

Learning Object Repositories an Emerging Knowledge Management Tool for Sharing and Reusing Learning Resources

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Abstract

In today's knowledge-driven society, libraries attached to the academic institution are finding it very difficult to manage their knowledge resources and cope up with ever changing and diversified demands of the user community of the academia. Knowledge resources have gained importance and hold the key to scholarly teaching, research and learning environment. Against this backdrop, Resource Learning Centers(RLC) want to equip their students, research scholars and teaching faculties with necessary skills to make them ready to take on the challenges of an ever-evolving society. This requires an educator who is no longer only 'dispenser of knowledge' but also a 'facilitator of learning'. A Learning Object (LO) is a 'modular digital resource', a discrete piece of content that has educational value. Learning objects that are stored in database or archives are called Learning Object Repositories (LOR). Faculty members, research scholars and students can make use of these LOR simultaneously and within and between RLCs / academic institutions and enhance the equality of teaching, research and learning process. This papers highlights the concept of LOR and discusses the need for LOR in the RLCs for effective teaching, research and learning. It explores some other practical problems emerging in this context , like academic community participation, quality of learning objects, quality of metadata, etc.

Introduction

Information Technology (IT) era is era of global competition where the society is fueled by knowledge. In order to meet the modern challenges of the new education, research and training needs of this society RLC/ library have to cope up to the shifting demands of the institutions and the changing aspirants of the students, research scholars and faculty members.

There is need to teach, guide differently to embrace new ITs and exploit effective ways of teaching, research and learning. Past research provides ample evidence to show that *how* faculty teaches is as important as *what* the faculty teaches, not only in terms of its

impact on the process skills the student develop, but also in terms of the content information that they learn. The goal must be to equip students and research scholars with well developed skills that enable them to be lifelong learners, ready to face the challenges of an ever-changing global society. Developing the IT skills in students and research scholars for an educator who is a 'facilitator of learning' and no longer only a 'dispenser of knowledge'.

In a IRC, collection of resources alone cannot provide the perfect guide to creating such a learning environment, there are resources that can help us as we consider new ways to teach and to facilitate learning, knowledge sharing and management.

Digital repository

A digital repository or a "collection of digital objects" is where digital content are stored and can be searched and retrieved for later use. The term 'repository' is used to emphasize the fact that many people may contribute digital objects to be shared among a community. Digital repositories may include search

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outputs, journal articles, theses, learning objects, audiovisual objects, presentations, learning materials and research works.

Learning Objects (LOs)

A Learning Object (LO) is any piece of information that can be used to contribute to a learning experience. LOs are produced by bringing together subject knowledge and pedagogical expertise of the knowledge developer. An LO can be a single page of text, a graphic animation or simulation with some learning objective. Alternatively it can be a composition of other LOs.

LO can be defined as “any digital resource that can be reused to support learning” [1] and an independent and self unit of learning content that is predisposed to reuse in multiple instructional contexts” [2]

LOs are building blocks of learning. This is a little bit like building a house. Two different houses may contain many of the common elements such as the type and number of doors or windows but everyone doesn't want exactly the same house. LO recognizes that it is important to be able to tailor each house based on individual needs but that there are many common elements that the builder can reuse across different houses.

Metadata and standards

Metadata is “structured data which describes the characteristics”. It shares many similar characteristics to the catalogue that take place in libraries, museums and archives [3]. Metadata is the information about the learning about the learning object that identifies it. For example, labeling makes it easy to identify which ice cream is inside a container without having to open up the container and look inside. The type of ice cream (content) in the ice cream container (structure) is identified by the labeling (metadata).

Metadata is used to describe what the learning object contains; metadata is what makes the LO reusable.

Learning Object Repository (LOR)

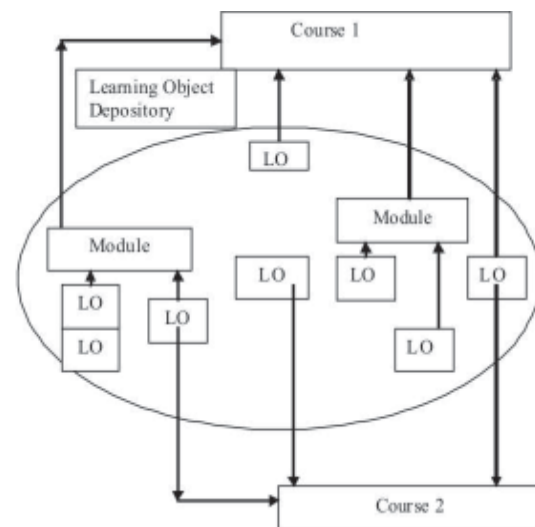
A Learning Object Repository (LOR) is a large area for objects that enables users to

find and reuse learning objects (Hatala and Nesbir, 2001). In the case of the ice cream container, the repository would be a refrigerator. The refrigerator holds many objects of different types. How organized the refrigerators is results in how easy it is to find what is inside.

