Learning Object Repositories: How useful are they?

Michael Verhaart
Eastern Institute of Technology, Hawke's Bay, NZ
mverhaart@eit.ac.nz

The packaging and distribution of learning content into learning objects is increasingly being discussed as a natural evolution. Such packaging and distribution allows the distribution of a variety of learning materials with lower production and delivery costs.
There is a view that the learning object will allow both educators and learners to individualise their material to best align with their teaching and learning styles, though customization raises some interesting issues.
Groups and organisations are collecting learning objects in electronic repositories, thus enabling their sharing across the world. Products such as Blackboard allow learning objects to be integrated within its learning management system.
This paper looks at the terminology and standards of learning objects and reviews some existing learning object repositories, discussing their usefulness in relation to providing course content.

Keywords

Learning Object, Repository

1. INTRODUCTION

With the wide adoption of the web as a delivery mechanism for learning, its underlying standardization that allows for platform independent delivery has created a technology that enables sharable learning resources to be developed. A unit of learning can be described in many ways, from a course of study (such as a degree), a paper in the course, a lesson in the paper, or a concept in a lesson. Online learning objects exist and interoperate at different levels of granularity. McGreal and Roberts (2001) describe the simplest level as the information object or component, which could be a simple text, a photograph, a video clip, a 3D image, a Java applet or any other object that might be used for learning. It becomes a learning object when a lesson is added to it, and is typically less than 90 minutes. Longer learning experiences or groupings of lessons that typically are less than 10 hours are considered to be modules. When lessons are longer than 10 hours or consist of more than one module, they are considered to be a course. A group of courses that lead toward a certificate or diploma are considered to be a programme. These are all learning objects (LOs) at different levels of granularity.

If a LO is to be sharable, then it needs to have some attached information that enables an instructor or learner to determine whether the unit is appropriate. For example, a paper will have a title, duration, probably a brief description, and so forth. This is the meta-data, and is an essential component in creating a sharable resource.

A unit of learning can consist of many things, for example, objectives, content, assessments, further study links, and so forth, and can in a computer-based electronic sense be made up of one or many electronic files. In order to distribute the unit to send to another lecturer, the files can be zipped, together with a meta-data file that describes what the unit is for and what files are included.

2. LEARNING OBJECT TERMINOLOGY

There is still some debate as to what constitutes a learning object. A Learning Object (LO) is defined by IEEE (1999) as any entity, digital or non-digital, which can be used, re-used or referenced during technology-supported learning. Examples of LOs include multimedia content, instructional content, instructional software and software tools that may be referenced during technology supported learning. In a wider sense, LOs could even include persons, organizations, or events.

Figure 1: Interrelationship of a learning object, metadata, and a learning content management system (LCMS).

Mortimer (2002) describes a LO as a piece of content that's smaller than a course or lesson, and is one of three interdependent components.

- The learning object itself.
- Meta-tagging, or the standardized way to describe the content in code.
- A learning content management system (LCMS) that stores, tracks, and delivers content.

This is illustrated in Figure 1.

3. LEARNING OBJECT STANDARDS AND CREATION.

In order to be sharable, learning object meta-data needs to be standardized. There are several meta-data schemes that have gained widespread acceptance. The most common are IEEE LTSC LOM, SCORM and IMS. SCORM. Nugent (2004), an e-Learning designer recently commented on the CETIS List Server (CETIS-ECSIG) that, the commercial sector is pretty much SCORM (or even AICC), and believed this was partly due to the big LMS vendors, Docent, Saba etc. having adopted these specifications in the early stages of e-Learning development. The Centre for Educational Technology Interoperability Standards (CETIS) is a United Kingdom group that develop meta-data standards for learning objects.

Tools are now appearing that enable authors to build learning objects. The RELOAD project is one such example, and is developing tools to facilitate the use of emerging Learning Technology Interoperability specifications such as those produced by ADL and IMS.

4. LEARNING OBJECT REPOSITORIES

LO repositories can be classified in two ways; as:

- containing downloadable LOs that can be inserted into a LMS or
- a database containing meta-data that links to the actual LO.

