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MANAGING DIGITAL LIBRARIES: THE VIEW FROM 30,000 FEET

Digital learning object repositories

H. Frank Cervone
Information Services, Purdue University Calumet, Hammond, Indiana, USA

Abstract

Purpose – This paper aims to provide an overview of the issues related to developing a digital repository for learning objects. Given the unique nature of digital learning objects, compared to other types of digital materials, several factors must be considered when establishing a learning object repository.

Design/methodology/approach – The conclusions of the paper are drawn from a review of the current state of the learning object repository market.

Findings – The issues related to creating digital learning object repositories are, in some cases, significantly different from those in creating "traditional" digital repositories. Staffing, metadata, and use considerations must be carefully considered in this unique environment.

Originality/value – This paper fills a gap in the current literature by providing a general overview of the current state of software and related practices in the learning object repository area.

Keywords Learning object repository, Digital repository, Digital libraries, Online teaching and learning, Institutional repositories

Paper type Viewpoint

Most digital repositories in academic institutions are focused on "traditional" materials such as theses, dissertations, images, video, or data sets. While these materials are useful to the researcher and in the classroom, faculty teaching in the online environment often express an interest in developing a common set of learning materials that can be reused in across courses. Consequently, many institutions, especially those with robust online learning environments, have a need to store, maintain, and disseminate digital learning objects with their learning management systems.

Traditional repositories often do not meet the needs of faculty because the issues related to creating a learning object repository are different from those of a traditional repository. For example, when creating a learning object repository the design team must be drawn from all areas of the institution and not primarily from the library. For a digital learning object repository to be a success, various constituent groups must be involved from the beginning. This typically includes information technology staff, teaching and learning experts, instructional designers and, of course, teaching faculty at the institution.

Storing, maintaining, and developing materials in a learning object repository requires a set of functions and capabilities that are not necessarily found in traditional digital repositories. For example, simple versioning of objects is not sufficient. Objects in a learning object repository must be designed for reuse, implying that the objects need to be created in ways that will permit use in multiple contexts such that

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reinvention of duplicative material is minimized. At the same time, a learning object repository must provide mechanisms for creating multiple instances of an item in those cases where customization of the object is a requirement. Additionally, these divergent instances of the original object have to be tracked and maintained in a way that they can be clearly related to their originating object in perpetuity.

Other common requirements involve social functionality such as enabling user comments. In addition to facilitating communication about how items are used and their applicability in various contexts, social functionality allows for the creation of trust networks within the institution to provide instructors with reference points that can be built upon in the future. Given that a repository is only as good as its content, this is an important consideration. For example, within the MERLOT repository (www.merlot.org/merlot/index.htm), this is enabled through "discipline-based communities." Comprised of faculty with expertise in various subject areas, social functionality is used to provide evaluation and peer review of learning materials with assessments of the quality of content, potential effectiveness as a teaching tool, and ease of use provided by the community. Additionally, an informal review process is also enabled which allows individual members of the community to submit comments regarding their experience using learning objects as well as provide examples of contexts where a learning object might be especially useful.

Another way learning object repositories differ from traditional repositories is how materials are organized within the repository. Learning objects require an intuitive organization of materials using various discovery approaches such as keyword, topic/subject, educational level, type of resource (online tutorial, assignment, animation, quiz, etc.) as well as format (PDF file, PowerPoint, jpg, Flash animation, etc.). For faculty to understand the possible use or reuse of an item, metadata information must include several aspects outside the scope of traditional bibliographic schemes such as: learning objectives, intended audience, special software requirements, deposit date, percentage of content that is specific to a particular context (essentially a measure of potential reusability).

As far as content in the repository, materials in the repository should be free of copyright restrictions or governed by a Creative Commons license. Doing so minimizes many of the issues related to reuse and remixing of learning object content. Additionally, to make object reuse simpler, objects should be developed using universally accepted, standard formats, such as Open Document Format (ODF, www.oasis-open.org/committees/tc_home.php?wg_abbrev = office) or HTML5 (http://dev.w3.org/html5/spec/Overview.html). This will allow content to be accessible across a wide variety of hardware platforms. For example, Flash animations have been commonly used to create learning objects; however, Apple has decided not to support this environment on their mobile devices, such as iPads and iPods. Consequently, Flash learning content is unusable to the population of users with these types of devices.

Traditional repositories, such as DSpace, can be used for simple learning object repositories. However, traditional repositories do not inherently provide the levels of support for learning object standards, such as those established by IMS (IMS Content Packaging Specifications www.imsglobal.org/content/packaging/index.html; IMS Metadata Standards www.imsglobal.org/metadata/) and ADL (Advanced Distributed Learning Initiative, www.adlnet.gov/) that are typically required. Standard support within repositories specifically for learning objects is, however, highly variable and different products tend to offer distinct features not found in others. Perhaps the most important aspect is support for SCORM (http://legacy.adlnet.

gov/Technologies/scorm/SCORMSDocuments/2004%204th%20Edition/Overview.aspx) and metadata for describing materials, such as IEEE LOM (Learning Object Metadata, http://ltsc.ieee.org/wg12/files/LOM_1484_12_1_v1_Final_Draft.pdf) and rights expression languages, such as ODRL (Open Digital Rights Language, http://odrl.net/). Without this support, the repository cannot communicate the nature of the content of the learning objects to a learning management system.

As has been the case with general repository software, such as EPrints, DSpace, and Fedora, most learning object repositories are also open source software. The three most commonly used learning object repository software include:

(1) DOOR (Digital Open Object Repository, http://door.elearninglab.org/website/index.php) is a project of the Università della Svizzera italiana (University of Italian Switzerland). Using a hierarchical object model, DOOR complies with the IMS metadata and content package specifications. Additionally, it is fully integrated with the Moodle learning management system.

(2) Ariadne, which is a project of the European Union, is a modular, three-tiered repository system for learning objects. The default distribution provides interfaces to both Moodle and Blackboard; however, the modular approach used in Ariadne allows the implementing institution to replace both the searching interface as well as the publishing interface. By doing so, it is possible for an institution to implement common search and publishing interfaces that work across all repository platforms.

(3) Rhaptos is the repository software upon which *Connexions*, one of the largest learning object libraries, is built. Rhaptos is a complete solution that provides facilities for creating, using, modifying, and reviewing learning objects (http://cnx.org/). Rhaptos facilitates tracking the provenance of materials by creating permanent versions of all materials placed in the repository.

The issues related to implementing learning object repositories have existed for for about as long as libraries have been implementing more generalized repositories. However, given that many of the issues related to long-term storage and use of learning objects are unique to these types of objects, development and implementation of learning object repositories has been slower than other types of repositories. In some cases, learning object repositories are integrated into learning management systems but often that integration comes at the expense of long-term flexibility. Additionally, at small institutions it may be difficult to generate enough momentum to create a repository of objects that is robust enough to provide for common curriculum needs. In those cases, implementing an inter-institutional repository may be the best approach. Regardless of the circumstances at an institution, there are many options available that can provide the level of functionality necessary for an institution to catalog, maintain, and use their digital learning objects.

Corresponding author
H. Frank Cervone can be contacted at: fcervone@purduecal.edu