A repository is a database designed to hold structured documents (Figure 1). It

includes features such as search, edit, access control, reuse of elements within other documents through reference. Once the repository is populated with learning objects clearly identified by associated metadata,

Figure 1 A Learning Object Repository



Source : Tan Daniel , Et al (2003)

there exists a bank of information to draw upon. This bank-LOR may be only within an institution or may be part of a boarder

Community of institutions LORs are key technologies for permitting sharing and reuse of learning materials.

Need for LOR in Academic Institutions

While creating the teaching material, the faculty usually gathers information from a

wide variety of resources like books, the internet etc, assimilates the information and constructs the actual teaching material. Every faculty does the same information gathering and assimilation process individually, and the end result is usually not reusable by other faculties. The teaching material could be course notes, examination

Papers, exercises, assignments simulations, powerPoint presentations or anything used in the teaching process.

Every faculty stores information in his/her own folder, and only they know how and where they have stored information. The information is not shared colleagues and it is lost if the faculty is disorganized, the periodicity of courses is long or when the faculty

Leaves the organization.

Each faculty uses his/her own materials but would like to know about the reuse material his colleagues are using. If the learning material but would like to know the reuse materials his colleagues are using. If the learning material can be shared and reused, it will not only save time but will also give different view points on the same subject area. Such a reuse will save time, which be a real benefit or teachers to have access to additional material when student react unexpectedly to the planned course. Of course, differences in teaching styles and methodology of differences faculties teaching the same subject, brings variety and creativity to a classroom.

There is a need to develop a learning object Repository (LOR) in academic institutions to ensure:

- Sharing and reusing digital objects.
- Access to a variety of leaning materials.
- Improve the quality of the leaning experience.
- Cater to different learning and teaching styles.
- Minimizing the cost of creating and providing access to resources.
- Ensuring he long-term sustainability of digital resources.

- Sharing learning materials within and digital institutes.

LORs are underpinned by the concept of interoperability and a growing awareness of the need o optimize the alue of resources created within educational institutions.

LORs offer a means by which institutions can break the cycle of individual silos of

Digital content by establishing a common store he access for all. Repositories can ensure the availability of content o improve the quality of learning experience and cater to different learning, and teaching styles. They can also stimulate a culture change in teaching and learning, as teachers review how hey deliver their courses and forces on how to improve the learning experience.

Learning Object Repository (LOR) Architecture

There are two major types of LORs : Repositories containing both the learning objects and learning object metadata. These repositories may be used to both locate and deliver the learning object.

Repositories containing metadata only: The learning objects themselves are located at a remote location and the repository is used as a tool to locate learning objects.

Some Learning Object Repositories are stand alone

They function a lot like pottals; They contain a web-bases user interface, a search mechanism, and a category listing.

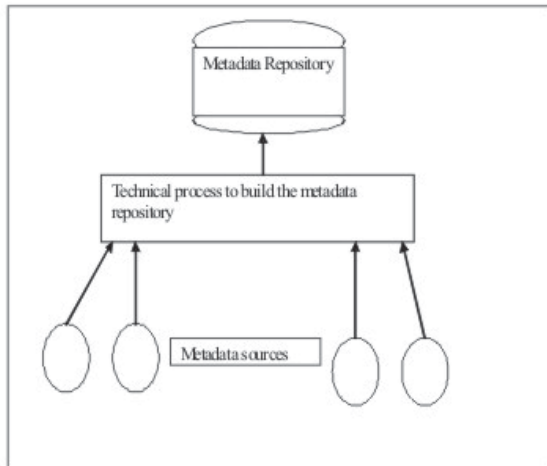
Another class of LORs functions more like a database attached o another product. A

Learning Content Management System (LCMS), for examples, may contain a learning object repository intended for its exclusive use.

Two major models for LORs exist:

- The centralized repository (see figure 2) in which the learning object materials is located on single sever or website (the learning objects themselves may be located somewhere else).