4.1 Meta-data databases with links to web based LOs

The following list has been derived from Baker and Owen (2003) and other sources. Each is considered to be collections of web-based multimedia LO resources:

- MERLOT, Multimedia Educational Resource for Learning and Online Teaching (http://www.merlot.org), founded by CSU and now a partnership of approximately 25 institutions. MERLOT is a free and open resource designed primarily for faculty and students of higher education. Links to online learning materials are collected along with annotations such as peer reviews and assignments

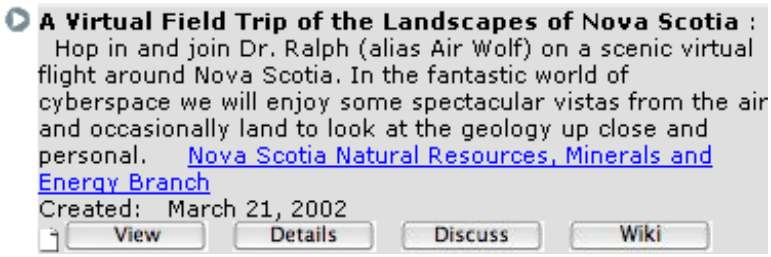

Figure 2: CAREO Learning object meta-data

■ GEM (http://www.geminfo.org), is sponsored by the U.S. Department of Education. GEM is a consortium effort to provide "one-stop, any-stop" access to the substantial, but uncatalogued, collections of Internet-based educational materials available on various federal, state, university, non-profit, and commercial Internet sites.

■ CAREO: Campus Alberta Repository of Educational Objects (http://careo.ucalgary.ca/cgi-bin/WebObjects/CAREO.woa). CAREO holds in excess of 4,000 LOs. Some of the newest and most popular are available to preview and a username is required to access the complete repository. The system is built as a place to view and run LOs as well as the ability to comment by discussion of wiki. Figure 2 shows sample meta-data for one LO.

■ LALO: Learning About Learning Objects (http://www.learning-objects.net). There are 127 objects and 81 categories in the database. There are none listed in the Information Sciences or Computer Science sections and no metadata standards are evident.

■ Edusplash (http://www.edusplash.net/default.asp?page=Home). The Portal for Online Objects in Learning (POOL) Project is a consortium of several educational, private and public, sector organizations to develop an infrastructure for learning object repositories. The site searches multiple LO repositories.

■ VCILT Learning Objects Repository which is hosted by the University of Mauritius (http://vcampus.uom.ac.mu/lor/index.php), maintains Meta-data about web based resources.

4.2 Downloadable LOs

While reviewing LO repositories it was discovered that there are very few actual repositories containing complete LOs as defined by existing standards, that is, a package containing the LO and metadata. Fortunately as a potential LCMS Blackboard provides an environment that can be used to integrate LOs. The term adopted by Blackboard is a Cartridge and has been adopted by many major book publishers such as Prentice Hall (http://cms.prenhall.com/blackboard). As at May 2004 there were approximately 30 listed publishers of Cartridges. The Blackboard web site (http://cartridgecatalog.blackboard.com/catalog/) describes what they are and has a list of approved publishers. Given that multimedia produces 3 hits and database 7 is an indication that this is in the emerging technology category.

Blackboard can also export to a LO using Control panel > Export Course. This creates a package that conforms to the IMS LO package specification.

5. HOW USEFUL ARE THEY?

The alternative to a LO Repository is an Internet search engine where a topic is found by using key words. In order to answer the question: *How useful are they*, LO Repositories will be compared to a standard Google search.

To make the exercise more realistic two topics in different domains were investigated. Firstly, in multimedia it is important that images can be resized, for example to reduce download size when sending across the web, or in a Multimedia presentation to prevent the presentation becoming unnecessarily large. In order to provide a meaningful analysis, resizing JPG files only will be considered. The second topic is a little more technical, and involves the in teaching of Database Normalisation to the third normal form. Spelling can play a significant role in returning valid search results, so to cope with both English and American variations, normalisation and normalization (z) were used.

Table 1: Search results from LO repositories

Repository	image	image+jpg	image+resize	normalisation/normalization
Merlot	405	0, image + resize	0	0/8
GEM	446	1 – but not appropriate	0	0/0
CAREO	100	x	100	0/0
LALO	6	x	x	0/0
Edusplash	100	x	100	errors!/3
VCILT	0	x	x	0/0

5.1 Repositories

Table 1 shows the results of searching the LO Repositories listed earlier. The search keywords *image, image+jpg, image+resize* and *normalisation/normalization* were used. Note that an "x" is used where it was determined that this would not produce any useful results, for example if image produced no results image + jpg would also not give any useful results.

The following observations were made while reviewing the repositories.

