and inconsistency that occur (Geisler, McArthur, & McClelland, 2002; Marshall, 1998). The overhead involved in creating and managing metadata is a potential barrier to the successful use of metadata to facilitate reuse and sharing (Douglas & Malaxa, 2005).

A number of studies demonstrate that entering complex metadata efficiently, accurately, and consistently can be confusing, costly, time consuming and error prone (Greer, 2002; Brase, Kunze, & Nejdl, 2002; Marshall, 1998). Inconsistencies in metadata assigned to resources can arise due to variations in a given cataloger's judgment over time and because different catalogers may make varied judgments in cataloging resources (Douglas & Malaxa, 2005).

Kunze, Brase, and Nejdl (2002) report that most editors or viewers for metadata learning resources concentrate only on the current standard and lack flexible structure to adapt to new standards. This suggests the need for flexible learning object metadata tools that are able to adapt to future metadata models or current extensions.

The quality of metadata was influenced by the user's interpretation of the metadata elements

and their values. These misinterpretations led to some meaningless metadata. Some users entered the keywords one by one, while others input all the keywords in one element. This issue would have proved significant when it came to searching for the learning objects in a collection (Douglas & Malaxa, 2005).

Conclusion

From this research we can see the functions of an LCMS can be delegated to either the LMS or the authoring program. The only feature they can't support is reusable learning objects.

The effort involved in maintaining and cataloging learning objects calls into question its usefulness.

More research needs to be conducted to see if the effectiveness of reusable learning objects is obtainable. If not, what is the future of LCMSs?

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