Figure 2: Centralized Metadata Architecture

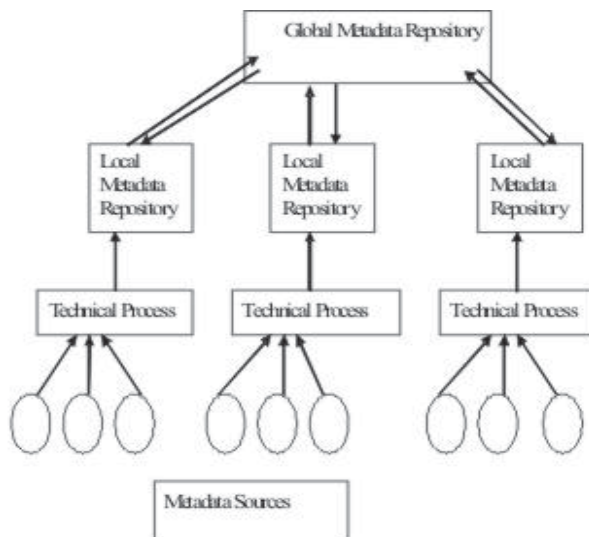


Source : Marco David (2001)and www.tdam.com/i018ht04.htm

- The distributed or decent repository (Figure 3) in which the learning object metadata is contained in a number of connected servers websites. Distributed

LORs typically employ a peer-to-peer architecture to allow any servers or websites to communicate with each other.

Figure 3: Decentralized Metadata Architecture



Source : Marco David (2001)and www.tdam.com/i018ht04.htm

Practical Problem Faced

The quality of the learning objects, the standardization and quality of learning object metadata, and the problems associated with sharing are some areas of the practical problems emerging in the field of learning object repositories as they offer a solution for creating, managing and sharing reusable learning materials.

Quality of Metadata

With the development of e-learning standards and specifications, a growing number of LORs are now being implemented. Some of these repositories are beginning to encounter problems with the metadata creation process and report that the quality of their metadata is having adverse effects on resources discovery. Practical problems resulting from a poor understanding of the metadata creation process are beginning to emerge.

Sketch

Standardized metadata is central to interoperability, at its best, it is a powerful tool that enables the user to discover and select relevant material quickly and easily. At worst, poor quality metadata can mean that a resource is essentially invisible within a repository or archive and remain unused. Good quality metadata is thus a key component in successful implementation of LORs.

Quality of leaning Objects (LOs)

The quality of LOs being deposited in the repositories is also a major concern. In order to be able to control the quality of LOs being deposited in LORs Peer Review of the LOs are done at some repositories like MERLOT. LOs are designed and developed by a team of instructional designers, editors, technicians, and student intern at Wisconsin Online Resource Center Repository to maintain a certain quality.

Storing Data

Repositories can grow only when there is self-archiving and faculty participation. The current culture in academic institutions does not encourage sharing and there is a lack of appropriate technology to facilitate sharing. There are no incentives and rewards to share. Hence here is a need for a change in the culture within academic institutions so as to encourage deposit.

Digital Rights

Many teachers and content creators resist their materials online for fear they will be copied and/or distributed endlessly with no compensation or credit to the creator. Some of these fears are real and some are exaggerated, Most learning objects do not acquire real value until they aggregated into lessons and courses, and it is likely that few individual learning objects will generate revenue on their own. Nonetheless these perceptions are real, and authorship and credit should always be acknowledged. At the same, time, the needs of users much also be taken into consideration .LORs will not succeed fit is difficult and time-consuming to download to learning object because of over-protective digital rights management.

Cost

The productions of learning materials and distribution incur huge cost. More complex and sophisticated the materials are, the higher the cost of maintenance will be. Storing of the resources according o the need of the institution has to be taken care of otherwise, the cost on the institution will be more. So, unless certain foundations or corporate fund the projects of the creation of LOs and maintenance of LORs, it will be very difficult for institutions in many developing countries to create their own repositories.

Sketch

Bandwidth

LORs are available online and to access it and use it on requires an internet connection. To fully utilize the benefit of repositories a broadband connection is required. This again is a cost consuming factor, May developing countries have to improvise on their communication system to get the full advantage of these repositories.

Examples of Learning Object Repositories

Multimedia Educational Resource for Learning and Online Teaching (MERLOT)

MERLOT (www.merlot.org) is probably the most well-known learning object repository it is a centralized repository containing metadata only and points to objects located at remote locations. MERLOT is a stand-alone repository, which acts like a portal for learning objects. In addition to providing searching and categorization, provides a peer review service provided by communities of experts in different subject areas.