- Merlot Linked to standard web resources, and no additional resources such as assignments were available for those found. It produced the best results in this set of repositories.
- Gem produced no useful results
- CAREO and Edusplash appeared to produce the same search results even when additional keywords were specified.
- LALO for image produced 6 hits, one was almost relevant.
- Edusplash. Of the 3 hits for normalization none of the links to the actual content worked. Normalization (with an s) produced search errors. A search through the actual LO list indicated that it would be possible to discover some relevant content.
- VCILT (University of Mauritius). As the repository only contained meta-data then linked to actual web sites, searching on keywords did not give filtered results. If the links were followed it is likely some useful content would be uncovered.

5.2 Blackboard cartridges

Normalisation is covered by Hoffer, *et al* (2002) in Database Management Systems. This book has associated LOs and is available as a cartridge from Prentice Hall for Blackboard: A preview of this shows that a set of Powerpoint presentations make up the downloadable LO. In order to download the full LO, a registration process is required and in spite of an assurance of two day turnaround for the keys a month later and a second try a response has only just been received. The key needs to be approved by the local Prentice-Hall agent, and this is in the process of being followed up.

5.3 Google searching

Using *JPG Image resize* produced 339,000 hits. The resulting page provided links to software that could be used for resizing, and the third item discussed resizing in Photoshop. Adding an image editing product to the search criteria further narrowed the selection. For example, adding PaintShop Pro (PSP) gave 2,960 hits with the first item a PDF file explaining how to resize in PSP. Using *Normalisation Database Introduction* produced 21,100 hits. The sixth item was a brief textual tutorial with examples from Wyllys, R. (2002). In both cases adding

"Learning Object" to the search criteria did not produce a link to an actual learning object package (LO and meta-data).

6. CONCLUSION

If the vast body of current theoretically based literature is synthesized, it could be concluded that there are repositories containing packaged learning object materials that could be used in a personal or corporate Learning Content Management Systems. This is true for targeted LCMS's such as Blackboard or WebCT. However, it appears that the Repositories have taken a different direction and have become records of meta-data stored in a database. Indeed, recent discussion on the IFETS list server indicated that many of the participants viewed a LO Repository in this way (von Brevern, 2004, Mason, 2004 ,Dubois, 2004).

When this paper was first considered preliminary research indicated that the goal of re-usable learning objects was fast becoming a reality. What the research discovered was that many of the Learning Object Repositories have evolved into database portals that provide a taxonomy in which a short, meta-data description is provided that relates to an external link. At this point in time it would seem that Internet searching produces better results than those obtained through learning object repositories.

ACKNOWLEDGEMENTS

The author would like to thank Dr Art Thomas for his review and comments for this paper.

REFERENCES

ADL SCORM (http://www.adlnet.org/Scorm/)

Blackboard Course Cartridges (2001). Retrieved May 06, 2004, from http://cartridgecatalog.blackboard.com/catalog/

Baker, J., & Owen, K. (2003). About the Learning About Learning Objects (LALO) Project. Retrieved 2004, May 5 from http://www.learning-objects.net/modules.php?name=Content&pa=showpage&pid=1

CETIS, the centre for educational technology interoperability standards (http://www.cetis.ac.uk)

Dubois, J-M. (2004, May 6) Re: Learning Object Repositories. Message posted to

Hoffer, J., Prescott, M., & Mcfadden, F. (2002). Modern Database Management. (6th ed.) Pearson Education Inc, New Jersey. http://www.prenhall.com/hoffer

IEEE Learning Technology Standards Committee (LTSC) LOM (http://ltsc.ieee.org/index.html)

Learning About Learning Objects.(2003). Retrieved 2004, May 5 from http://www.learning-objects.net/modules.php?name=Web_Links

IMS (http://imsproject.com)

Learning Technology Newsletter (2004, April), Vol 6, Iss 2, IEEE Technical Committee on Learning Technology (TCLT). Retrieved 2004, April 23 from

Mason, C. (2004, May 6) Re: Learning Object Repositories. Message posted to

Metadata. (n.d.) Retrieved June 15, 2002, from

Mortimer, L. (2002). (Learning) Objects of Desire: Promise and Practicality. Retrieved June 15, 2002, from http://www.learningcircuits.org/2002/apr2002/mortimer.html

McGreal, R., & Roberts,T. (2001). A Primer on Metadata for Learning Objects. Retrieved November 14, 2001, from

Nugent, S. (2004, May 7). SCORM in the commercial world. Message posted to CETIS list server. CETIS-ECSIG

RELOAD: Reusable eLearning Object Authoring and Delivery (http://www.reload.ac.uk/)

von Brevern, H. (2004, May 6) Re: Learning Object Repositories. Message posted to

Wyllys, R. (2002). Overview of Normalization Database Management Principles and Applications. Retrieved from http://www.gslis.utexas.edu/~l384k11w/normover.html.