MERLOT is a free and open resource designed primarily for staff and student in higher education. Anyone can contribute descriptions of learning materials to the catalog or use MERLOT materials subject to licensing and rights agreement.

ARIADNE Knowledge pool System (www.ariade.eu.org)

The mission of the European Union's ARIADNE project is to enable be better quality leaning through the development of learning objects, tools and methodologies that enable a "share and reuse" approach for education and training. The ARIADNE knowledge pool system is a distributed repository of leaning objects and SQI for Simple Query Interface. ARIADNE supports English, Dutch, French, Spanish, German, Italian, Finnish, Danish, Portuguese, Swedish, and Romanian languages.

Campus Alberta Repository of Educational Objects (CAREO)

CAREO (www.careo.org) is a centralized collection of learning objects intended for educators in Alberta, Canada. The CAREO educational object repository is a stand alone repository contains metadata and provides access to learning objects located on remote web serves CAREO's primary goal is to create a searchable, web-based collection of multidisciplinary teaching materials for education across the province and beyond.

Sketch

National SMETE Digital Library (SMETE) (www.smete.org)

The SMETE digital library is a dynamic online library and portal of services by the SMETE Open Federation for teachers and students .Here one can access a wealth of teaching and learning material as well as join this expanding community of science,

mathematics, engineering and technology explores of all ages. If one is a student, one will have access to resources that can help one prepare for a class or examination. If the classroom right away. SMETE opens up the worlds of science, mathematics engineering and technology education to teachers and students anytime anyplace.

Learning Object Repository for Edinburgh University (LORE) (www.lore.ed.ac.uk)

LORE provides a learning object repository for the University of Edinburgh's learning projects and will investigate the provision of a university wide repository Initially the

Repository is only available to the University of Edinburgh staff.

Wisconsin Online Resource Center (www.wisc.online.com)

The Wisconsin online Resources Center is a digital library of web-based learning resources called "learning objects" The digital library of

objects has been developed primarily by the faculty of the Wisconsin Technical College System (WTCS) and produced by multimedia technicians who create the learning objects for the online environment. The Wisc-Online digital library contains 1,938 objects that are accessible to all WTCS faculty at no cost and with copyright clearance for use in any WTCS classroom or online application. other colleges, universities and consortia from throughout the United states and around the world can use the library with permission, learning objects are designed and development by a team of instructional designers, editors, technicians, and student interns.

EduSource Canada (www.edusource.ca)

The general vision of the EduSource project is focused on the creation of a network of linked and interoperable learning object repositories across Canada. The initial part of the project will be an inventory of ongoing development of the tools, systems, protocols and practices. EduSources Canada is to be based on national and international standards fully bilingual; and accessible to all Canadians.

Conclusion

Academic institutions, especially higher education institutions, throughout the world are in a phase of rapid charge. In the post Y2K world, most institutions have placed computers on faculty desks, installed campus network (LAN) and created websites, Networked communications systems, from small through text chats, have encouraged faculty previously isolated by geographical location to collaborate.

The new educational system is learner center with the teacher bring a facilitator and classroom lectures being enhanced with the use of ICT in contrast to the traditional teacher-centric educational system. The new system should enable teachers to create challenging assignments to close the gap between the worlds of instructions and work, thus increasing the efficiency of learning.

Technology opens up avenues for innovation in design and delivery of courses, sharing expertise among faculty in different parts of the world, an educational system where content and learning materials should be shared among faculty.

Learning increasingly takes place in diverse environments-web-based courses, video courses, traditional classrooms, websites, and resource repositories. A huge amount of learning material is being produced in order to support leaning and teaching in a wide range of contexts (school academic, training, life-long learning, etc) The rapid increase of learning resources techniques and tools for searching, managing and reusing.

LOs are at the intersection of a number of emerging issues, including rapid application design approaches, digital rights, e-learning design and knowledge management. They are adaptable and flexible in any place of learning. They add flexibility to the teaching and learning experience, Faculty can use LOs when teaching a basic concept, applying concepts in “real world” application, checking and testing mastery, providing simulation, or giving remedial instruction.

Faculties in academic institutions need to share resources, LOs for effective teaching and knowledge sharing. Initiatives to share knowledge support the vision of an inter-campus collaborative for teaching and learning with technology. Providing faculty with a repository of “learning objects” would help in generating and reusing teaching material. The challenge is to convert the information that currently resides with individuals and make it widely and easily available to any faculty member.

Academic institutions have initiated the process of sharing research outputs with the use of Institutional Repositories, Courseware with the use of Open Courseware Initiatives and learning materials with the use of LORs to enhanced learning and teaching through technology and to move toward a stronger culture of professional collaboration and scholarship in educational practices.

Access to a variety of learning materials which can be shared and re-used improves the quality of the learning experience. Ensuring the long-term sustainability of digital resources and sharing learning material within and across institutes is possible with the use of LORs.

While many universities are pondering whether or how to implement a LOR, a growing number of institutions and consortia are activity engaged in setting up and running repositories. The practical experiences gained by these initiatives-organizational, technical, and legal-should prove instructive to other institutions, and the technical infrastructures that several of the projects are developing might provide turnkey systems that speed repository implementation by others.

LORs in academic institutes are growing with the hope to leverage the shared values, research outputs and learning objects available.....presenting themselves as open spaces for virtual learning communities.

References

1. Barton Jane, Currier Sarah and Hey Jessie M N. *Building Quality Assurance into Metadata Creation: An Analysis based on the Learning Objects and e-Prints Communities of Practice*, 2003. (<http://eprints.soton.ac.uk>)
2. Bellinger Gene. *Knowledge Management-Emerging Perspectives*, 2004.
3. Botturi land Tagliatesta B. *A Map of E-Learning*. 3rd International Conference on New Learning Technologies; Fribourg, 2001.
4. Cogburn Derek. *Globalization, Knowledge, Education and training in The Information Age*. South Africa; Global Information Infrastructure Commission, 1998.
5. Downes S. Learning Objects: Resources for Distance Education world Wide. *International Review of Research in Open and Distance Learning* 2001.
6. Downes S. Design and Reusability of Learning Objects in an Academic Context: A New Economy of Education? *USDLA Journal* 2003; 17(1).
7. Dublin Core Initiatives. www.dublincore.org

8. Emanuela Buseti, Paola Forcheri et al. Repositories of Learning Objects as learning Environment for Teachers Fribourg. *Proceedings of the IEEE International Conference on Advanced Learning Technologies (ICALT 04)*, 2004.
9. Filip Neven and Erik Duval. Reusable Learning Objects: A Survey of LOM-based Repositories. France; *Proceeding of the 10th ACM International Conference on Multimedia*, 2002.
10. Hatala M and Nesbit J. An Evolutionary Approach to Building a Learning Object Repository. *Proceedings of 4th IASTED International Conference on Computers and Advanced Technology in Education (CATE)*, Banff, June 27-29, 2001; 54-59.
11. Helen Hayes. Digital Repositories, Helping Universities and College. *JISC Briefing paper Higher Education Sector*, 2005.
12. IEEE Learning Technology Standard Committee. <http://ieeeltsc.org/>
13. Kidwell Jillinda et al. Applying Corporate Knowledge Management Practices in Higher Education. *Educase* 2000; 4.
14. Lennox Duncan. Managing Knowledge with Learning Objects. *A WBT Systems white paper*. <http://www.wbtssystem.com>.
15. Marco David. Metadata Architecture Fundamentals. *The Data Administrative Newsletter* 2001; 10.
16. Natasha Boskie. Learning Objects Design: What do Educators Think about the Quality and Reusability of Learning Objects? *Proceedings of the 3rd IEEE International Conference on Advanced Learning Technologies (ICALT 03)*, 2003.
17. Permanand Mohan. Design Issues for Building Reusable Digital Learning Resources. *Proceeding of the International Conference on Education and Information Systems*. Orlando; Technologies and Applications, 2004.
18. Peter Higgs, Sam Meredith and Tim Hand. Technology or sharing-Researching Learning Objects and Digital Rights Management. *Australian Flexible Learning Framework*, 2003.
19. Polsani P. Use and Abuse of Reusable Learning Objects. *Journal of Digital Information* 2003; 3(4): 164.
20. Shankar Mahadevan and Saifur Rahman. Modern profile of a Digital Library and the Associated Learning Object Model for posting Meta-tagging and Integrating Content into Digital Libraries. *32nd ASEE/IEEE Frontiers in Education Conference*, November 6-9, Boston, MA, 2002.
21. Tan Daniel, Mohamed Ismail Fazilah, Tony Chan and Ravi Sharma. An Architecture of a Distributed Archive for Reusable Learning Objects. *Lecture Notes in Computer Science* 2003; 29(11): 384-397.
22. Wiley DA. Connecting Learning Objects to Instructional Design Theory: A Definition, a Metaphor, and a Taxonomy. In D A Wiley (ed). *The Instructional Use of Learning Objects* (Online Version), 2000.